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International Policy Approaches to Digitalising Incubator and Accelerator Services

Lessons for Thailand

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This paper examines international trends and issues in digitalising the services offered by business incubators and accelerators to start-ups and early-stage ventures and lessons for policy in Thailand. The paper examines the evolving role of virtual services in incubators and accelerators internationally and examines the situation in Thailand. It makes recommendations for the future of virtual services in Thailand's business incubator and accelerator system.

Foreword

This paper was prepared by the Centre for Entrepreneurship, SMEs, Regions and Cities (CFE) of the Organisation for Economic Co-operation and Development (OECD), led by Lamia Kamal-Chaoui, Director, at the request of the Office of Small and Medium Enterprise Promotion (OSMEP) of the Government of Thailand. It forms part of the outputs of the OECD project on Entrepreneurship in Regional Innovation Clusters in Thailand, extending the analysis on business development services presented in the report of that project.

The paper was prepared by Lois Stevenson (consultant) under the direction of Dr. Jonathan Potter, Head of the Entrepreneurship Policy and Analysis Unit, CFE, OECD. It benefited from interviews with business incubation stakeholders in Thailand as well as in other countries. The interviews in Thailand included representatives of the Thai Business Incubators and Science Parks Association (Thai BISPA), the National Science and Technology Development Agency (NSTDA), the Science and Technology Park (STeP) at Chiang Mai University and the OSMEP.

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The international evolution of business incubation and acceleration

Business incubators and accelerators play an important role in the entrepreneurial ecosystems of countries, particularly in stimulating the start-up and growth potential of promising ventures, their launch into the marketplace and their chances of success. The business incubator model has evolved significantly since its first generation in the 1980s (Table 1), which emphasised the provision of affordable (and often subsidised) space in an incubation facility, along with access to shared office and administrative services (see Bruneel et al., 2012; Pauwels et al., 2016). The second generation of incubators, from the 1990s, recognised the value of providing professional business development services (e.g. training, advisory services) to the incubating enterprises. The third generation, following the collapse of the internet economy at the beginning of the 2000s, focused more heavily on knowledge-intensive and technology-based ventures and emphasised more proactive support, mentoring and coaching, and networking capabilities, and often integrated access to seed financing. In these first three generations of incubator development, the predominant model limited the provision of incubator services to enterprises formally accepted into the incubator programme and housed in a physical space in the incubator facility for a period of 2-5 years.

In the fourth generation, evolving primarily since 2005, business incubators broadened the set of incubator services and increased emphasis on networking interactions between the incubatees and external environment, including internationalisation connections. This generation also evidenced the early-stage evolution of e-incubators providing cost-effective services to larger numbers of businesses through use of distance learning and counselling. Use of the Internet (and web-based training programmes) improved access to incubator services by reducing geographic barriers and lowered the cost of services to a larger client base.

The primary policy objective of the earliest incubator programmes was job creation. Over time, evidence accumulated that the formal incubation of start-ups led to higher survival rates for enterprises graduating from the incubator programme (see CSES, 2002; Hackett and Dilts, 2004). The objective of later generations has shifted to the facilitation of innovation and the commercialisation of R&D and technology. Over time, incubator programmes have evolved into comprehensive programmes incorporating a range of resources, such as physical infrastructure, office support services, financial support, process support, and network access (Indiran et al., 2021).

Table 1. Evolution of business incubator generations

Generation	Features
First generation business incubator (1980s)	The major objectives were job creation, revitalisation of neighbourhoods, and strengthening of local economies. The offer was shared (affordable) rental space, office equipment and administrative services; reactive business support. The focus was generally on low-tech enterprises, e.g. light manufacturing.
Second generation business incubator (1990s)	Spawned from recognition that enterprises need more than space to survive and would benefit from proactive support by way of advice, networks, finance, and sustained assistance. The shared space was supplemented with counselling, skills enhancement, and access to professional support for the incubator clients.
Third generation (late 1990s, early 2000s)	Rise of sectoral, multi-purpose incubators (non-tech and tech). Boom of ICT industry. Incubators focused more on creating growth-potential, high-tech ventures (e.g. ICT, biotech, advanced engineering) and promoting the innovation process. Ventures required more IT-savvy assistance. Incubators often linked to a technological university, research laboratory, or technology park with access to research facilities that made it possible to communicate with start-ups in remote regions. Shared space, counselling and training was supplemented with professional and tech support services, mentoring and access to financial resources, including seed and risk capital for incubating enterprises. Greater emphasis on providing access to services via external networks, including to potential customers, suppliers, technology partners and investors.
Fourth generation (2005+)	Incubator services were broadened to include market assessment, market strategy consulting, partner and sales development, more focus on networking interactions between the incubatees and external environment and enhanced internationalisation connections. Early-stage evolution of e-incubators providing cost-effective service to larger number of businesses through use of distance learning and counselling. Improved access to incubator services by making use of the Internet (and web-based training programmes) to reduce geographic barriers and lower the cost of services to a larger client base. Also saw the rise of business (start-up) accelerators.

Sources: Bruneel et al. (2012), "The evolution of business incubators: Company demand and supply of business incubator services across different incubator generations", *Technovation*, 3(**2**): 110-121; InfoDev (2010), *Global Good Practice in Incubation Policy Development and Implementation*, World Bank, Washington; Lalkaka (2006), *Technology Business Incubation: A Toolkit on Innovation in Engineering, Science and Technology*, UNESCO, Paris; Abdul Khalid et al. (2014), "The Way Forward for Business Incubation Process in ICT Incubators in Malaysia", *International Journal of Business and Society*, 15(***3***); 395-412; Pauwels et al. (2016), "Understanding a new generation incubator model: The accelerator", *Technovation*, 50-51: 13-24.

Largely since 2010 has come the advent of business accelerators, which are shorter incubation programmes (3-6-month duration) with the aim to fast-track and seed cohorts of high-growth potential start-ups to market- and investment-readiness through an intensive programme of training, mentoring, and linkages to business angels and investors (Pauwels et al., 2016).

The major differences between accelerators and business incubators are the fixed, short length of accelerator programmes, their cohort-based nature, the intensity of support services, and the provision of seed and investment capital (see Table 2). Many of the accelerator programmes are spearheaded by private sector organisations, often venture capital-related entities looking for a good return on their investment, and responded to the growing unmet demand from potential entrepreneurs with promising business ideas, mostly knowledge-intensive, to work more quickly in establishing the viability of their start-ups (García-Ochoa et al., 2020). The major incubation supports in accelerator programmes are intensive mentoring and networking contacts, especially with investors (Pauwels et al., 2016). These programmes accelerate the time horizon for reaching milestones, raising venture capital and achieving customer traction, while also speeding up the cycle of the venture leading to quicker growth or quicker failure (Cohen and Hochberg, 2014).

Table 2. Accelerators versus business incubators

	Business incubator	Accelerator
Objective	To **produce successful firms** that will leave the incubator financially viable and ready to survive on their own outside of incubator support	To **identify high-potential, scalable start-ups** worthy of investment support through an accelerated process; develop very early-stage start-up ventures into investment-ready businesses
Duration	Typically **house start-ups for 1-5 years** (depending on sector and programme)	Operate on **shorter "condensed" time frames**; in most accelerator programmes, cohorts graduate in **3-6 months**
Enterprise targets	More capital-intensive start-ups; competitive entry criteria; will **accept individual founders** into the incubator programme on a per applicant basis**; incubatees will have different entry and graduation dates**	Innovative start-ups; variety of different industry verticals; highly competitive selection process (as few as 1% of applicants to top accelerators get accepted); **accepts high potential start-ups on a cohort "team founder" basis; classes of start-ups enter and graduate together**
Services	Office space, learning, business advice, mentoring, networking, linkages with financiers/investors. **Will generally NOT offer seed capital or take an equity position in the start-ups**.	Co-working space, plus a small amount of **seed capital for which the accelerator will take an equity position**. Services focus on **"intense" mentorship and educational seminars** with access to a large network of contacts. Most programmes end with a "demo day" where ventures "pitch" to a large audience of qualified investors.
Ownership	**A mix of predominantly public-owned and -supported, or public-private partnerships**	**Most frequently, private-sector or corporate-owned**; often affiliated with venture capital firms or business angel groups; may be affiliated with universities, local governments or non-governmental organisations
Fee structure	**Charge fees for rent and services; do not typically take equity in the tenant enterprises**. Difficult to become self-sustaining; generally, require an operational subsidy.	Generally, **provide seed funding and take equity from the graduate enterprises**. Lower overhead, more likely to be self-sustaining over time as successfully-accelerated ventures increase their share value.

Sources: Cohen and Hochberg (2014), "Accelerating Startups: The Seed Accelerator Phenomenon", *SSRN Electronic Journal*; García-Ochoa et al. (2020), "How business accelerators impact startup's performance: Empirical insights from the dynamic capabilities approach", *Intangible Capital*, 16(***3***): 107-125; Pauwels et al. (2016), "Understanding a new generation incubator model: The accelerator", *Technovation*, 50-51: 13-24.

As reference points for the remainder of this paper on virtual delivery of incubator and accelerator services, various definitions are offered in Box 1.

Box 1. Business incubator-related definitions

Business incubator: "a place where the incubation activities are carried out, and where the would-be entrepreneurs and the existing SMEs find a suitable place, in terms of facilities and expertise, to address their needs and develop their business ideas, and transform them into sustainable realities" (European Union, 2010, p. 6).

Business incubation: "a business support process that accelerates the successful development of start-up and fledgling companies by providing entrepreneurs with an array of targeted resources and services" (Stumpf, 2015, p. 1, based on a definition used by the National Business Incubation Association).

Physical business incubation: "Business incubation with clients accommodated in the business incubation environment's building…. services can include tailored facilities with Internet connection, video conferencing and laboratories, as well as business support services including mentoring, networking, peer-to-peer learning and training" (Lyngdoh and Dundar [eds], 2015, p. 19).

Outreach business incubation: "Business incubation with clients not located in the incubator… incubation services are delivered to non-resident clients or 'out-of-wall' clients. It combines traditional incubation space and services with virtual services offered to both on-site tenants and offsite clients" (Lyngdoh and Dundar [eds], 2015, p. 19).

Resident client: **"**A client who is part of the incubation process and is renting accommodation in the incubator, sometimes called a 'tenant' or an 'on-site client'" (Lyngdoh and Dundar [eds], 2015, p. 19).

Non-resident client: "A client not located in the incubator building, sometimes called…an 'off-site client' or commonly a virtual client…. The client is still able to access many of the support features provided by the incubator" (Lyngdoh and Dundar [eds], 2015, p. 19).

Virtual business incubator: incubators where some or most of the service package is virtual (i.e. location independent) by design, and delivered (partially) with virtual tools (InfoDev, 2011, p. 22).

Virtual business incubation: "…'incubators without walls' and e-platforms of online services deployed by incubators with physical premises" (European Union, 2010, p. 6).

Online business incubation: sometimes referred to as 'outreach business incubation'….implies there is no physical incubation space and "all incubation services are delivered electronically" (Lyngdoh and Dundar [eds], 2015, p. 19).

