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New Strategic Role of Science Parks in Cities: Regional Innovation Ecosystem Management Coordinator, and the case of Isfahan Science & Technology Town (ISTT) in Isfahan Region"

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Authors:

Sepehr Assadian
Mehdi Keshmiri

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"New Strategic Role of Science Parks in Cities: Regional Innovation Ecosystem Management Coordinator, and the case of Isfahan Science & Technology Town (ISTT) in Isfahan Region"

Sepehr Assadian[1], Mehdi Keshmiri[2]
Isfahan Science & Technology Town (ISTT)

Abstract

In this paper, we examine the case of one Science Park and how it has faced with further transformation, from local k-based economy development and entrepreneurship facilitation center to an innovation hub and regional innovation ecosystem coordinator in its region. One of the hallmarks of an innovation ecosystem coordinator is that it accesses to all main elements in the ecosystem. A sustainable regional innovation ecosystem must include four main factors: talents, local technologies, global networks, top-runners and attractive players. The case of Isfahan Science and Technology Town (ISTT) illustrates how one science park has benefited from its circumstances as an innovation development structure among other ecosystem players (entrepreneurs' community, finance, academia, private and public sector) and implementing innovation national economy road development programs.

Keywords: Innovation, Ecosystem, Science Park, Region,

Introduction

Science and technology parks (STPs) are increasingly a decisive part of the new global technology revolution, aiming to bring together innovative, entrepreneurial thoughts along with the components necessary for commercial impact. Moreover, science parks as the links between academia, industry, and society are considered as one of the key elements of the regional innovation ecosystem. Indeed, nowadays, developing innovation ecosystems as being grounded in effective interactions among STPs, universities, corporations, entrepreneurial community, the government and risk capital. This collaboration has served critical support to creating the knowledge foundations, to solve short-term, incremental problems, to provide a flow of fresh talent.

STPs follow different objectives in the region, and they could be classified into different categories. Some of them are university science parks that focus mostly on the commercialization of research results performed in universities and create technology hubs based on the university achievements. Many science parks are urban parks that develop science and technology in the society and lead to creating and developing business innovation in the community, facilitating entrepreneurship in the society, and promoting the knowledge-based economy. The urban parks could play a dominant role in the region to shape and enhance regional innovation ecosystem by leading and coordinating its strategic partners and players.

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[1] Director, Ecosystem Experience, ventureLAB, Toronto, CANADA
[2] President, Isfahan Science & Technology Town (ISTT), Isfahan, IRAN

Regional innovation ecosystems are the main cornerstones of innovation-driven societies. They are built on local know-how and are aimed to bring out the best in innovation processes. They focus on collaboration of academic knowledge, the experience of the private sector, and demand of society, resulted in market-driven commercialization processes. In most cases, initially these regional ecosystems are developed around a knowledge hub organization such as an STP, but if the STP could not coordinate and manage the key components, it might lose its leading role and authority.

One of the most major challenges for the science parks in their regions, to coordinate and develop the ecosystem, is that their regions have countless NGOs, private and public organizations whose primary goal is helping entrepreneurs. For an instant, according to recent research by Isfahan Plus, an Iranian Technology news website, over 40 innovation hotspots are active in the Isfahan region alone. Add to these all of the various networks, venture groups, and NGOs, and it quickly becomes difficult to see the wood for the trees. Therefore, to find the way in the landscape of regional innovation ecosystems, science parks can use the "Ecosystem Canvas" tool. This model would help them improve their knowledge of both the innovation landscape and the strategic players and partners. This tool enables STPs to have better understand how cooperation with other players in the ecosystem can result in win-win propositions.

The ecosystem canvas is an at-a-glance overview of the critical components of the regional innovation ecosystem. These key components include policy and regulation, networks and markets, capital and resources, talent and champions, culture and communities, infrastructure and programs, and vision and strategy.

In this paper, we examine the case of one Science Park and how it has faced with further transformation, from local k-based economy development and entrepreneurship facilitation center to an innovation hub and regional innovation ecosystem coordinator in its region. One of the hallmarks of an innovation ecosystem coordinator is that it accesses to all main elements in the ecosystem. A sustainable regional innovation ecosystem must include four main factors: talents, local technologies, global networks, top-runners and attractive players.

