

ICCubeX: A Structured University Incubation Model to Accelerate the Lab-to-Market Process

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Abstract

The paper delves into the ICCubeX incubator initiative to enrich the university's technology Commercialisation ecosystem. It focuses on cultivating high-quality techno-entrepreneurs, enhancing income generation through technology Commercialisation, and creating a favorable ecosystem for techno-entrepreneurs at Technovation Park. This study uses the narrative literature review method to answer the question, "Is the ICCubeX program good enough for start-ups compared to other regions?" The review result is then compared to the ICCubeX incubation program. Key findings reveal that an ideal incubation program should possess clear objectives and focus on specific industries, social innovation, and technology start-ups. Access to funding through investment, grants, or investor connections proves pivotal for start-up development. Workshops, mentorship, and training covering various entrepreneurial aspects are critical for sustained success. This study underscores the significance of tailored incubation facilities to create a conducive start-up environment. Leveraging university resources such as laboratories further bolsters product development. Moreover, the importance of policy support for start-up formation and longevity is highlighted. Continuous monitoring and activity tracking play a role in ensuring start-up sustainability. The paper culminates by emphasizing the adaptable nature of the incubation model across diverse disciplines and technological readiness levels, as gleaned from the literature review. The ICCubeX incubator initiative stands as a testament to the holistic and forward-looking approach that Universiti Teknologi Malaysia is undertaking to foster a thriving ecosystem for innovation and entrepreneurship.

Keywords: ICCubeX, Start-up, Incubation Program, Incubator, Spin-off

Introduction

The Universiti Teknologi Malaysia (UTM) has outlined EnVision 2025 as a guide for its community to achieve its mission and vision (Din et al., 2021). The Innovation & Commercialisation Centre (ICC) is responsible for creating several initiatives to achieve those agendas, such as several commercialized IPs from deep-/high-tech research projects facilitated and registered under UTM, developing the UTM Technovation Park ecosystem, and the amount of funding supporting teaching, learning and research activities related to University-Industry-Government-Community consortium.

The previous ICC UTM's management launched the Incubator Program. However, the position and space of the incubator were not attractive, and the program only provided rental space facilities without guidance for researchers. The management of ICC UTM has proposed several improvements to revitalize the program based on the study of weaknesses and threats faced by the SPRINTER incubator program introduced in 2017 (Indiran et al., 2017). The new program, the ICCubeX Incubation Program, will consider the need for incubator workspace in the current business environment. Therefore, the ICCubeX program was designed to achieve more structured activities in commercializing the university's intellectual properties and support in entrepreneurship training, pre-Commercialisation funding, and free workspace for ICCubeX incubates. Currently, no study compares ICCubeX to incubator programs in other countries. This study is very important to ascertain whether the program is a good enough for start-ups. This paper aims to give an insight into the conceptual idea of the ICCubeX program as a structured university incubation model to accelerate the lab-to-market process and compare it to other incubation models from other regions based on the literature review.

The ICCubeX Incubation Program

ICCubeX is a new initiative that will integrate and enhance the technology Commercialisation ecosystem at UTM under ICC'S supervision. This initiative aims to create a more structured approach to cultivate self-efficacy and resilient techno-entrepreneurs, increase income generation through the Commercialisation of research-based technology by UTM researchers, and establish a conducive ecosystem for UTM techno-entrepreneurs at the Technovation Park. Figure 1 shows the infographic of the ICCubeX Incubation Program that summarizes the program's agendas.

The ICCubeX Incubation Program consists of three stages: Novice, Competence, and Advance. The development and implementation planning of the ICCubex Program in stages is essential to foster innovation and entrepreneurial growth. This program was designed to support and nurture aspiring entrepreneurs, researchers, and start-ups within a structured framework.

The Novice stage's objective is to provide macro-level exposure regarding the importance of industry/market-driven research to ensure successful Commercialisation activities while emphasizing the responsibility of protecting UTM's intellectual property.