Virtual tool: "a way of delivering a service to a dispersed group of users (using ICT-based or other means), where the service provider and service recipient are not in the same physical location" (InfoDev, 2012, p. 8).

Digital business incubator: an incubator based solely on the virtual/digital delivery of incubation services.

Sources: European Union (2010), "The Smart Guide to Innovation-Based Incubators (IBI)"; InfoDev (2011), "Lessons on Virtual Business Incubation Services: Case Studies", World Bank; InfoDev (2012), "Lessons on Virtual Business Incubation Services", World Bank; Lyngdoh and Dundar (eds) (2015), *Manual on Establishing a Business Incubator*, Kultur University, Istanbul; Stumpf, M. (2015), "Is Business Incubation a Winning Strategy, Part One: What we know", White Paper, February, Place Dynamics, New Berlin, WI.

The emergence of virtual services

Recently, the concept of virtual incubation has emerged. This reflects the premise that digitalisation of incubator services is essential in the digital era; connecting digitally will increasingly be the "way of doing business". In addition, the opportunity of offering services via virtual means has been recognised since the early 2000s as a viable option for overcoming the challenge of limited incubator facility space and providing services to more companies (InfoDev, n.d.).

"Virtual" within the context of business incubation may be different than "digital" incubation. Virtual incubation services may be offered as part of a comprehensive package of incubation services to client enterprises residing inside the incubator facility or as a stand-alone offer to start-ups and SMEs in other parts of the country that for geographic or other reasons are unable to take advantage of the physical space in the incubator facility. Virtual delivery of incubator services provides an opportunity for business incubators to reach more client enterprises, and also presents a solution to the limited space availability in many incubators (where demand for incubation services exceeds the supply of spaces in the incubator facility). The virtual delivery of incubator services will generally employ a combination of virtual tools, such as access to online training tools and virtual mentoring, with some onsite activities, whereby the off-site incubatees are invited to participate in in-person training, group meetings or networking events in a physical location or can access special facilities in the incubator, such as wetlabs. This may be referred to as a "hybrid" or "blended" incubator models.

On the other hand, a digital incubator provides all of its services through digital tools, for example, the Bridges for Billions digital business incubator platform (Box 2) and the Avalgon all-digital business incubator (Box 3). Bridges for Billions is a private sector-driven social enterprise which garners support from many sponsoring organisations, including corporations, universities, foundations, governments, and international donor organisations. Avalgon is a Switzerland-incorporated private sector-led "all-digital" with global appeal, which demonstrate where the digital business incubation approach is moving.

Box 2. Bridge for Billions virtual business incubation model

Description of the approach

Bridge for Billions is a digital ecosystem of entrepreneurship programmes for early-stage entrepreneurs launched in 2015 by a team of aspirational impact entrepreneurs. It was incorporated in the USA as a Public Benefit Corporation, a for-profit social enterprise that is required to report on the public benefit it creates as well as its financial performance. The corporation is headquartered in New York, and although most of the Bridges for Billions team is based in Madrid, team members are also located in New York, other parts of the USA, France, and Costa Rica. The venture is the end result of a Masters degree project initiated by the lead entrepreneur while studying at Carnegie Mellon University with the aim to design a tool to help seed-stage entrepreneurs structure and develop their businesses. The project took two years of co-creation by Carnegie Mellon graduate students from the USA, Mexico and Ghana.

The flagship programme is the 100% online "LEAP" incubation programme, a 4-month discipline-based learning and mentoring programme to take start-up entrepreneurs from business idea to market in a short period of time. At the end of the four months, the entrepreneurs should have a go-to-market plan and the skills needed to start the business. Up until 2020, the programme had supported over 1 900 entrepreneurs in 87 countries and engaged 1 368 volunteer mentors to provide mentoring services to the start-ups. About 80% of the incubating entrepreneurs completed

the e-learning component of the programme and started 1 030 ventures, 64% of which were still in business after two years. In 2021, the target is to support 5 000 start-up founders globally.

The e-learning component consists of **eight online business creation modules**, each one to be completed over a 2-week period (and requiring 6-8 hours of time per week). They cover essential topics, such as the value proposition of the business idea (problem to be solved, market segments), the competition, the stakeholder map, the business model and marketing, pricing and business viability, financial projections, and growth plan milestones, targets and key performance indicators.

Each week, the entrepreneur has a **virtual meeting with a mentor** to review the work they have completed in alignment with the learning module. Over the four months, the entrepreneurs receive a total of about 18 hours of online mentoring. Every two weeks, the entrepreneurs **meet virtually with their peers** to exchange experience and focus on developing the soft skills needed for successful entrepreneurial activity, such as tenacity, resilience, learning from failure, leadership, team motivation, time management and prioritisation, creativity, communication and personal branding.

After completing the programme, the entrepreneurs have lifetime access to the Bridge for Billions e-platform to seek advice, participate in its digital workshops and events, and connect with other entrepreneurs and the programme's online global community of founders, mentors, and investors. They can also participate in "Pitch Practice Meetups" to hone their pitching skills, and join the Bridge for Billions Global Investment Network investment-readiness training to help them prepare for their seed financing efforts. This includes **online seed-stage investment bootcamps** where the entrepreneur can learn from invited experts and investors.

Factors of success

The digital/online nature of the programme enables outreach to entrepreneurs who normally would have limited (if any) access to the necessary entrepreneurship support in a traditional business incubation programme. The step-by-step format of the programme with weekly **digital work planning tools** ensures the entrepreneurs are kept on track with their commitments.

Weekly mentor meetings are core to the success of the virtual programme. Being able to attract a large number of diverse-background mentors to the programme was key. The Bridge for Billions mentor list includes 1 500 mentors from 89 different countries; 70% of whom are entrepreneurs themselves. Mentors participate in onboarding training to learn the programme methodology and how the programme and platform works. The mentor-entrepreneur matching process is facilitated online.

Another key factor in the programme's success is the online community for entrepreneurs to connect and chat with other members, which provides emotional and other sharing supports.

The digitalisation of incubator services allows start-ups to work at their own pace and combine their incubation training with their day-to-day responsibilities (many of the start-ups are holding full-time jobs and developing their business ideas on the side), which can be of especially important value for female entrepreneurs. Consequently, the Bridge for Billions virtual incubation platform supports 30% more female entrepreneurs than the average business incubator.

Obstacles and responses

Pricing the user's subscription to the programme was an initial challenge. Bridge for Billions estimates a cost of USD 1 500 per entrepreneur to deliver the virtual programme (e.g. software and tools, office expenses, marketing support, advertising, facilitating the online community, tech support for the entrepreneurs and mentors, mentor selection and onboarding to the platform, continuous support during incubation, follow-up with the entrepreneurs after finishing the learning component

of the programme). However, to "democratise" access to business incubation services for entrepreneurs globally, Bridge for Billions initially limited the price to USD 325/month (for the 4-month programme), and further offered a subsidy for up to 66% of the price, which benefited almost 80% of the entrepreneurs. The subsidy is often covered by foundations, corporations and other interested stakeholders and partners, including governments, who support the social mission of the programme. As the programme reaches further into the developing world, Bridge for Billions has had to adjust its pricing model according the level of economic development of a country. Starting in 2020, the per entrepreneur pricing ranges from USD 100/month in developing countries to USD 300/month for high-income countries.

Language may be a barrier for start-up entrepreneurs in some countries. Initially an English-only programme, the platform is now also available in French, Portuguese and Spanish.

Relevance to other countries, including Thailand

Bridge for Billions partners/works with local ecosystem players in countries wanting to add more efficient and scalable incubation programmes to the entrepreneurial ecosystem by enabling them to digitise programmes for better outreach and efficiency in recruiting entrepreneurs and mentors and achieving tangible results. In 2020, it provided open source free-of-charge access to its online structure/platform methodology to other organisations for delivery of their entrepreneurship programmes that would otherwise be confined by COVID-19 lockdown restrictions and lack of digitisation. The scalable model enabled local entrepreneurship support organisations, such as incubators and accelerators, among others, to support more entrepreneurs. One of the major developments was the partnership with the Argidius Foundation and the PESLATAM consortium (formed by Ashoka, the Swiss Agency for Development and Co-operation/SDC and private venture companies) to bring the Bridge for Billions incubation platform to Latin America.

A platform such as Bridges for Billions may be a viable option for the Thai government to explore, given its interest in seeking avenues for digital business incubation and virtual delivery of incubation services to make these services more available to start-up entrepreneurs. This could involve initiating dialogue with Bridges for Billions and discussions with donor organisations to support a pilot project that would bring the virtual incubation platform model to Thailand, onboard the Thai University Business Incubators (UBIs), and subsidise the subscription costs for entrepreneurs to participate in the service.

Sources of additional information: Bridge for Billions website: https://www.bridgeforbillions.org/our-purpose/; https://www.bridgeforbillions.org/mentorship-programs/; https://www.bridgeforbillions.org/meet-our-mentors/; https://www.bridgeforbillions.org/mentors-journey/; https://www.bridgeforbillions.org/2020-year-in-review/.
The LEAP programme, https://vc4a.com/bridge-for-billions/the-leap-program/.

Box 3. The Avalgon global digital incubator

In 2020, Avalgon, a private sector company headquartered out of Switzerland, launched a 12-month **all-digital incubator programme** targeting tech start-ups (with the potential to become "unicorns") from anywhere in the world. Making use of seamless and secure virtual cloud-based platforms for project management and communication, the programme exposes the incubatees to a global network of business providers and investors.

The online application to the incubator is analysed and scored by artificial intelligence (AI) software prior to being reviewed and assessed by a virtual investment committee. Promising candidates then participate in an online interview. Once selected into the programme, digital signatures are used to finalise the incubator contracts. Each incubatee is assigned a team of experts and specialists (e.g. project management, tech development, legal, etc.) to guide the start-up process through business modelling, minimum viable product (MVP), website development, pitching decks, public relations, legal issues, investment strategy, etc. Each start-up of the incubator also gets a seed investment of CHF 450 000 (about USD 500 000) to be used for company set up, human resources, technology development, fundraising efforts and marketing.

The all-digital Avalgon platform connects investors with the incubating entrepreneurs to assess their plans, hear their pitches, and take investment decisions in a safe and reliable manner. Investors are onboarded to the Avalgon digital system and all investment deals are concluded with digital tools.

The incubator founding team invested two years of development time to bring the all-digital incubator programme to fruition.

Sources: Avalgon website : https://www.avalgon.com/about-us/; https://www.avalgon.com/startups/ ; https://www.avalgon.com/investors/; "Avalgon - The World's First Global Online Incubator For Tech Startups" YouTube video, 10 December 2020, https://www.youtube.com/watch?v=hg_5dgyfTaU/; "Avalgon - How Our 12-Month Digital Incubator Program Works:, YouTube video, 18 February 2021, https://www.youtube.com/watch?v=Rqn6RO1A_JU/.

The scope of virtual services and tools

Virtual incubators are just like traditional incubators, except without the physical space. Whatever the delivery mode, business incubation must satisfy certain criteria, including the provision of a "comprehensive service package" (InfoDev, 2011, p. 11). To be effective, virtual incubators must still offer a "systematised approach" to incubation by way of delivery of a "bundled package of services" aligned with the incubation process (Syed, 2017). This would include a tailored combination of processes and services, such as mentoring, training and networking support.