The case of Isfahan Science and Technology Town (ISTT) illustrates how one science park has benefited from its circumstances as an innovation development structure among other ecosystem players (entrepreneurs' community, finance, academia, private and public sector) and implementing innovation national economy road development programs. This important position, programs, and structure seek to develop new technology-oriented business capabilities among Technopreneurs, startup ventures, mature companies, and industry clusters in Iran.

Establishments of ISTT in Isfahan was a move initiated by academia, industries and local governments with supports offered by the central government. ISTT not only created several STPs and Technology business incubators in the region, but it has also been able to influence the regional development plans due to its organizational structure which has the provincial government of Isfahan as the head of its executive board.

Furthermore, we reviewed the key components of Ecosystem Canvas and created Isfahan's one to examine ISTT's effect on each element. Evaluation of these impacts helped us explored ISTT

role in creating value and developing innovation ecosystems. Then we considered solutions empowered ISTT's situation as a coordinator in the ecosystem.

Knowledge Region

Concentration on a region and its development is one of the primary responsibilities for local governments to reduce the rate of youth, talented, and professional resources migration to other areas or even other countries.

A region is a "geographical area surrounded by specific borders and characterized by cultural and social activities in a society which consist of political and public organizations, industrial firms and academic institution". These institutional structures form the quarto helix to enhance regional growth and development.

Following the definition, the regional development includes four main topics: economic, social, cultural and technological development. Based on the global point of view, regions all over the world compete with one another to develop sustainably. They define long-term strategies and implement executive plans and solutions including but not limited to locating of Foreign Direct Investment (FDI), propagating the culture of innovation and entrepreneurs among citizens, developing entrepreneurial skills, providing the infrastructures business, and attracting the talents to settle or migrate to (Sheikh-Zeinoddin, Assadian, Danesh, & Maghsoodian, 2013). The entrepreneurial skills development, public and private services and programs to support the entrepreneurship, besides the high potential economic and industrial opportunities, create flows of capital and technology and shift to the knowledge-based region.

Economic development is considered one of the most important and influential factor(s) in every regional development. The concept of economic development is an economic procedure which causes fundamental and adequate qualitative changes in the structure of society or region.

Nowadays, knowledge is the most important contributing factor in designing and running the developed societies. Moreover, by developing knowledge-based products and services, the region economic development could alter (Sheikh-Zeinoddin, Assadian, Danesh, & Maghsoodian, 2013).

To shift to the knowledge region and have knowledge economy most nations, at the national, regional and municipal levels, are running different supporting programs and mechanisms popularly known as science and technology parks (STPs) and incubators (Mian, 1997). Science and technology parks by running different supportive programs, providing the financial resources and available talent and mentorship pools, can help entrepreneurs develop their innovative ideas and build own businesses. It is now emphasized that, in this new global economy, innovation and entrepreneurship are engines of regional economic growth and knowledge-based SMEs and startups are critical contributors to that growth. (Mian, Fayolle, & Lamine, 2012)

Innovation Ecosystem

The concept of innovation ecosystems has become more popular in last ten years due to several business articles in websites like Entrepreneurs or Inc and books such as Startup Communities by Felds. These works have spread out the concept amongst main players and policymakers that

different actors and conditions need to interact appropriately to managing and have a significant impact on the entrepreneurship process in regional level (Stam & Spigel, 2016).

The first component of the term is innovation: a process in which new opportunities are recognized, evaluated and applied for creating products and services. The innovation ecosystem often limited the entrepreneurship to ‘unicorn start-ups’ or ‘scale-up’ and confine this type of startups as the major source of innovation, productivity growth, and job creation. Theoretically, networks of innovative start-ups or intrapreneurs can also be part of impressive entrepreneurship, create innovation and source of regional development. According to the concept of the innovation ecosystem, it is clear that the entrepreneurship definition does not include the traditional factors of entrepreneurship, such as 'self-employment' or 'small businesses' (Stam & Spigel, 2016).