The Competence stage has two phases. Phase one is to develop successful technovative-based entrepreneurial skills. There is hands-on human capital development to transform a lecturer's mindset into an incubator participant, consisting of ten modules managed by ICC UTM. Phase two aims to strengthen the skills of technovative-based entrepreneurs and prepare them for the establishment of spin-off companies. There is hands-on human capital development to strengthen technopreneurship skills and to prepare them to start a business. This consists of ten modules.

The Advance stage provides executive and corporate training to all academic staff involved in spin-off companies. The following essential elements in conducting business will be emphasized: directorial responsibilities, compliance with corporate governance practices, business advancement methods, understanding corporate finance, managing various business risks, and other elements for business development. There is hands-on human capital development to strengthen the skills of directors and executives in the field of excellent technopreneurship within their respective spin-off companies.

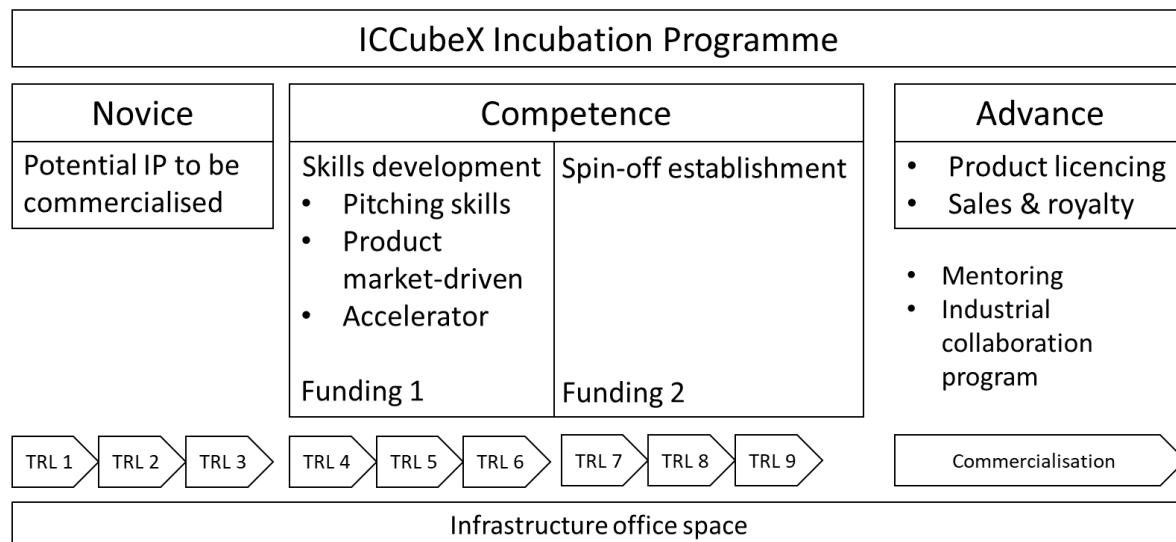


Figure 1. ICCubeX Incubation Programme

Practically, the ICCubeX program aims to guide incubatees with a structured stage to foster their journey toward Commercialisation. ICCubeX offers incubatees a seed fund, covering mentoring sessions from successful spin-off companies or start-up entrepreneurs in their Commercialisation products, subsidized spaces with complete facilities to run their business activities, and student involvement in developing a business model and plan. There is also legal advice throughout their journey in the ICCubeX circle. As a government-affiliated entity, ICC ensures its internal resources are fully aligned with the national vision and objectives to support incubatees.

Methodology

This study uses the narrative literature review method to answer the question, “Is the ICCubeX program good enough for start-up compared to incubation programs in other regions?” The review was done by selecting literature on start-up incubation programs from the Google Scholar search. Most articles were selected from reputable publishers such as ScienceDirect, Springer, and Taylor & Francis to ensure the quality of the literature. The articles were reviewed based on five aspects: the number of case studies, country, incubation strategies, and incubation target. The findings are compared to the ICCubeX program to determine whether ICCubeX is better than other models discussed in the literature and if other models can be used to improve the ICCubeX program.