Virtual business incubation services, offered to non-resident incubatees that are not physically present in the incubator's facility, can be applied to key incubation services through the use of virtual business incubation tools (InfoDev, 2012). These can be applied to:

- Online recruitment and selection of incubatees, mentors and investors.
- E-learning, which covers access to online training and peer-to-peer networks to enhance the capacities and know-how of selected incubating enterprises. The online learning can be delivered through self-paced modules via streaming video, CD-ROM, and Apps, complemented by online access to mentors or advisors who can answer questions.

- One-on-one electronic exchanges between the incubatees and incubator staff, as well as among the incubating enterprises via Emails, phone or WhatsApp calls, SMS messaging, Skype, Zoom, and online collaboration tools.
- Online delivery of mentoring and coaching support, networking opportunities with potential investors ("pitching sessions") and access to other professional experts and experienced entrepreneurs to add value.
- Virtual communities – online networking platforms where entrepreneurs can exchange knowledge and information and initiate collaboration.

The COVID-19 pandemic has accelerated the delivery of virtual services

The COVID-19 pandemic presented many operational challenges for business incubators and accelerators. Physical incubator facilities saw a decrease in demand for their services as the start-up companies had to vacate the premises and many networking and other events had to be postponed. At the same time, the demand rose for online training and coaching sessions, forcing many traditional incubators following the model of facility-located start-up clients to pivot to totally virtual models of doing business. The experience of a myriad of business incubators across Canada, the USA, Europe and elsewhere indicate the shifting to virtual delivery of incubator services in order to sustain activities and support client enterprises during the pandemic. The example of the COVE Start-up Yard incubator in Nova Scotia, Canada (see Box 4) is illustrative.

Box 4. Shifting to virtual delivery of services – the case of the COVE Start-up Yard, Nova Scotia, Canada

The Centre for Ocean Ventures and Entrepreneurship (COVE) Start-up Yard is a publicly-funded business incubator for start-ups and early-stage companies engaged in the commercialisation of ocean technology. Under the scope of Innovacorp, a provincial government entity, Start-up Yard operates with 10 000 square feet of incubator space and a 3-person staff. It offers the standard package of services to clients: incubator space, information technology (IT), meeting rooms, on-staff business advisors, coaching, mentors, and networking activities (peer-to-peer, with investors, with community experts). Enterprises can stay in the incubator/incubation programme for two years, although they may leave early if they outgrow the incubator space. The objective of the incubator is to move client enterprises through the various "stages" of development, from idea to discovery (customer/market discovery, the opportunity), acceleration (development of the business model, prototype, etc.) and pre-seed, angel investment (attracting financing). To monitor the incubator's performance, the Start-up Yard collects data on the graduation rates from different stages of the incubation process to the next stage, for example, the percentage of clients in the pipeline for incubation (i.e. in the discovery phase).

The majority of Start-up Yard clients are at the "discovery" or pre-seed stage. Most client enterprises are located in the incubator facility, although the incubator programme also accepts start-ups located in other parts of the province (remote clients). The remote clients tend to be in the very early stages of developing the business idea and pre-start-up (working out of their homes and not requiring incubator space).

Generally, the Start-up Yard executive director does not see much difference in the experience of the in-incubator and remote enterprise clients. However, once the start-up starts hiring employees, they prefer to be IN the incubator because at that point they need the space. For remote clients, incubator staff schedule monthly and quarterly calls to check against milestones set for the venture.

The big advantage of having in-incubator enterprises is that incubator staff can get to know them better because of the daily face-to-face contact. On the other hand, the offer of virtual incubator services expands the client reach and opportunities to help more start-ups move to the next stage in their development. In the spring of 2021, 25%-30% of the clients were incubator tenants, and 70%-75% were remote.

Impact of COVID-19 restrictions: modifications in delivery of incubator services

During the COVID-19 lockdowns, the incubator facility had to close, making in-house provision of incubator services impossible. All incubator staff had to work virtually, using email and other virtual tools to communicate with the incubator clients. During the lockdown, Innovacorp modified the incubator space according to COVID-19 safety protocols (installed an air ventilation system, erected plastic barriers, etc.). On a limited capacity basis, this allowed clients to still have access to the incubator facility, but not use of the meeting rooms, etc. Workshops for client enterprises were all held online.

Transition to online mentoring

Mentoring is considered a core component of modern-day incubation programmes. Innovacorp has therefore developed a network of (domestic and international) external experts, mentors, specialists and investors to mentor incubator clients. The "MentorFirst Programme" connects client enterprises with carefully selected experienced (volunteer) advisors who offer counsel. Start-up Yard seeks mentors with some knowledge of ocean technology enterprises. Pre-COVID-19, the Start-up Yard was already making use of mentors in California (through its association with the Massachusetts Institute of Technology/MIT Venture Mentoring Service/VMS) and providing online mentoring. During the COVID-19 crisis, all mentoring has been undertaken virtually.

Shifting to online training

The Start-up Yard does not offer "modularised" entrepreneurship training and was not equipped during the COVID-19 in-person restrictions to develop an online training programme. Consequently, they "piggy-backed" on other programmes by tapping into the online Lean Canvas Ideation training programme offered by a 100% virtual e-accelerator programme in a close-by province. Rather than developing its own online training programme, this partnership was a good option for the Start-up Yard.

Transition to online "pitching" sessions

Pitching to investors is a critical component of incubator programmes – connecting incubator clients with funding sources. Traditionally, the pitching sessions are organised in a meeting room environment. During COVID-19, Start-up Yard organised "virtual" pitching sessions over Zoom, and will likely continue with this approach. The big advantage of the virtual approach is expanded reach – both for inclusion of the remote clients and for a larger number of potential investors.

Transition to virtual networking

Networking is an important feature of incubator programmes, especially the opportunity to network with peers in the incubator space and with mentors. During the COVID-19 lockdowns, Start-up Yard organised half-hour monthly "Ocean Founders" Zoom meetings that enabled the founders/entrepreneurs to talk to each other and the newer start-ups to learn from the more established ones (peer-to-peer learning). Before COVID-19, the peer-to-peer learning would have been facilitated over a lunch or dinner. Post-COVID-19, the incubator will continue with the virtual meeting approach, which can also be more inclusive of the remote clients.

Transition to online tracking of clients' progress

To track data on its incubation clients, Start-up Yard makes use of the online tool, "Hockeystick" for accelerators and incubators. This is an artificial intelligence (AI) platform to capture data against key performance indicators (KPIs). It includes the collection of data to track the intake process, CRM management and investor funding. The Canadian Acceleration and Business Incubation (CABI) Association has offered free "Hockeystick" accounts to its members.

Sources: Phone interview with Start-up Yard Executive Director, May 2021. COVE Start-up Yard website: https://innovacorp.ca/incubation/start-yard-cove/; https://coveocean.com/; Mentor First Venture Package, at: https://innovacorp.ca/acceleration-initiatives/mentorfirst#how-do-i-join-mentorfirst/.

For example, in 2019, 85% of organisations in the European Business and Innovation Centre (EU|BIC) Network provided physical incubation services to the founders and start-ups they supported, although around 45% also reported providing some virtual incubation services (EBN, 2020b). The survey of EU|BICs in 2020 revealed that 86% of the respondents shifted their programmes and services to online delivery. Although close to 30% of these organisations reported not initially having adequate technology, infrastructure and internal processes to deliver their services virtually, "going virtual" aided the EU|BICs in addressing a significant gap during the COVID-19 crisis and is expected to lead to a greater integration of online and offline service offerings as part of the ongoing business model of business incubator programmes (EBN, 2020a). For example, the Berytech business incubator in Lebanon shifted to digital platforms in October 2020, moving their incubation services and coaching sessions online. They adopted "Trello" board (project management tool[1]) and "Slack"[2] for online communication; onboarded and trained incubator staff, start-ups, coaches and mentors to the virtual tools and how to use them properly; structured weekly online meetings with incubator staff, after equipping them with the necessary equipment for online communication (e.g. headsets, internet connection boosters); and implemented tools to monitor the activities of the team. Post-COVID-19, Berytech anticipates that remote working and service delivery will continue to be part of its operational model (EBN, 2020a, pp. 11-12).

Start-up accelerators, traditionally employing in-person hackathons, bootcamps and fast-track incubation programmes, had to revert completely to virtual delivery of their programmes. Moving its training and support programmes to a completely online delivery enabled the Y Combinator (see example in Box 5) to double its intake of European start-ups during the COVID-19 lockdown (EBN, 2020a).

By moving incubator services online, programmes have been generally able to increase their intake of clients, although online incubation support does pose some challenges. Incubator staff have to be trained in the use of online delivery approaches, and online platforms and tools have to be developed, or accessed, to deliver the services. Less tech-savvy entrepreneurs may be limited in terms of their participation in online business incubation programmes and require adapted readiness support (technical support, digital skills development). In addition, the availability of virtual incubation programmes leads to increased competition and increased pressure on specific incubator programmes to meet quality standards in their performance.

As a result of the COVID-19 pandemic, incubators have had to innovate in their approach to maintaining their incubator operations and services. Thanks to digital communication and collaboration technologies, start-up incubation has become a virtual phenomenon, enabling incubators to adopt new approaches to reaching out to a larger number of start-ups (with virtual services), and through greater

[1] https://trello.com/en/

[2] Slack is a business communication platform (app) that provides for direct messaging, chat rooms, and team work.

connectivity, engaging with a global pool of mentors and tapping into trans-national start-up ecosystems (Batra, 2021). Coming out of the COVID-19 experience, greater integration of online and offline offerings is expected, modelled around a structured hybrid solution combining in-person interactions and remote digital experience (EBN, 2020a). On the other hand, Batra (2021) stresses that virtual incubation, digital mentoring, and global connectedness are the way of the future; if traditional business incubators intend to remain relevant, they will need to reflect, pivot and re-strategise in "the new post-COVID digital world".

Box 5. Y Combinator accelerator programmes went virtual in 2020

Y Combinator (YC) is world-known start-up accelerator, founded in 2005, and operating in several countries. The main objective of the 10-week programme is to identify and develop promising start-ups to the investment-readiness stage, identify seed-capital opportunities for YC investment (during the programme), and later bridge connections with later-stage investors to raise money on a larger scale. Entrepreneurs apply to the accelerator programme and are selected into cohorts (or "batches") on a highly competitive basis. Out of up to 13 000 applications each year, YC selects to work with around 200 projects.

During the programme, founders participate in group office hours every two weeks and can schedule separate office hours with partners as often as needed. In addition, the programme hosts weekly talks where invited experts speak to the start-ups on particular topics. At the end of the 10 weeks, start-ups present their products/services to a specially selected audience of investors (and media) during a "Demo Day".

For the first time in 2020, Y Combinator had to run its start-ups programmes remotely, which was noted as a "transformative experience", both for YC and the start-up teams. Moving to a virtual programme required YC to build software that would improve its new client onboarding, alumni directories, internal wiki, catalogue of start-up advice, and the Demo Day website. It integrated "Slack" and Zoom for chat and video conferencing.