The second component of the term is an ecosystem. In biology, ecosystem refers to mutual dependences among particular plant or animal communities and the physical environment (non-living) that support them (Tansley 1939). The ecosystem definition can be extended to the dynamic concept of an innovation ecosystem. The innovation ecosystem is the concept used to define the large number and diverse nature of players and resources that are necessary for innovation and entrepreneurship. These players include "entrepreneurs, investors, researchers, university faculty, R&D, venture capitalists as well as business development and other technical service providers such as science parks and incubators and public and governmental organizations. The innovation ecosystem definition highlights the multiple institutional factors that affect the way in which an innovative idea finds its way into the marketplace. This way goes through a series of complex processes, interactions taking place within a real economy and its players. (Wessner 2005).

Innovation ecosystems are necessarily connected to geographic regions. Therefore, innovation ecosystems focus on the society, institutions, politics, culture, and networks that developed within a region over time. Regional sustainable development, as a result of the innovation ecosystem, defined as the process by which region develops its main factors includes economic, social, cultural one within innovation and knowledge (Stam & Spigel, 2016). The sustainable development will eventually promote an innovation culture comprises creativity, initiative, taking estimated risks and social, geographic and professional mobility (Patris, Valenduc, & Warrant, 2001). The innovation ecosystem also has to do with developing skills which have different manifestations, like knowledge-based startups, knowledge economy, and entrepreneurial talent pool. The entrepreneurial talent pool seems to be the most influential player in a knowledge-based region.

In other words, the regional innovation ecosystem is a complex and reciprocal interaction among stakeholders, processes, and organizations in a structured context. (Cukier, Stolarik, Ngwenyama, & Elmi, 2016) The Innovation Ecosystem has set the platform to deploy technological innovations. These have brought about many entrepreneurs who find it easier to develop their ideas. Krueger (2012) argues that just as it is critical to nurture a more entrepreneurial mindset, communities need to develop an innovation and entrepreneurial ecosystem that supports the increasing entrepreneurial activity (Cukier, Stolarik, Ngwenyama, & Elmi, 2016).

Therefore, an innovation ecosystem can be defined as a connected group of institutions which aid the entrepreneur to throw all the stages of new business development (Andrez, Johannisse, Leo, & Romanainen, 2017). Also, as regards of increasing the number of startups in recent years, its

innovative products and services, and their role has modified the innovation ecosystem title to the startup ecosystem.

The entrepreneur (and his team) as a founder of the startup with the ambition to grow it is the figurative element of innovation ecosystem and this ecosystem must incorporate adequately to support the entrepreneur. Regarding the supporting factors involved in an ecosystem, two levels can be distinguished (Andrez, Johannisse, Leo, & Romanainen, 2017):

• Level 1: contextual factors that vary in each region and define the conditions in which entrepreneurial activities run. These factors can be divided into a) political & legal framework, b) cultural & institutional environment and c) economics & regional dynamics.

Level 2: includes several actors who support the entrepreneurs and their businesses directly. These actors/institutions can be divided into various fields includes IP and technology development institutions (universities and laboratories), public support (e.g. government, public grant providers and regional innovation hubs), professional support (e.g. management consultants, legal firms and accountants), funds (e.g. angel investors and VCs), industry (SMEs, established businesses, and R&D), and primary support and facilitate organizations (science and technology parks, incubators and accelerators).

While models of innovation ecosystems are different in part depending on geographical position, goal and strategies, the key elements include (Cukier, Stolarik, Ngwenyama, & Elmi, 2016):

- Universities and Higher Education Institutions: which are a source of science, new technologies, IP and talent for startups, R&Ds and public organizations
- Startups: which create and develop through a process in which opportunities for creating new goods and services are explored, evaluated and exploited. Sometimes startups are formed as result of the corporation between private sector and universities to commercialize new technologies.
- Established Businesses: which may apply innovations and provide financial resources, and investment, technology development platforms and open innovation opportunities via initial orders to startups.
- Financial institutions, Banks, and VCs: who provide funding for startups and existing businesses.
- Human capital: the most critical element, may be as fresh graduates, from existing companies, or new residents and immigrants.
- Intermediaries which provide support and infrastructures to ease the facilitate initial business development processes. The intermediaries include incubators, accelerators, business advising services, etc. and maybe run by universities, public sector, private sector.
- Government and policy makers who develop policies that may promote innovation, provide significant policies and strategies to support innovation ecosystem and are also themselves applying innovation and technologies.
- “Culture,” which is broad, vague and opaque, refers to the attitudes, beliefs, mindsets, and values in a society related to entrepreneurship, technology, and innovation.