Results

Table 1 shows fourteen articles were selected: six from Asia, five from Europe, four from North America, and one from Africa. Kohler (2016) studied the framework for understanding

the design dimensions and identified common patterns for designing effective corporate accelerators. For this study, 40 managers of corporate accelerators and accelerator-affiliated start-up teams were interviewed. Corporate accelerators are connected to companies like Intel, Samsung, Orange, and Cisco. The results show that the design consideration for corporate accelerators is within four dimensions: Proposition (What), Process (How), People (Who), and Presence (Where). The manager has a clear objective for the start-up by considering: how to run the start-up, who is the customers and industry target, and how to position the start-up. Those design strategies are aligned with the development of the ICCubeX program. However, the corporate accelerator has more advantages in getting the early adopters because the corporations supporting the start-up will be the early adopters. More industrial collaboration is needed in the ICCubeX program to close the gap between the spin-off company or researcher and the industry.

van Rijnsoever (2020) conducted a study on 100 start-ups from Western Europe and North America, leading to a financial support network (FSN) in an entrepreneurial ecosystem. The findings offer fresh theoretical perspectives on how networks in entrepreneurial ecosystems and innovation systems grow and how incubators function as the middlemen in this procedure. The model has demonstrated that a sufficiently robust network among start-ups is the key to overcoming weak network failure in an FSN. Other than that, field building is also one of the most effective support systems, and it increases the mating chances between start-ups and VCs. However, the findings do not mention entrepreneurial training for managerial start-ups. Results show that the ICCubeX incubator program could be one of the successful entrepreneurial programs consisting of technology and start-up from the university level, internal pre-Commercialisation funding to increase the technology readiness level, entrepreneurial-based training, and the incubator or facilities to accommodate the start-ups.

Tang et al (2021) proposed that incubation policymakers should facilitate communications between market-oriented and traditional government-sponsored incubators, provide favorable conditions for traditional incubators to learn from market-oriented incubators, and assist them in developing appropriate strategies and complementary business models. In Malaysia, the government does not interfere in the incubator operation, and there is no related incubation policy, but UTM's start-ups follow the UTM spin-off company policy.

Munkongsujarit (2016) studied the problems and obstacles that impede successful business incubation in Thailand. The university's KPIs are not in line with the funding provided. Consequently, their business incubators were unable to concentrate on creating profitable companies. In the context of UTM, the KPIs set by the university are in line with the funds provided. UTM has allocated prototype and Commercialisation funds for implementing the ICCubeX incubator program.

Table 1

Summary of Literature on Start-up Incubation Program

References	Number of case studies	Nation	Incubation strategies	Incubation target	Findings
ICCubeX	5 incubatees, 38 spin-off companies	Malaysia	Structured stages Training Funding Technology Readiness Level-based Infrastructure University support	Commercialisation of university intellectual property	A new structured incubation program includes upskilling programs, funding, mentorship, and incubator spaces.
David-West, Umukoro, and Onuoha (2018)	196 incubators	Africa	Space Training/mentoring Funding R&D	Addresses rising youth unemployment and develop home-grown solutions to Africa's peculiar developmental issues.	Despite acknowledging the importance of growth and sustainability of the incubation strategies, the effectiveness of incubators is very poor. ICCubeX is a far better program.
Kohler (2016)	40 managers	USA	Funding Corporate support, including space, training, and funding	The start-ups will solve the corporate needs.	The design consideration for the incubation program is similar to ICCubeX. However, the corporate accelerator participant has strong support from the corporate and has the corporate itself as the customer.
Nair and Blomquist (2019)	56 incubator managers/business coaches and entrepreneurs, 9 Swedish business incubators.	Sweden	Early idea modification and stakeholder involvement. Business incubation - predictive (perceptions of scalability and temporal exit stages) and non-predictive (team focus, stakeholder involvement, and collaborative	Incubator managers/business coaches and entrepreneurs	Early idea modification and early stakeholder involvement impact and constrain the precursors of growth, similar to early involvement in the potential start-up in the early stage of the ICCubeX program.

			platforms and spaces) strategies.		
van Rijnsoever (2020)	100 startups	Western Europe and North America	Network among start-up Field building/facilities Network start-up with VC	Start-up Field building/facilities VCs	The model has demonstrated that a sufficiently robust network among start-ups is the key to overcoming weak network failure in an FSN. Other than that, field building is also one of the most effective support systems in increasing mating chances between start-ups and VCs. Compared to ICCubeX, the findings do not mention entrepreneurial training for managerial start-ups.
van Rijnsoever and Eveleens (2021)	935 entrepreneurs	North America and Western Europe	Tangible and Intangible resources	Incubation program	Start-up entrepreneurs with incubation experience develop the capability to value resources that are consistent with VRIN argumentation more than non-incubated start-up entrepreneurs. Start-up entrepreneurs with incubation experience value intangible resources (training & coaching, shareholder involvement, legitimacy) more than their non-incubated peers.