As a result of these improvements and its online delivery of services, YC partners were able to work with companies in over 15 time zones, complete 50% more individual and group office hours than in previous "batches", and chat with all of the teams in real-time (over 250 000 Slack messages were sent during the batch). Finally, YC "Virtual Demo Day" was extremely successful and outperformed many in-person Demo Days from past years. During Demo Day, 319 companies presented virtually.

Sources: Y Combinator website, https://www.ycombinator.com/about/; Michael Seibel, "YC W21 Remote Batch", 10 September 2020, https://blog.ycombinator.com/yc-w21-remote-batch/.

However, even when incubators adopt greater use of virtual tools in the delivery of incubation services, a staff team is required to manage the incubation process, build partnerships with other ecosystem organisations, mobilise mentor and investor networks, and monitor the progress of incubatees through the various phases of the incubation process (InfoDev, 2012). This includes technical and IT personnel to manage the website "hosting" to keep the network and channels alive for access by the incubator enterprises, update the information on events, make sure the hyperlinks work and monitor the "chat" rooms (e.g. password-protection, etc.).

Pros and cons of virtual incubation relative to physical incubation

Virtual incubation programmes have certain advantages over the delivery of in-facility services of traditional physical incubators; however, there are also advantages to the physical presence of incubator clients (as highlighted briefly below and summarised in Table 3).

Advantages of virtual services

The provision of virtual incubator services to clients has a number of advantages over purely in-facility services. The most critical advantage of online support is the ability to reach more potential entrepreneurs and start-ups. The digitalisation of business incubator programmes has lowered the barriers for entrepreneurs and start-ups located in rural or economically-disadvantaged regions who can participate in these programmes virtually (OECD/European Commission, 2019), assuming they have digital skills and access to the internet. This has enabled incubators to broaden their reach to a larger pool of promising business ideas and high potential start-ups. This allows incubators and accelerators to access, support and connect to a global audience of entrepreneurs and start-ups, not confined by regional or national borders, and thereby multiplying their potential impact on economic development (EBN, 2020a).

Physical business incubators, especially the most popular and successful ones, are often heavily oversubscribed relative to the number of available incubation spaces. Thus, the application process is very competitive and highly selective, with some estimates that the acceptance rate is 1-2% or less.[3] The provision of virtual incubator services enables business incubators to attract and support a growing number of start-up applicants regardless of location or level of mobility. Virtual service delivery also allows the business incubator to engage a broader geographic and sectoral representation of mentors and investors who are not bound by geography to participate in virtual mentoring and "pitching" sessions.

In addition to advantages in outreach, virtual incubators can help respond to the constraint of the capital investment needed for physical incubators, which are capital intensive projects. Through the use of virtual services, the incubator programme does not have to invest in infrastructure and overhead costs to expand its physical space to meet demand, thereby improving the cost model of an incubator programme.

Advantages of physical incubators

Start-up entrepreneurs in the early start-up phase value being able to interact directly with and learn from their peers during the start-up process (InfoDev, 2012). This happens more effectively if they are located in the same physical environment and can have daily and regular contact, even if informally; otherwise, the remote clients miss all the social interaction of being in a physical location with incubator staff and other incubating enterprises. Thus, one of the biggest downsides of moving online is the loss of informal conversations among incubator staff and with the incubating companies. Fewer informal talks "over coffee" reduces opportunities for informal learning exchanges (which is a strength of in-person workshops versus online workshops).

[3] Brex blog, "What is a business incubator?", 13 April 2020, https://www.brex.com/blog/what-is-a-business-incubator/.

Table 3. Advantages of virtual versus physical incubators

Virtual incubators/services	Physical incubators
• Ability to reach more potential entrepreneurs and start-ups • Allows the incubator to engage a broader national and international network of mentors, advisors, and investors for the benefit of incubator clients • Enables more inclusiveness by lowering the barriers for entrepreneurs and start-ups in rural areas • Overcomes the limited space availability and capital-intensive nature of physical incubators to accommodate growth and impact • Improves the cost model of an incubator programme	• Value to incubating clients of being able to interact directly and learn from their peers in the same physical proximity • Ability of incubator staff to "get to know" the incubating clients, develop a trust-based client-incubator management relationship, and closely monitor activities/ behaviours on a daily basis • Ease of communication with incubator staff for informal learning exchanges • Ease of access to incubator facilities, such as wetlabs, 3-D printing, research/ prototyping labs (if they exist)

Source: Various

Virtual services are not necessarily a replacement for traditional business incubation as they must still be anchored in a real trust-based client-incubator manager relationship and a feedback mechanism to provide direction tailored to the specific needs of each client (InfoDev, n.d.). In other words, the delivery of online services alone, without this relationship aspect, would have little value to entrepreneurs.

Furthermore, although some experts predict that virtual incubators have the potential to disrupt the traditional business incubator model, others suggest that physical incubators may still be the most appropriate for certain types of start-ups, such as medical/pharmaceutical and biotech start-ups that require long gestation periods, and access to specialised equipment or facilities, such as for prototyping, testing, fabrication, etc.[4]

Approaches going forward – blended models

An optimal approach for physical incubators may be to combine traditional incubation space and services with virtual services offered to both on-site tenants and offsite clients. In this approach, the virtual incubation service has a very strong physical element, wherein the business incubator manager meets with the outreach clients face-to-face occasionally and the business incubation process is facilitated by use of virtual incubation tools. This "bundled offering" can help build a good relationship between the client and the incubator and can be a strong value proposition for incubators that need to demonstrate a greater reach and impact of service delivery (Lyngdoh and Dundar [eds], 2015).

Another viable approach may be to offer virtual pre-incubation programmes to very early stage "aspiring" entrepreneurs. For example, Y Combinator (YC) (Box 5 above) offers a free online "Start-up School" (SUS) course (https://www.startupschool.org/curriculum/). The Start-up School curriculum has two different tracks: one for "aspiring founders" and one for entrepreneurs with an already active enterprise. The modularised curriculum includes video lectures, exercises, and access to moderators, YC partners, and the international community of YC founders. Learners complete weekly exercises to reinforce curriculum lessons, participate in weekly live video chats with other participants, and submit weekly updates on their progress. Successfully completing the SUS course does not replace or guarantee acceptance into YC's core accelerator programme, however it may increase the founder's chances of getting into the programme, and certainly exposes more people to entrepreneurial skills and networks.

It is likely that incubators will adopt this type of blended model. This is confirmed by case studies of the EU|BICs, which indicate an intention among European business incubators to continue with the digital transition process post-COVID-19 with increased conversion to "blended models" that combine remote delivery of services with some face-to-face activities (EBN, 2020a).

[4] This could also include access to shared commercial kitchens in the case of incubators for agri-food and food processing enterprises.

2. The incubator system in Thailand

The overall institutional structure for business incubation support in Thailand

Business incubators are a key element of government policy for transitioning Thailand to an innovation-driven economy. There are two major public business incubator systems in Thailand. The first is the network of Technology Management Centres (TMCs), initiated in 2002 under the direction of the National Science and Technology Development Agency (NSTDA). This operates 18 technology business incubators (TBIs) across the country. Many of these TBIs are located in the network of Science and Technology Parks, which also house research institutes and corporate tenants. The TBIs provide pre-incubation, incubation and post-incubation support to start-ups, including several hours of training, mentorship, business skills and knowledge workshops, and linkages to researchers, investors, funding and markets, along with intensive project evaluation to help promising "technopreneurs" transform their ideas to products that can enter the market for traction and scale.[5] In addition, the TMCs offer the "Programme for Success". This targets early-stage enterprises (with 2-5 years in business) and helps them grow their market in Thailand and abroad by matching them with consultants and mentors. It is therefore essentially a "scale-up" programme.

The second network is comprised of university business incubators (UBIs). These were initiated by the Office of Higher Education Commission (OHEC) in 2004, and are located at more than 80 universities. The UBIs provide incubating enterprises with support such as advisory and consultancy services, and mentoring. Incubatees in the UBIs are encouraged to apply and integrate university-based research and technologies to develop and/or improve their products and/or services. As most universities in Thailand have established business incubators, they have substantial potential capacity to support innovators and technology entrepreneurs throughout the country. However, many of the UBIs have inadequate structures and are not performing well. Common issues are that the manager of the business incubator is often a professor who does the job on a part-time basis; the university may not allocate resources for the incubator services; and there can be a lack of sufficient commitment on the part of university management to promoting the role of the UBI within the regional entrepreneurial ecosystem. Critical issues faced by the UBIs are a lack of strategic support, insufficient resources, and uncertain financial support (Gerdsri et al., 2021). Therefore many of the UBIs need strengthening to improve their standard of performance.

The Thai government does not have a national incubator policy/strategy. Although there is a well-developed strategy for the TBIs that has been developed by NSTDA, this is not the case for the UBIs. With the merger in 2019 of the former Ministry of Higher Education (MHE) and the Ministry of Science and Technology (MOST) into the Ministry of Higher Education, Science, Research and Innovation (MHESRI), the possibilities for such a national "integrated" BI strategy may be forthcoming.

[5] NSTDA Business and Entrepreneurial Business Incubation Programmes, https://www.nstda.or.th/en/industry-support/business-and-entrepreneurial-acceleration-programs.html/.

In addition, there are a number of start-up accelerators. Some are associated with the national StartUp Thailand project[6] and many others have been initiated by the private sector. These include, for example, the SPRINT Accelerator Thai, the HEXGn Start-up Ready accelerator programme, and the Stormbreaker Venture EdTech Accelerator. The number of private sector accelerator programmes has risen in the past two years, indicating the emergence of a growing "venture builder model" in Thailand.

The Association of Thailand Business Incubators and Science Parks (THAI-BISPA) is a national incubator network, formed in 2009 as a partnership between the NSTDA, the OHEC and the OSMEP to strengthen the management of Thai business incubators (BIs) and their service offerings, and essentially to become an ecosystem builder with shared platforms, knowledge exchange, and networking (see Box 6).

Box 6. Role of the THAI-BISPA in supporting business incubators and accelerators

In addition to providing policy input to the government, BISPA focuses on four pillars of activity:

1. Learning (conferences, workshops and seminars, knowledge-sharing);
2. Resources (facts and figures, news updates, business incubator toolkits);
3. Professionalisation (providing service standard guidelines and accreditation for business incubators and business incubator managers); and
4. Community ecosystem development (business incubator directory, mentor network, angel and investor networks, co-incubation platforms to create a bridge for exchange and information sharing nationally and with the international network of business incubators).

Only business incubators are "full" members of BISPA, however, BISPA also offers three other membership categories: 1) Founding organisations (the NSTDA and the OSMEP); 2) Honorary members, i.e. organisations that support or fund BISPA; and 3) Associate members (public or private organisations that would like to be part of the ecosystem). Through its Advisory Board, BISPA includes representation from the Federation of Thai Industries (FTI), the Venture Capital Association, universities, and government bodies (e.g. the OSMEP, the Office of Higher Education, Science, Research and Innovation/OHESRI Council, and the Thai Science Park).