In recent years, policymakers in national and local levels start developing the regional sustainable development strategy to shift regions to the knowledge-driven ones. In the knowledge-driven regions, technology and science have become a key factor for economic development. As a

significant source of advanced technology and innovation, human capital is playing a crucial role in the innovation process of regions and countries (Zhang, Cao, Dong, & Cantwell, 2017). As well, the governments invest in intermediating and supporting institutions like science parks contribute to facilitating running new ventures and startups (Almeida, 2005).

The development of intermediating institutions such as science parks and incubators can provide platforms in playing a pivotal role in this regard by lining up the interests of multiple stakeholders especially the talent pool within an innovation ecosystem with defined sustainable regional development. These intermediating institutions platforms ease the collaboration established businesses, higher education institutions, and laboratories, as well as venture capital firms and financial institutions within innovation ecosystem. Science parks in regional ecosystems consist of knowledge-generating and exploitation sub-systems linked to global, national and other local systems for commercializing new knowledge as technology (Mian & Hulsink, 2009). A science park in innovation ecosystem as its focal point may manifest a coordination role depending upon the science park's governance structure and the regional context. It leads us towards the Role of science parks in innovation ecosystem and critical elements of a coordinative regional innovation system framework (Zhang, Cao, Dong, & Cantwell, 2017).

Science Parks and Regional Innovation Ecosystems

Innovation is becoming more and more crucial for businesses to compete in the market and stand out. It means more talent and innovative employee need, increasing R&D expenses and facilitate innovation processes. In addition to this, the definition of innovation is changing. Trends such as technological disruption, the rise of corporate venturing and open innovation increasingly taking place inside chains or networks, rather than just inside a single organization. Because of these transformations, the term 'innovation ecosystem' has become increasingly popular. Governments, startups, established companies and knowledge institutions consider it to be the place for open innovation, so they are interested to be part of it or help shape it. Science parks as one of the leading factors in developing the innovation ecosystem should have a clear picture about this network to facilitate the new venture creation process for entrepreneurs and lead the services to the proper clients.

The growing role of the STP in the regional innovation ecosystem is largely a result of the development of entrepreneurial culture and influential role of tech startups in regional economic development. Tech startups, access to talent capital is increasingly more available, and there is greater potential for interaction and collaboration within a community and higher education institutions. These startups and its founders and teams form an innovation ecosystem where new technological discoveries can be rapidly tested locally and then expanded as a viable business (The Next Silicon Valley, 2012). Bringing such human capital together into one region and synergy of individual talents can lead the region to larger and more efficient innovation ecosystem. This kind of ecosystem can greatly facilitate the development of ideas from innovators with little or no prior entrepreneurial experience and help them run their startups from scratch. According to the Science park definition by IASP (IASP, 2017):

"A science park is an organization managed by specialized professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions. To enable these

goals to be met, a science park stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies, and markets; it also facilitates the creation and growth of innovation-based companies through incubation and spin-off processes; and it provides other value-added services together with high-quality space and facilities."