					Networks provided by incubators contribute to sustainable competitive advantages. These findings validate the ICCubeX model for tangible and intangible resources.
Vaz, Teixeira, and de Carvalho (2022)	16 founders of technology-based start-ups	Portugal	Incubation factors that enhance or hinder their overall incubation experience.	Entrepreneurs consider intangible resources and social and relational aspects the most enriching dimensions of their incubation experiences and conclude with the services they consider more important.	Negative aspects of the incubation experience are mostly related to the non-regular periodicity of mentoring sessions, training events provided by external entities, and issues while using services provided by external incubators' partners. ICCubeX also provides good intangible resources.
Munkongsujarit (2016)	56 business incubators	Thailand	Programs and initiatives include the National Science and Technology Development Agency (NSTDA) (2002). University Business Incubator (UBI) supports the technology Commercialisation from both public and private universities in Thailand (2004). University as a mentor to new start-ups and shares the business network among the 56	To increase the number of start-up companies from 56 incubators and to increase each company's revenue.	Thailand's University Business Incubator faces obstacles that impede successful results. Five major obstacles faced by UBI are the KPIs for the number of start-up formations, budget constraints to run the incubator, lack of experienced and skilled staff, lack of entrepreneurial skill among the start-ups, and weak business

			incubators in 9-region networks.		ecosystem in Thailand. Compared to the scenario in Malaysia, various agencies, such as MTDC, Mranti, Cradle, IRDA, and Teraju, provide funds for Commercialisation and start-ups that have direct engagement with ICC.
Wahyuni and Noviaristanti (2022)	992 start-ups and 23 business incubators	Indonesia	Provide resources and expertise to attract venture capital to invest in start-up companies.	Offer programs that provide selected start-ups with funding, mentorship, resources, and access to networks	Data suggest that the majority of Indonesian business incubation programs lack the means, know-how, and standing necessary to draw in venture capital. Most services provided by business incubators in Indonesia were implemented in the ICCubex program and are continuously upgraded to fulfill the needs of each start-up and incubator participant.
Tritoasmoro, Ciptomulyono, Dhewanto, and Taufik (2022)	12 respondents, including start-up graduates from the incubation program, program managers, and mentors. 30 start-ups incubated at Bandung Techno Park for the 2014–2017 period.	Indonesia	Adapting the lean start-up (LS) framework prioritizes connectivity with potential customers from the beginning of product and business development.	University start-ups.	This study confirms that several LS incubation metrics significantly affect start-up sustainability after incubation. ICC UTM initiates the Innovation Business Engagement (IBE) Program to monitor the sustainability of

					UTM's start-ups in terms of technology licensing and product Commercialisation.
Tang et al. (2021)	5 next-generation TBIs are clustered in the Zhongguancun region of Beijing, the 'Chinese Silicon Valley.'	China	<p>Quadrant 1: low availability but high absorption of entrepreneurial resources, aims to provide venture tenants with very limited types of entrepreneurial resources but focuses on fully assisting them in absorbing entrepreneurial resources.</p> <p>Quadrant 2: High availability and absorption of entrepreneurial resources, aim to provide venture tenants with a wide range of entrepreneurial resources and assist them in absorbing them in-depth.</p> <p>Quadrant 3: Low availability and low absorption of entrepreneurial resources, aims to provide as many venture tenants as possible essential types of entrepreneurial resources as possible and as many essential types of entrepreneurial resources.</p> <p>Quadrant 4: High availability and low absorption of entrepreneurial resources, aims to</p>	Technology Business Incubators (TBIs)	<p>The incubation policymakers should facilitate communications between market-oriented and traditional government-sponsored incubators, provide favorable conditions for traditional incubators to learn from market-oriented incubators, and assist them in developing appropriate strategies and complementary business models.</p> <p>In Malaysia, the government does not interfere in the incubator operation, and there is no related incubation policy. Still, there is 'Prosedur Penubuhan Syarikat Hiliran UTM' as a guideline for UTM's start-ups.</p>