In mid- 2021, BISPA had 36 business incubator members, 22% of which were public incubators, 53% were university-based/academic incubators, and 25% were private. The majority of these business incubator members were located in the Central Region. In the past 2 years, the business incubator members have supported 3 130 start-ups/ventures.

Business incubators pay a membership fee to BISPA and have to meet certain criteria to be accepted as a full BISPA member. Many of the UBIs are not up to the BISPA standard and, according to the BISPA "categorisation of incubators" (see Annex A), are considered below the "defined level" of maturity development. To assess the capabilities and quality level of the individual business incubator mechanisms according to the five levels of business incubator maturity, BISPA uses the results of a business incubator self-assessment tool based on an assessment of the incubator's strategy and

[6] **StartUp Thailand**, established in 2016, is the national start-up promotion platform to support a start-up ecosystem in Thailand and encourage start-up growth. The platform's entrepreneurial ecosystem approach encompasses Startup Thailand Launchpads (co-working spaces for start-ups) and start-up incubators in three regions in the country - the Northern Innovative StartUp Thailand, Deepsouth StartUp Thailand, and Eastern Economic Corridor.

organisational structure, financing, body of knowledge, human resource development, infrastructure, network, and services.

The **BISPA Business Incubator Accreditation** process involves collecting, assessing, and reviewing data on the business incubator and the incubator model, and preparation of a customised report for each business incubator indicating areas to improve its practices and performance.

The **BISPA Certification programme** focuses on training of incubator managers and staff (making use of the World Bank InfoDev programme for certification of trainers to do the training).

The **BISPA "Co-incubation platform"** creates a network for TBI programmes in Thailand. The main objective is to offer companies access to practical solutions to soft-land and enter or expand into new markets more effectively. The platform also aims to accelerate the establishment of overseas sales presence for both local and foreign companies and the internationalisation and scaling up of client enterprises. In this regard, BISPA maintains relationships and alliances with a number of international organisations, such as InfoDev, the International Business Innovation Association (InBIA), Asia-Pacific Incubation Network (APIN), ASEAN Business Incubator Network (ABINet), UBI Global, the European Business and Innovation Centre Network (EBN), and others.

Source: See: https://www.thaibispa.or.th/en/about-us/

An important goal of BISPA is to attract more business incubators into its membership and to professionalise the provision of incubator services. For many business incubators, particularly the UBIs, this would first require strengthening in order to meet the minimum standards (management structure, financial capacity, etc.) for membership and convincing them of the value-added benefits of membership. The entry of new incubators into the ecosystem and the high level of turnover in business incubator staffing demands ongoing efforts to offer business incubator training and certification programmes.

Because it enhances the personal interaction between trainees, BISPA prefers face-to-face delivery of its certification training to business incubator managers. However, it also recognises the merits of online delivery, perhaps complemented with some face-to-face meetings. In this regard, BISPA is seeking to make its business incubator training available online (BISPA Certification programme). This would make competency training and certification possibilities more accessible to incubator managers and staff, especially in the UBI network, and improve their standards of operation.

In 2021, the Association of Indonesian Business Incubators (AIBI) began offering its own business incubator training programme as an online, Zoom-facilitated package, part of it in co-operation with the InfoDev certification programme (see Box 7). BISPA may find it useful to examine the AIBI programme as a possible model to emulate.

Box 7. The Association of Indonesian Business Incubators (AIBI) offers online training packages to business incubator managers

The Association of Indonesian Business Incubators (AIBI) formed in 2013 with the objectives of synergising all business incubator organisations in Indonesia, increasing their capacity and ability to carry out coaching and development of new businesses, entrepreneurs and SMEs, encouraging the emergence of new business incubators, improving the competency and quality of AIBI-member business incubators, and developing networks with stakeholders at the national and international levels. The AIBI website lists 55 registered business incubators.

In June 2021, the AIBI started offering an online, Zoom-facilitated business incubator training programme targeting both existing business incubators and prospective business incubator institutions throughout Indonesia. The "Business Incubator Training Services" package, delivered in four parts, includes:

1. the AIBI-certified business incubator establishment training package (incubator business and action planning);
2. the AIBI-certified Start-up Assistance Training package (coaching and mentoring, legal standards, etc.);
3. the AIBI certified business incubator Institutional Strengthening Training package (standard operation procedures/SOPs, business matching, Demo Day, incubator management, etc.); and
4. the World Bank infoDev- and AIBI-certified business incubator managers training package (certification programme).

Sources: AIBI website at: http://aibinetwork.com/pelatihan-inkubator-bisnis-aibi-2021-online/; http://aibinetwork.com/program-coaching-dan-mentoring-inkubator-bisnis-aibi-2021/;

The OSMEP is also a player in supporting business incubators, predominantly through the UBIs, and as a founding partner in THAI-BISPA. The OSMEP has invested THB 400 million in the UBI system and to facilitate co-ordination of the UBI network with BISPA. This included sponsoring study tours of business incubator models in the USA. To support the UBIs in overcoming the lack of budget resources from their institutions, the OSMEP makes efforts to secure budget for the UBIs in the Integrated Budget Plan and may use its own budget to contract some services from the UBIs (short-term projects), mainly technology-matching services for SMEs. However, more awareness of the UBIs and their services among entrepreneurs and SMEs is needed to create demand for their services.

The role of virtual services in the current system

Thai business incubators generally accept start-up clients on an "in-wall" and "out-wall" basis

The TBIs operate on both an "in-wall" and "out-wall" basis, depending on the nature of the incubating enterprise and the region being covered by the incubator services. The distinction in service delivery is more a function of whether or not the client has a space in the incubator facility. In the Thai context, "out-wall" is better understood as "outreach" without a strong physical element, with use of some virtual or online tools to complement the incubation process for these clients, which often requires some onsite delivery. Many of the incubating start-ups are not physically located in the incubator facilities and only

come into the incubator sites or Science Parks when they need to, for example to participate in a workshop, training session, meeting or networking event, or to make use of wetlabs, 3-D printing, fabrication labs, etc., or to access other R&D facilities, as appropriate. Apart from that, the out-wall start-ups access the incubator services remotely and are able to participate in the TBI network online learning programme consisting of five modules (e.g. marketing, business planning, finance, etc.). The development of these online training courses was supported by the OSMEP. Start-up Bootcamps are also being offered virtually.

The UBIs may not have a sufficient allocation of physical incubator spaces to accommodate the demand for "in-wall" enterprises. Consequently, largely out of necessity, the UBIs tend to serve their incubating enterprises on an "out-wall" basis. However, there may also be a high degree of inconsistency in the package of incubation services among the UBIs, including to the out-wall clients.

The delivery of incubator services in response to the COVID-19 crisis

The delivery of virtual/online services has become critically important during the COVID-19 lockdowns. During this time, about 90% of the incubating clients have been "out-wall", with the TBI network making use of WEBEX, Microsoft Team, Zoom, etc. to deliver training, consulting and business advisory/coaching services. The TMCs also moved to an electronic system for receiving applications to the incubators, selected candidates on the basis of online interviews, and organised virtual pitching sessions, where the start-up enterprises "pitched" their businesses to potential investors or partners. Employing virtual pitching formats allowed the TBIs to include investors from other countries, for example, Taiwan and China, thereby broadening venture opportunities for the incubating enterprises.

Although, many incubator clients were accepted on an "out-wall" basis before the pandemic (making use of the incubator programme services, but not the space), some incubators, such as the Technology Business Incubator for Start-ups and Innovative Entrepreneurs at the Science and Technology Park Chiang Mai University (STeP) noted some disadvantages with transitioning to virtual services during the COVID-19 pandemic. The major disadvantages specifically related to the communication between out-wall clients and incubator staff (see observations profiled in Box 8). The out-wall start-ups miss the social interaction with incubator staff and other incubating enterprises of being in a physical location and may feel they are not getting enough attention. STeP is of the view that to operate as a totally virtual incubator would require the incubator to have the right tools to manage the incubation programme, i.e. virtual tools to schedule mentorships and investment pitches, and for collecting and monitoring client data to track progress against milestones.

Another challenge in providing digital platforms to support business incubator clients may be their lack of digital skills, which would make it difficult for them to make use of digital platforms. Thus, it would be important for the business incubators to educate their client enterprises in digital skills.

Box 8. Virtual service delivery during COVID-19 – experience of the TBI at the Science and Technology Park Chiang Mai University

During the COVID-19 lockdowns in 2020, the Technology Business Incubator for Start-ups and Innovative Entrepreneurs at the Science and Technology Park Chiang Mai University (STeP) provided all of its incubator services virtually – mentoring, coaching, and monthly meetings with the clients to monitor progress against milestones. This included using an online application process to accept new clients and Zoom technology for "pitching" sessions and mentoring.

The one advantage of virtual pitching sessions, compared to physical sessions, is the ability to broaden the representation of investors who participate in the session (not limited by geography, travel, etc.), although adequate bandwidth is needed to handle Zoom pitching sessions as well as back-office technical support to "set the stage". In a virtual session, the moderator also has more capability to control the presentation time of each entrepreneur (can use the mute button to end the presentation). Although clients and investors actually prefer the face-to-face pitching sessions, STeP is of the opinion that the incubator can become more efficient by making greater use of Zoom for meetings in the future (post-COVID-19).

Since reopening the STeP incubator space at the end of May 2021, 20 enterprises were back onsite in the incubator, and the rest were "out-wall" (no space in the incubator).

Whether the incubator client needs a space in the incubator (in-wall) depends on the stage of the client's development. However, even in the "ideation stage" (which involves training/workshops programme, market validation, prototype development, lots of networking events and exchanges among the start-up clients themselves, and considerable back and forth between the client and the incubator staff), it is advantageous if the client can come into the incubator to ask questions, and is even more advantageous for networking (e.g. pop-up meetings, interaction with other entrepreneurs in the incubator space) if the client actually has an incubator space (in-wall). Once the client has formed a company, it is more important for the enterprise to be in-wall.

STeP has found that one of the advantages of the "in-wall" approach is a higher incubation programme completion rate. During the first year of the incubator programme, STeP estimates that up to 50% of the out-wall founders/clients do not achieve their milestone goals; in 20% of the cases, the venture falls apart (e.g. the teams break up, the business model does not work). The rate of completion of milestones is much higher for the in-wall clients. Based on this evidence, in 2021, the STeP incubator is requiring all clients to be in-wall for the first year of the programme so their progress can be better tracked and monitored.

Source: OECD interview with an official from the STeP incubator management team in June 2021.

3. Enhancing the virtual delivery of business incubator services in Thailand

Business incubators in Thailand already have some experience in providing incubator services to remote (out-wall) clients. The shift to online virtual delivery of services was accelerated during the COVID-19 restrictions. However, more can be done to develop the platforms and co-ordination mechanisms to enable business incubators to transition to greater, and more strategic, use of virtual programme delivery.

Expanding the use of the BISPA InteGreat platform

Over the past two years, BISPA has been working on developing the Inno-Peer Platform, a virtual community platform for incubators and other business development entities to "build a thriving innovation ecosystem in Thailand". The Inno-Peer platform, focused on digital transformation, human capital development, accreditation and ecosystem connect, includes the InteGreat platform (http://integreat.in.th/), which aims to facilitate the work processes of business incubators, increase management efficiency and raise the standard of sustainable business operations for the business incubator entrepreneurs. Each business incubator pays USD 100/year to license use of the InteGreat system. This platform includes the online-accessible Company Profile feature that enables business incubator members to enter and monitor their incubator client data using a "Document on Cloud" feature (and receive quarterly reports on their client data), plus a Business Model Canvas. As a member of BISPA, the STeP incubator, for example, is making use of the BISPA data collection tool for its clients. In January 2021, the BISPA platform included data on 1 072 incubator clients, 110 incubator staff, 26 administrators, and 11 Board members.

The InteGreat platform provides a very useful resource for business incubators, many of which may face challenges in implementing and running virtual programmes (e.g. loss of information, staff turnover). The challenge is to bring more of the business incubators, particularly the UBIs, into the system. This could be achieved by greater promotion of the service among the UBIs and efforts to assist them in building capacity to migrate to the service.

Identifying packages of services to be delivered virtually by incubators

The OSMEP and the NSTDA offer a range of online and offline support services to entrepreneurs and SMEs – information, training, advice and counselling, start-up vouchers, and linkages to R&D and professional resources. The key advantage of offering such services through an incubator or accelerator programme, rather than as distinctive one-off support services, is the "bundling" of a package of supports, which are delivered as part of a focused, integrated, and relationship-based approach and follows the client through the developmental incubation process. The accepted standard for the "bundle" of support services includes training, coaching/advice, mentoring, networking, and tracking progress against milestone objectives.

A mapping of the existing support services available for entrepreneurs, by type, and by availability of online access and virtual delivery, may identify opportunities for "bundling" services into packages for delivery by business incubators, particularly the UBIs, which are less mature in the offer of incubator services than the TBIs.

The adoption of virtual incubation models, which are increasingly in use and well suited to the pre-incubation stage of the entrepreneurial journey, could be of particular relevance to the UBI network. Offering a package of online tools (including training modules, business modelling and planning tools, mentoring, etc.) to encourage entrepreneurs to participate in pre-incubation programmes could serve to promote the development of entrepreneurial skills and promising business ideas from potential entrepreneurs across the country, regardless of geographic location. Such virtual pre-incubation programmes can be effective in expanding the reach of incubator services and ultimately developing a pipeline of future clients for the full-scale incubation programme. This is illustrated by the Y Combinator start-up accelerator offer of a free online "Start-up School" (SUS) modularised training curriculum (described briefly in section 1). Completion of the training exposes more people to entrepreneurial skills and networks and helps build demand for full incubation programmes.

A virtual pre-incubation programme would be instrumental in strengthening the capacity of UBIs to support entrepreneurship beyond the boundaries of their own physical locations and open the door to attracting incubator-ready clients to their incubator programmes for those start-ups which would benefit from onsite services offered by the physical incubator. Graduates from the pre-incubation programme needing or potentially benefiting from UBI resources, such as prototype development, wetlabs, or research facilities could then be directed to the incubation programme best fitting their needs – perhaps with a greater physical presence for accessing facilities and attending networking events.

Providing virtual training to incubator clients

OSMEP training tools

The OSMEP is in general committed to making all of its services digital. The OSMEP SME website, in place for three years, is currently upgrading its online services, with the goal of making learning tools available to more entrepreneurs and SMEs through online platforms. Because some SMEs may still have difficulties accessing online services and data, the OSMEP cannot go completely online at present (or many SMEs would not be served).

However, some of the OSMEP online tools could be made more specifically accessible to the UBIs as part of the services package for incubator clients (see Table 4). For example, in 2020, additional budget was allocated to improve the effectiveness of the OSMEP Knowledge Centre platform by making it more focused on self-learning, such as via the "SME Academy 365.com" tool. Other learning tools, such as the "SME-Early Stars: All Stars" could be reconfigured as an online-accessible training activity for use by the UBIs.

In addition, the Startup Thailand Academy offers online access to Startup Thailand applicants, who can register online for the free "Startup 101" and "Startup Warrior" online courses. Upon completion, the entrepreneur receives a digital certificate.

Table 4. OSMEP learning tools for SMEs and start-ups

Learning tools	Description and potential
SME Knowledge Platform (https://www.smeknowledgecenter.com/)	This platform has been in place for 2-3 years. It provides access to short online courses, webinars, seminars, knowledge videos, information/ articles, case studies, e-books, etc. targeting start-ups, microenterprises, and SMEs (at different stages of development and with different learning needs).
"SME ConneXt"	An information tool containing news, information, data of use to entrepreneurs and SMEs that is accessible through a mobile device application system. It is currently connected only to OSMEP clients, but could be extended to all business incubators in the future.
"SME Academy 365.com" tool	365-day online access to courses, accessible via website or App. It creates opportunities for entrepreneurs and stakeholders to learn entrepreneurial skills and acquire digital literacy to expand their markets through online modes/platforms and accelerate their business growth. Not linked to the business incubator programmes.
"SME Course"	Online training course linked to coaching by experts, which can also go to local SMEs physically. It changed to an online coaching format during the COVID-19 pandemic, but is seeking new tools to deliver this effectively. It aims to do more coaching online to SME clients. Not linked to the business incubator programmes.
"SME-Early Stars: All Stars" training	A six-class classroom-based training course which is delivered in collaboration with Thammasat University to develop new entrepreneurs. It targets start-ups and early-stage enterprises (in business for no more than 3-5 years) and includes involvement of consultants to give advice to the entrepreneurs throughout the training course. The goal during the March-August 2021 period was to develop/upgrade 2 500 entrepreneurial ventures.
SME Regular Level Promotion and Business Development Programme (https://www.sme.go.th/th/cms-detail.php?modulekey=118&id=1384/)	An in-depth business development training/consultancy programme to increase the competitiveness of entrepreneurs and SMEs by improving their standards and quality in the production process or the added value of their products or services and encouraging them to obtain acceptable product or service standards, including an audit to obtain a certificate of internationally accepted standards. The OSMEP is in the process of revising the programme to make it more accessible, and also to add a "fast track" component. This programme could be adapted for online delivery and made available to business incubators for use with the more advanced incubator clients.

BISPA training tools

BISPA does not have a universal set of training modules (curriculum) that business incubators can use or a virtual platform for business incubators to tap into for entrepreneurship training modules. Each business incubator develops/uses its own training programmes/materials. A short-term option for BISPA is to link into the ASEAN Business Incubator Network (ABINet), which in 2020 launched a Virtual Incubation Programme (AVIP) platform as a tool for use by TBIs in the ASEAN region. The AVIP platform provides access to six online training courses that can be referred to incubator clients as part of a package of their business incubator services (see Box 9). As a member of ABINet, BISPA could promote use of the AVIP platform among Thai incubators, including the UBIs.

Box 9. The "Virtual Incubation Programme (AVIP)" of the ASEAN Business Incubator Network (ABINet)

The ABINet was created in 2013 as a platform for learning, knowledge, and experience sharing among business incubator management, start-up incubatees, and resource persons and experts from across the ASEAN.

In 2020, the ASEAN launched the Virtual Incubation Programme (AVIP) to support the ABINet. The AVIP provides an integrated virtual platform (Portal) to link incubators and entrepreneurs across ASEAN Member States and assists incubators to reach more enterprises within their country by providing virtual incubation services that are not confined by physical factors such as geographical location, time and "bricks and mortar" walls. In 2021, 10 TBIs were listed as participating members in the AVIP (from Brunei [1], Indonesia [2], Malaysia [4], Singapore [1], the Philippines [1], and Vietnam [1]), but none from Thailand).

The participating TBIs can refer their incubation clients to the AVIP Portal to access six thematic online training courses from the ASEAN Virtual Academy (e.g. business strategy and planning, marketing/sales, product development, financial management, business operations, human resource development). These modules may be suitable for inclusion in the package of incubator services offered by the UBIs in Thailand and could be explored by the OSMEP and the BISPA.

In 2018, a multi-year project of the ASEAN Coordinating Committee on Micro, Small and Medium Enterprises (ACCMSME), funded by Japan, was launched with the objective of strengthening ASEAN technology business incubators through capacity building and regional networking and linkages. This enabled start-ups in ABINet-member incubators to spend 1-2 weeks in an incubator in another ASEAN country. This project therefore has the potential to facilitate the internationalization of more start-ups. This could be of benefit to Thai incubator programmes.

Source: https://www.aseanvirtual.com/about/.

Implementing virtual mentoring services for start-ups

A mentoring (or coaching) service is a common feature of incubator and accelerator programmes globally. In Thailand, mentoring has been integrated as a feature of various government programmes, including business incubator programmes, but formal mentoring guidelines or mechanisms have not been implemented. Each government agency or business incubator has developed its own list of mentors and mentoring protocols. Often the mentors are university professors and lecturers, as opposed to successful business leaders and entrepreneurs, unlike in many mentoring programmes in OECD countries where experienced entrepreneurs are generally found to be excellent mentors for start-ups with growth potential.

Virtual mentorship is becoming more common and enables start-ups to be matched with the most appropriate mentor regardless of their domicile. For example, the Small Business Administration (SBA)-supported SCORE mentor service in the USA provides mentoring access to start-ups and SMEs through in-person face-to-face sessions or through virtual media (e.g. email, video chat, Google Hangouts, Skype, Facetime).[7] While it may be easier to assign a mentor that is geographically closer

[7] The Service Corps of Retired Executives (SCORE) Programme is an external volunteer network of more than 11 000 SCORE-certified, mostly retired, business professionals who provide free or low-cost mentoring and training

to the company, it is more beneficial to ensure the assignment of a mentor with the most relevant industry experience to meet the company's request. In the case of Thailand, a virtual mentoring programme should also consider developing a roster of diaspora mentors who can be called upon to mentor Thai start-ups/growth SMEs using web-based platforms.

Box 10. An online mentor matching system – the Bridges for Billions virtual incubator

Description of the approach

The Bridges for Billions virtual business incubator includes access to an online platform that includes the list of onboarded volunteer mentors and a mentor-matching tool. Each month, description profiles of the entrepreneurs/projects requiring mentorship are posted on the platform. The mentors have two weeks to review the profiles and shortlist the entrepreneurs for brief initial online meetings. Mentors identify 3-4 projects they would be interested in working with. The mentor will send an invitation for an initial meeting with the shortlist of entrepreneurs/projects they believe they are well-fitted to help. The entrepreneur has two weeks to accept the invitation and meet with the mentor(s). During the virtual meeting, the mentor can get to know the entrepreneurs and their projects more in depth and determine if there is a good match for working together. Based on this initial round of virtual meetings, both the mentors and the entrepreneurs will provide a ranking of who they would prefer to work with. Based on these rankings, the programme suggests a matching.