			provide venture tenants with multiple entrepreneurial resources but cares little about their entrepreneurial resources' absorption.		
Bandera and Thomas (2017)	The study analyzes data from the Kauffman Firm Survey (KFS) and County Business Patterns (CBP) datasets.	USA	Leverage the available social capital. Engage in collaborations.	To create an environment fostering social capital and collaboration among start-ups, established companies, universities, and other stakeholders. The incubator aims to facilitate interactions and relationships that allow start-ups to leverage social capital, including resources like information, knowledge, and connections.	Start-ups need to actively collaborate and effectively utilize the available social capital to improve their chances of survival and success. ICCubeX program provides a more comprehensive and structured approach, offering a complete journey from novice researchers to successful technopreneurs, encompassing social capital, technical skills, business acumen, and sustainable entrepreneurial practices.
Pauwels, Clarysse, Wright, and Van Hove (2016)	13 accelerators	Europe	Methods to accelerate and support the creation of successful entrepreneurial companies: 1. Program package (mentoring services, training program, counseling services, demo day/ investor day, location services, and investment opportunities).	As a new incubation model, the accelerator program is targeted to provide support and bring positive advancements to start-ups to improve the probability of survival and accelerate their development and growth journey.	The research has identified the accelerator model's key design parameters consisting of five accelerator design elements and three accelerator design themes (ecosystem builder, deal-flow maker, welfare stimulator) In this program package, ICC fund recipients will

			<p>2. Strategic focus (accelerators' strategic choices regarding the industry, sector, and geographical focus).</p> <p>3. Selection process (online open call, the team as a primary selection criterion, use of externals for screening - selection committee comprises mentors, investors, and alumni to help shortlist companies in its program).</p> <p>4. Funding structure (investor funding, corporate funding, public funding, and alternative revenue).</p> <p>5. Alumni relation (alumni network, post-program support).</p>		<p>automatically be incubated in the ICCubeX Program and offered a series of free entrepreneurship training and subsidized complementary incubation rooms with shared facilities for a certain period.</p>
Hemmert et al. (2019)	60 Information technology start-ups	China, Japan, and South Korea	<p>Sufficient availability of government funding at a city level, such as venture capital funds and angel investors. Policymakers to design more targeted support programs. Support services and communities well support Chongqing's start-up entrepreneurs.</p>	<p>To complement and help weak start-ups. More targeted support programs for high-potential start-ups.</p>	<p>The authors identified various common features of entrepreneurial ecosystems, including the size and type of aggregations, the size and characteristics of networks, and the nature of government support policies. UTM has a guideline for UTM's start-ups and spin-off companies.</p>

<p>Nicholls-Nixon, Valliere, Gedeon, and Wise (2021)</p>	<p>400 companies under DMZ (university-based incubator-UBI)</p>	<p>Canada</p>	<p>Identity-Legitimacy-Life Cycle (ILLC) model provides a useful theoretical lens for explaining how resource providers in the local university and city/region ecosystem shape the evolution of a UBI.</p>	<p>To change the research conversation from past static accounts of what is being done by UBIs to a more explanatory and theoretically based account of why and how UBI activities change over time.</p>	<p>Additional resources progress through distinct stages in the ILLC model, and the legitimacy requirements of key resource providers drive change in the UBI's identity and attributes as it progresses through these stages. ICC UTM initiates the IBE Program to monitor the sustainability of UTM's start-ups in terms of technology licensing and product Commercialisation.</p>
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In Thailand, the business incubation conducted under UBI is understaffed and lacks key skills. Most staff members are new to business incubation. Consequently, the incubator program cannot be carried out well, and the high staff turnover rate makes it difficult for the business incubator to sustain its objectives. ICC, which runs the ICCubeX program, has 31 staff (in 2023) who are also exposed to the turnover risk due to the university's requirements and direction. Although the level of staff achievement at ICC is slightly above par, long-term training is needed to ensure that the staff's knowledge and skills can support the effectiveness of the incubator program.