Once both parties agree on a collaboration, they sign a Mentorship Agreement (e-document) defining each person's commitment and confidentiality issues. The mentor is given access to the entrepreneur's online workspace to work collaboratively with the entrepreneur (e.g. commenting on every aspect of their business model/business plan, etc.), and to a "team video room" embedded in the platform to facilitate the weekly mentorship meetings. The mentor will also have one-to-one messaging available with the mentee(s), and decide with the mentee on the use of alternative communication channels, such as WhatsApp, email, Slack, etc. The mentor time commitment is around 1.5 hours per week.

Apart from the private project workspace, the mentor is also given access to an online group with all of the participants from their cohort (mentors and entrepreneurs) to share articles and resources, ask questions, and overcome challenges together.

Factors for success

A key success factor for Bridges for Billions is being able to attract a large number of geographically-dispersed and sectorially-diverse mentors to be available to start-up clients on a virtual basis. Another key factor is the mentor onboarding process, which involves training of the mentor in the incubator methodology so they are able to deliver the mentoring according to a systematic framework. The virtual mentor-mentee matching process, based on online profiles of the start-ups and the mentor backgrounds, virtual introductory meetings, and preferences rankings has worked well for the mentoring assignments.

to entrepreneurs in a wide range of settings. New volunteer mentors must complete the SCORE Mentoring Methodology Training programme during a 3-month probationary period (consisting of 2-3 online training modules based on five key components to be applied in mentoring sessions), shadow an experienced mentor, and take part in team mentoring (https://www.score.org/frequently-asked-questions-about-score/; https://www.score.org/find-mentor/.

Obstacles and responses

Thailand may encounter some obstacles in adopting a virtual mentoring programme such as Bridges for Billions. First of all, Thailand uses a different definition of a "mentor". Many mentoring programmes in other countries place heavy emphasis of attracting successful entrepreneurs as mentors, and mentors are assigned to work with the start-up clients on a regularised basis (e.g. weekly or biweekly sessions of 1-2 hours). In Thailand, mentors are more likely to be drawn from professionals or experts (e.g. accountants, lawyers, technologists, consultancy firms, government officials) rather than entrepreneurs "who have been there, done that". The mentors may come from any part of Thailand (in some cases from international locations) and be brought into the incubator to work with groups of clients. For example, before the COVID-19 pandemic, the STeP business incubator had the practice of flying "mentors" into the incubator to stay for several days to meet with a number of incubator clients.

Mentors in Thailand also expect to be paid a fee for their services, unlike the predominant use of volunteer mentors in many other countries. The cost of the mentor services is covered by the incubator budget. Incubators with sufficient budget resources, such as the TBIs, are more likely to provide such mentor services. Due to budget limitations, UBIs are not able to form the same kind of mentor relationships as the TBIs. For example, if the UBI is able to identify an expert in international trade, they might bring them into the incubator for a day to give some coaching/advice to the incubator clients, but this is not a regularised or systematic component of the incubator service offering.

Relevance for Thailand

Implementing a virtual mentor programme for business incubators would bring many advantages to Thailand. The use of virtual mentoring (via Zoom) would reduce the cost of providing mentor services (e.g. less need to cover travel costs of bringing mentors into the incubator). It would also enable Thailand to broaden the mentor roster to include international mentors (which virtual mentoring would more easily enable) and attract successful entrepreneurs who are willing to provide mentor services on a volunteer basis. The virtual accessibility of mentors may also make it feasible for UBIs to incorporate the mentoring package as a standard offer of their business incubator services. To implement a virtual mentoring and mentor matching programme would require development of the appropriate software, which BISPA has already identified as a priority in the coming period as an enhancement to the Mentor Connect service.

Further information

See: https://www.bridgeforbillions.org/become-business-mentor/.

One of the significant BISPA developments in 2020 is "Mentor Connect", an offline Mentor Pool, which provides a resource database of mentors for business incubators in the regions which do not have access to a range of local mentor resources (e.g. finance, tax, accounting, digital marketing, international marketing, human resource development, manufacturing design, business law, standards, business management, etc.). Although the Mentor Connect tool can also track mentor relationships, the platform does not currently enable online client-mentor matching or online bookings with mentors. Working on an online mentor matching tool is planned for Phase 2 of the InteGreat platform project. The online mentor matching process employed by Bridges for Billions may provide an example to BISPA for structuring the online capability of its Mentor Connect platform and an online mentor-matching feature (see Box 10).

The OSMEP has also been spearheading an initiative in partnership with the Institute for SME Development (ISMED) to increase the supply of mentors to help start-ups and SMEs become more innovative and competitive. The "Train the Coach" project, launched in 2018 provides access to an

online course to educate and increase the skills of mentors. The objective is to attract, train and develop a database of mentors/coaches with the knowledge, skills and competencies in different areas of activity to help SMEs solve their problems.[8] This initiative is well-founded and in line with international practices. In parallel, in response to COVID-19 restrictions, the OSMEP has worked with the ISMED to develop the tools for SMEs to access a professional coach from the network of coaches in various areas around the country on an online basis. The client can request an online consultation from the "SME Coach Online" website (www.thesmecoach.com) by providing information about the problem to be solved and the online system will use various filters to identify the coach(es) best suited to address the need. The online service is managed by the ISMED and supported by the OSMEP Service Centres in all provinces.

The online system achieved some success, providing online advice to more than 500 establishments nationwide in the first half of 2020.[9] However, this online service is not connected to the activities of BISPA or to the UBIs, although it offers the potential for integration into these systems. For example, the "smecoach.online" tool could be a resource to BISPA in transitioning its Mentor Connect database to online access. The ISMED service could also be promoted to the network of UBIs and become part of their standard package of incubator services to start-up clients.

Virtual services to match R&D resources with incubating start-ups

The OSMEP has identified an information gap with respect to matching start-ups with available R&D and technology resources in universities and research centres that the start-ups can commercialise. Specifically, a virtual service could be created to link incubator clients to research activities with commercialisation possibilities. Bridging the gap between universities and public research institutes and business incubators would contribute to the greater innovation potential of start-ups, potential also identified by the NSTDA and the National Innovation Agency (NIA).

As an example of what can be done, the STeP incubator has been working more in partnership with research institutes and building linkages between university research and start-up clients over the past couple of years. STeP's goal for 2021 is for half of the start-up clients to come out of university research/technology.

On the other hand, the UBIs may not have such a strategic focus. There could therefore be a role for the OSMEP in bridging the research/technology knowledge gap for start-ups in the UBI system. The OSMEP has made attempts to promote technology matching services through funding projects in the UBIs. However, start-ups in the UBIs (or those based on technological know-how) are most likely to be making use of the R&D resources within the university where the business incubator is located and not made sufficiently aware of the R&D resources or competencies in other universities or the network of publicly-funded research institutes, such as BIOTEC.

The concept of "open innovation"[10] and collaborative ecosystems is rapidly gaining knowledge and acceptance. "Open innovation" is based on the intelligent use of all possible resources, including collaborations with entities outside the firm (Mercandetti et al., 2017). While many start-ups may realise the importance of co-operating with other companies and research organisations, they face difficulties in undertaking a systematic search for possible partners, including technology partners, generally

[8] To become certified as a "coach", the applicant must have at least three years of experience in providing advisory services or at least five years of related work experience; complete the online training programme; and demonstrate a track record in providing advisory services to businesses. See: https://www.thesmecoach.com/.

[9] Tekdeeps, "OSMEP holds SME coaching system nationwide online Proven to solve business problems after Covid 19", 14 July 2020, https://tekdeeps.com/osmep-holds-sme-coaching-system-nationwide-online-proven-to-solve-business-problems-after-covid-19/.

[10] NineSigma, "Open Innovation Basics", https://www.ninesigma.com/open-innovation-basics/.

relying on their existing and local business and research networks to find collaboration partners. However, by relying on their existing local networks, start-ups and SMEs may miss innovation opportunities.

In addition, many start-ups operating in new technological domains may have limited knowledge of the applications or industry sectors where their innovation could add value, or of which markets and collaboration opportunities they should pursue for effective matchmaking (Mercandetti et al., 2017). Fostering more collaborative development of innovative solutions requires building bridges between start-ups and existing SMEs to make the identification of possible users of new technologies (e.g. SMEs) more accessible to start-ups, as well as making start-ups more identifiable by SMEs. Similar bridge building is essential to facilitate collaborations between start-ups and research entities.

For example, in helping to resolve the collaboration issue in Switzerland, the Institute for Innovation and Technology at Lucerne University of Applied Sciences and Arts and the Lucerne School of Information Technology developed a shared platform to facilitate the innovation matchmaking process between interested SMEs and start-ups. As described in Mercandetti et al. (2017), SMEs and start-ups submit standardised documents to the platform profiling their technology profiles, patents, product profiles, and expectations. Initial matching is then supported by AI software that scans all documents to find the common ground for meaningful matches to members on the platform and initiates discussions on possible collaborations.

The NineSigma Techbox in Japan, also expanded to Thailand, provides an example of an online database and virtual technology-matching service that could be modelled for use with SMEs and business incubator clients (Box 11).

Box 11. Online database for linking incubator clients to R&D and technology resources – Example from the Nine Sigma Techbox in Japan

Description of the approach

NineSigma is a digital innovation platform, initially launched in 2012, to connect innovative start-ups, SMEs, large companies, academia and labs. The platform seeks to connect technology providers with technology solution seekers. Technology seekers, such as start-ups and SMEs, can register on the platform with a profile indicating the nature of the problem to be solved. Technology providers, such as researchers, research institutes, universities, SMEs and large companies can register on the platform with a profile of the technology they have developed that may be useful to technology seekers. Through a platform Control Centre, technology providers can submit an online response to the needs of technology seekers, indicating what their technology can do in terms of providing a solution. The technology seeker can review the proposal and determine whether a discussion should take place.

A practical application of the NineSigma digital platform is Techbox, a searchable online database that seeks to match applied research being carried out in Japan's higher educational institutions and research institutes with SMEs seeking scientific and technological solutions. It is also linked to data on patents and licensable technologies. The database is searchable by field of research, e.g. biotech, agriculture, medical/health services, pharma, artificial intelligence (AI), etc., and technologies, e.g. robotics, advanced materials, nanotechnology, electronics.

The Techbox database platform has two channels:

1. "Technology Providers", which profiles researchers and companies with technological solutions for applications, and

2. "Technology Scouters", which links SMEs and start-ups seeking technology solutions from technology providers.

J-GoodTech, a matching site for connecting Japanese SMEs to companies across the world, is the application of the database platform in Japan. Operated by SME Support Japan, the government's SME development agency under the Ministry of Economy, Trade and Industry (METI), the objective is to create an ecosystem of "open innovation" to redefine and facilitate client relationships between companies, including SMEs, and providers of research and technological solutions. Most of the technology-based SMEs interested in the J-GoodTech platform operate a B2B business. The premise is that activities destined to create value in client companies based on their own technology ("innovation") must engage in diverse "open" efforts, such as co-operation with universities, public testing and research institutions, and maximising cross-industry networks. The J-GoodTech platform is a vehicle for taking advantage of outside resources, the key to an "open innovation" approach. By making use of J-GoodTech's "Needs" function, companies, including SMEs, can publicise their needs and find partners that suit their needs. This involves J-GoodTech's experts connecting researchers at partner companies/organisations, but few opportunities to encounter SMEs and start-ups, with SMEs and start-ups who have excellent technology but difficulty contacting major companies.