Incubation can contribute and create value in developing ventures from multiple resources and providing specialized support for start-up entrepreneurs. Vaz et al (2022) explained the most enriching dimensions of their incubation experiences are intangible resources and social and relational aspects, which are more important. The study also reveals negative aspects of the incubation experience, mostly related to the irregular period of mentoring sessions, training events provided by external entities, and issues while using services provided by external incubator partners. Even though incubation experience lowers the valuation of tangible resources incubators offer to execute a potential prototype or product (van Rijnsoever & Eveleens, 2021), incubatees need seed funding to develop the prototype. The ICCubeX incubator program, based on TRL, provides several seed funds to help them upgrade to another technology level to be a market-ready product. The funds support prototype development, product or technology showcasing in Technovation Park, industry alliance, and product Commercialisation. In addition, incubatees will be offered a complete package with

the sharing facilities to ensure they are well-equipped with a conducive business environment in their Commercialisation journey.

Tangible and intangible resources are important to new start-up entrepreneurs. van Rijnsoever and Eveleens (2021) used tangible (physical space and financial capital) and intangible (business knowledge, legitimacy, and network) resources as a basis for their study. Meanwhile, sustainable competitive advantages must be valuable, rare, inimitable, and non-substitutable (VRIN). Findings from this study also show that start-up entrepreneurs with incubation experience value intangible resources more than their non-incubated peers, and networks provided by incubators contribute to sustainable competitive advantages. Entrepreneurs consider intangible resources and social and relational aspects the most enriching dimensions of their incubation experiences and conclude with the services they consider more important.

Additionally, intangible aspects, such as social capital, are important (Bandera & Thomas, 2017). It describes how social networks, relationships, and interactions within an incubator environment can influence the success and growth of start-ups. The research also highlights that access to valuable resources, mentorship, knowledge sharing, and collaboration facilitated by social capital can greatly impact the development and outcomes of start-ups within an incubator setting. In addition to receiving ICC funds, ICCubeXs' incubators gain business knowledge and other upskilling from subsidized training given by novice researchers to successful technopreneurs, legal advice, and the opportunity to widen their network through exhibitions, pre-Commercialisation or Commercialisation funders.

Wahyuni and Noviaristanti (2022) found that 88.40% of the 992 start-ups in Indonesia favor independent models because they are more adaptable and self-sufficient. Already established companies founded 5.24% of start-ups. Only 6.35% of start-ups were founded and nurtured via business incubators. This data suggests that most Indonesian business incubation programs lack the means, know-how, and standing to draw in venture capital. Due to a lack of talent among the staff and inappropriate processes for fund management, a business incubator was less effective, which pushed entrepreneurs to launch their businesses independently. The product development stages were conducted at the research level with at least TRL 3 before it was evaluated for the ICCubeX incubator program. Most services provided by business incubators in Indonesia are implemented in the ICCubex incubator program and are continuously upgraded to fulfill the needs of each start-up and incubator participant. The ICCubeX program lacks product development experts to guide the start-ups even though funding for prototyping activities has been allocated. However, ICCubex should utilize the wide range of lab services available at the university to overcome this problem. Therefore, there were no requirements to have lab services in the business incubator. This approach will increase the lab utilization hours and generate income to sustain the lab operation.

Tritoasmoro et al (2022) studied the effect of business incubation metrics based on the LS framework adaptation on start-up survival after 30 start-ups incubation at Bandung Techno Park during the 2014–2017 period. They analyzed the obstacles in implementing the LS framework. They identified the start-up incubation metric components that affect a start-up's post-incubation survival. They found that incubation metrics that positively affect a start-up's post-incubation survival are related to its ability to determine appropriate problem-solving hypotheses, find early adopters, and pivot as needed. Compared to the ICCUBEX program, no specific method or framework is implemented for the graduated participants' sustainability. However, ICC UTM has initiated the IBE program to monitor the sustainability of UTM's start-

ups regarding technology licensing and product Commercialisation. Besides, the engagement also discusses the issues, challenges, and opportunities faced by UTM's start-ups and the reminder on rules and regulations for operating the start-ups in public universities.