Factors of success

The Techbox database, supported by SME Support Japan, reduces the time and cost for SMEs to search for applied research and technological solutions to their new product challenges. There are two major merits to using J-GoodTech. First of all, it helps identify companies with cutting-edge technological capabilities, including start-ups, with companies seeking these capabilities to solve their own problems that otherwise would be difficult to find through other private matching services. Secondly, J-GoodTech experts will search for companies or researchers with the technologies matching the "needs' function of technology seekers at very little cost and on a timely basis.

Obstacles and responses

The major initial challenge is building and populating the database. The J-GoodTech platform depends on researchers/companies registering in the database. In the case of Thailand, a more proactive approach may be required in order to make the "technology provider" field as broad as possible. For example, the OSMEP could partner with university technology transfer offices to collect database information on licensable technologies available for commercialisation, and with the university research arms to compile information/data on applied research competencies within the university. The NSTDA, the NIA, and Thailand's public research bodies (e.g. BIOTEC) could be information/data sources on promising technologies looking for solutions and for the availability of testbeds and testing environments for prototypes.

Relevance to Thailand

Thailand stakeholders see value in matching innovation demand with supply. In co-operation between SME Support Japan and the Thai Ministry of Industry (Department of Industrial Promotion), the J-GoodTech digital platform has been adapted for use in Thailand. The T-GoodTech digital platform focuses on B2B matching among Thai entrepreneurs and SMEs and between Thai entrepreneurs/SMEs and foreign companies in order to facilitate opportunities for participation in the global value chain. T-GoodTech is linked to the J-GoodTech network, which therefore expands opportunities for Thai entrepreneurs.

Business incubators can play a role in co-ordinating the flow of innovation requests and possible solutions related to the start-ups and early-stage enterprises being incubated in the UBI environments. While a UBI may know the applied research competencies and developments within

their own university, they may not be aware of such competencies in other Thai universities or throughout the public R&D network.

With a searchable online database, such as Techbox and J-GoodTech, researchers can post the solutions they are working on (Technology Provider) and the incubating start-ups can post their innovation/R&D solution needs (Technology Seeker). The approach to adaptation of the digital platform for this purpose could be explored by the OSMEP in co-operation with the NSTDA and the NIA, and the virtual matching process facilitated even further by the integration of artificial intelligence (AI) software.

The J-GoodTech platform could also be improved upon by making the services smartphone-compatible. This would enable start-ups, SMEs and technology providers with "whenever, wherever" access to the functionality.

Sources for further information: Techbox website at: https://techbox.ninesigma.com/
Organisation for SMEs and Regional Innovation (SME Support Japan), https://www.smrj.go.jp/english/.
J-GoodTech, https://jgoodtech.smrj.go.jp/pub/en/how-it-works/.
T-GoodTech B2B Matching Platform, https://www.tgoodtech.com/th/aboutus/;
http://tgoodtech.com/file_managers/uploads/file_managers/tsource/pr/brochure_A4_en.pdf/
"Open Innovation for Regaining SME Power in Japan - 1st Article: Open innovation = Redefining Client Relations", by K. Motohashi, University of Tokyo, https://jgoodtech.smrj.go.jp/pub/en/featured/highlights/opinnv1.html/.

4. Conclusions and policy recommendations for Thailand

Increasing the virtual delivery of incubator and accelerator services is essential in the digital era and will increasingly be the “way of doing business”. However, two points must be kept in mind. First of all, virtual business incubators are not likely to completely displace the need for physical business incubators, although virtual tools can be integrated to improve outreach and accessibility to important services, such as training and mentoring. Secondly, even a fully virtual incubator requires a full business incubator management team to develop relationships with clients and monitor delivery of the integrated set of virtual tools.

Completely virtual incubation programmes are evolving, particularly since the COVID-19 disruption, when many physical incubators have had to introduce virtual delivery of their programmes. Virtual incubation models are also increasingly in use and well suited to the pre-incubation stage of the entrepreneurial journey. Such virtual pre-incubation programmes can be effective in expanding the reach of incubator and accelerator services to more potential entrepreneurs, independent of location, and ultimately develop a pipeline of future clients for the full-scale incubation services. Supporting the Thai UBIs in the adoption and delivery of virtual pre-incubation programmes could be a first step in strengthening their capacity to deliver more of their services virtually.

The Thai business incubators (particularly the UBIs) could also be supported in making the transition to ongoing virtual access to mentors, and other activities of the full incubation programmes. Once they have achieved a level of success in delivering the virtual tools/approach, they could move up the maturation level in the incubator’s performance. In general, the UBIs are in need of professionalisation, including the capacity building of incubator managers and staff and their onboarding to the use of a more virtual incubation system, which is critical to improving their standard of performance. In addition, the UBIs should be further integrated as an important partner in the entrepreneurial ecosystem.

Therefore, OSMEP in co-operation with the UBIs, and in agreement with the MHESRI and perhaps BISPA, could support development of a national business incubator strategy platform as well as upgrading activity to bring more of the UBIs up to a higher performance level. Such an initiative could be considered as a component of the next Thailand Masterplan for SMEs. It could include support for the introduction and upgrading of virtual incubator services.

In the meantime, the performance of the UBIs could be enhanced by working with them collectively to develop a consistent incubator programme package that emphasises the provision of a training curriculum (topics, e-learning modules, expert workshops); scheduling of weekly “office” hours to maintain regular contract between incubator management and clients, monitor the progress of each incubatee, and answer any questions; mentor services; Demo Days/investor pitching sessions; linkages with financiers/investors; and post-incubation programme support. The UBIs could also be supported with a platform for an online application and screening/evaluation approach.

Going forward, OSMEP could work with BISPA to offer an online knowledge programme to help the incubators (e.g. an online training programme for incubator managers that could lead to certification).

In co-operation with BISPA, the OSMEP could add considerable value to incubator clients by seeking greater connectivity with the UBIs regarding use of the OSMEP online tools as part of a virtual business incubation "package requirement" for provision of virtual incubation services to start-ups across Thailand. Connecting UBIs to the ASEAN Virtual Incubator Programme platform may also be an option for improving their access to online training courses as part of the package for incubating enterprises.

The demand side of virtual incubation services could also be strengthened by the specific offer of an OSMEP "digitalisation voucher" targeting start-ups and SMEs so they can gain competence in accessing the online services of business incubation programmes.

There would also be significant advantages in linking Thai SMEs from business incubation systems to SMEs from other ASEAN countries. This could be promoted by encouraging the TBIs and UBIs to join the online ASEAN ACCESS Platform, which was launched in 2021 to connect regional SMEs to global markets via information and contact points.

Based on the analysis, the following policy recommendations are offered to strengthen the digital delivery of business incubator and accelerator services in Thailand.

Box 12. Policy recommendations on virtual delivery of business incubator and accelerator services in Thailand

- Develop an action plan to implement the virtual delivery of business incubator services as part an overall national strategic incubator plan.
- In a co-operative effort between the OSMEP, StartUp Thailand, BISPA, and the UBI network, outline a standard set of incubator services and determine how existing virtual tools can be modified and packaged to serve the needs of out-wall incubator clients. This could include a package of virtual business incubation tools to be used by UBIs for the online provision of pre-incubation services to start-ups across Thailand.
- Develop a proactive, systematic approach for integrating some of the existing OSMEP online tools into a standard service package of the UBIs and the TBIs, as applicable (e.g. reconfiguring the OSMEP "SME-Early Stars: All Stars" as an online-accessible training activity for use by UBIs).
- Develop a guide on virtual delivery of business incubator services for the UBIs including guidance for virtual mentoring, online "pitching" and Demo Day activities (to be developed by the OSMEP in concert with BISPA) and assist UBIs with onboarding to a virtual system.
- Design an OSMEP "digitalisation voucher" to enable start-ups to gain competence in accessing the online services of business incubation programmes.
- Examine the potential for adapting one of the global virtual incubator platforms (e.g. Bridges for Billions) for use in Thailand (e.g. via adaptation and translation of materials) and train UBI managers on how to run the digital platform.
- Examine the potential for the OSMEP to connect the "SME Coach Online" service managed by the ISMED to the activities of BISPA and to the UBIs. This could be achieved by promoting the "smecoach.online" tool as a resource to BISPA in transitioning its Mentor Connect database to online access, and linking the ISMED service to the network of UBIs to become part of their standard package of incubator services to start-up clients.
- Promote use of the BISPA InteGreat client data management tool by the UBIs and encourage more of them to participate in the system by offering technical support to assist their migration to the service.

- Co-operate with BISPA to support the development and implementation of an online incubator manager training programme for specific use in the UBIs, but also for new staff of any business incubator.
- Pursue the connection of more UBIs to the ASEAN Virtual Incubator Programme platform to improve their access to virtual products and use of the six online training courses as part of the package for incubating enterprises.
- Develop a searchable online database of available technology/R&D resources and a chatroom that could be accessed by UBIs and SMEs and start-ups to create more awareness of research with commercialisation among SMEs and start-ups and stronger linkages for matching innovation needs with resources.

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Annex A. Maturity level used in the capability assessment model for business incubators in Thailand

Level	Description
Initial	An incubator is established with minimum infrastructure to operate. Staff are assigned to cover basic day-to-day operations only. The organization still lacks organizational structure, clear work procedures, etc. The organization requires 100% financial support from the government to operate.
Defined	An incubator has defined the work procedure aligned with strategic goals and targets. However, the strategic implementation plan is still not effectively in place. The achievements are measured based on outputs not outcomes. Currently, an incubator has sufficient infrastructure but faces challenges in coping with the increasing demand requested by incubatees.
Established	An incubator has a well-established organizational structure and is perceived as a stable organization. The strategic implementation plan is in place with clear KPIs. Key risks are identified. An incubator is capable of providing a wide range of services throughout the value chain and stages of incubatees. An incubator begins to focus the outcomes on economic value. An incubator is able to generate incomes from services accounting for around 20% of the annual expenses.
Systemized	An incubator has a well-established organizational structure following the international standards, such as having an advisory board, applying a systematic approach for risk management, etc. An incubator is actively linked with other incubators, domestically and internationally. An incubator is also capable to strategically adapt to changing environments. The issues related to sustainable development of an incubator are always brought up for discussion. An incubator is able to generate income from services accounting for around 21–50% of its annual expenses.
Matured	An incubator has been perceived as a sustainable organization with many achievements contributing to economic value creation. An incubator is able to effectively adapt its strategies to cope with changing environments. An incubator is able to generate income from services of more than 50% of its annual expenses. An incubator takes an active role in many incubator networks and has been internationally recognised for one of the best practice incubators.

Source: Gerdsri, N., B. Iewwongcharoen, K. Rajchamaha, N. Manotungvorapun, J. Pongthanaisawan, and W. Witthayaweerasak (2021), "Capability Assessment toward Sustainable Development of Business Incubators: Framework and Experience Sharing", *Sustainability,* 13(*9*), 4617, p. 7.(https://doi.org/10.3390/su13094617/).