Nicholls-Nixon et al (2021) studied 400 companies under DMZ, one of the reputable UBIs in Canada, aimed at understanding the forces that explain why and how UBIs change over time. The study uses the ILLC model (Fisher, Kotha, and Lahiri. 2016), to explain how the pursuit of resources and organizational legitimacy shapes the development of UBIs together with the key strategic and operational dimensions. The research highlighted the dynamic interrelationship between UBI, members of the university, and the city ecosystem driven by the UBI's increasing need for resource access to support its development and growth. However, the ILLC model does not consider the differences in resource providers' power or the politics involved in managing relationships across various stakeholder groups. Meanwhile, in the context of ICCubeX, the key strategic and operational functions strongly depend on the sustainability of the resource provider, especially from government funds and the political situational involved in granting the funds to the researchers and the infrastructure built to improve the Commercialisation ecosystem.

Hemmert et al (2019) found that in oriental countries like Japan, China, and South Korea, the entrepreneurial ecosystems rely heavily on government funding at the city level to assist new and weak start-ups. The Silicon Valley start-ups are heavily dependent on private and venture capital funding. In addition, government policies have assisted many high-potential start-ups in supporting programs for innovation and Commercialisation. In line with the ICCubeX incubation program, UTM has developed the UTM Spin-Off company Establishment Procedure as a guideline for researchers to increase product and service Commercialisation from UTM to the strategic level based on the laws outlined.

Discussion

Overall, the ICCubeX incubation program is close to the ideal practice of an incubation program based on comparing it to incubation programs in other countries. An ideal incubation program should have clear objectives and focus (Kohler, 2016). The program should have well-defined goals, whether fostering specific industries, promoting social innovation, or supporting technology start-ups. More funding opportunities should be provided, whether through seed investment, grants, or connections to investors, because it is crucial for start-ups' development (Klaasa & Thawesaengskulthai, 2018; Munkongsujarit, 2016; van Rijnsoever, 2020; van Rijnsoever & Eveleens, 2021; Wahyuni & Noviaristanti, 2022). Regular workshops, training, and mentorship should cover essential aspects of entrepreneurship, from business planning to how to sustain the business (Klaasa & Thawesaengskulthai, 2018; Munkongsujarit, 2016; van Rijnsoever, 2020; van Rijnsoever & Eveleens, 2021; Vaz et al., 2022; Wahyuni & Noviaristanti, 2022).

Other than that, incubation facilities are needed to support start-ups and provide a conducive environment that offers a range of resources and services to help start-ups succeed (Klaasa & Thawesaengskulthai, 2018; van Rijnsoever, 2020; van Rijnsoever & Eveleens, 2021; Wahyuni & Noviaristanti, 2022). As for start-ups from a university, the product development should use the university's facilities, such as laboratories and workspaces. Furthermore, policymakers should promote start-up formation and sustainability to ensure the start-up can grow successfully (Tang et al., 2021). Monitoring activity is needed to ensure the sustainability

of the start-up and create self-efficacy and resilient technopreneurs (Nicholls-Nixon et al., 2021; Tritoasmoro et al., 2022).

Another novelty of the ICCubeX incubation program is the TRL-based stages, which are used to monitor a start-up's progress and development. Providing training and funding can also be based on TRL. As TRL increases, more advanced training and funding will be provided.

Conclusion

The ICCubeX incubation program represents a significant stride towards expediting the lab-to-market process for innovative technologies and research outputs. By offering a comprehensive framework encompassing mentorship, resources, networking, and tailored support, this incubation model addresses the multifaceted challenges that often hinder the seamless transition of research outcomes into the market. The paper has shed light on the vital components of the incubation model, emphasizing its adaptability to diverse disciplines, technology readiness levels, and entrepreneurial aspirations based on the literature review from other countries. The journey from laboratory to market breakthroughs is intricate. Still, with a structured incubation model, it becomes a journey of promise and potential, where innovation finds its path to changing lives and shaping industries.

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