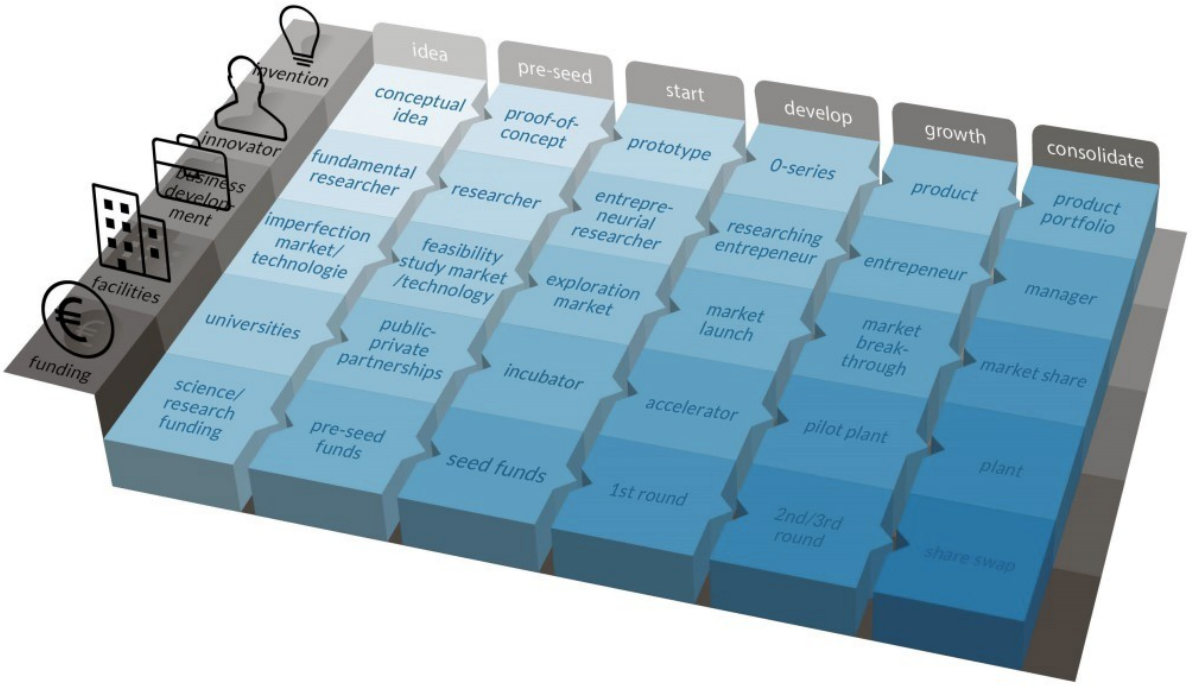
The science parks are the primary coordinator and key player to run and deploy the innovation ecosystem in regions and attune the player's role in this service network and facilitate entrepreneurship in society. Moreover, the symbiotic relationship between science parks and the surrounding region is crucial to the innovation ecosystem that fills in gaps that exist in the region and add value to society (National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 2013).

One of the most significant challenges for the science parks in their regions, to coordinate and develop the ecosystem, is that their regions have countless NGOs, private and public organizations whose primary goal is helping entrepreneurs. For an instant, according to recent research by Isfahan Plus, an Iranian Technology news website, over 40 innovation hotspots are active in the Isfahan region alone (Isfhan Plus, 2015). Add to these all of the various networks, venture groups, and NGOs, and it quickly becomes difficult to see the wood for the trees. Therefore, to find the way in the landscape of regional innovation ecosystems, science parks can use the "Ecosystem Canvas" tool. This model would help them improve their knowledge of both the innovation landscape and the strategic players and partners. This tool enables STPs to have better understand how cooperation with other players in the ecosystem can result in win-win propositions.

As many parties are involved in innovation ecosystem, it is difficult to realize such a complex innovation ecosystem. This complexity is recognized more in particular by governments and intermediating organizations that wish run the ecosystem. To help these organizations to find a clear picture of innovation ecosystems, KplusV – a consultancy firm specializing in public-private cooperation – has developed a particular model: the 'Ecosystem Canvas' (Nellestein, 2016).

governments and intermediating organizations can apply this model to improve their knowledge of both the innovation structure and the strategic corporation between key players. This lets them have entrepreneurs better view on which innovation ecosystems there are, how these can be applicable and helpful for their businesses, and how work with other players inside the ecosystem can result in a win-win situation. 'With the Ecosystem Canvas, they can show entrepreneurs where they should go with which issue in which innovation stage. And thereby boost innovation and entrepreneurship', Nellestein explains (Nellestein, 2016).

The Ecosystem Canvas designed in two dimensions. First, it defined in six stages of an innovation process. An innovation process defined in six stages, in which an innovative idea 'grows over into a product. These are the idea, pre-seed, start, develop, growth and consolidate stages. The other dimension includes four different building blocks that are necessary to develop an innovative idea into an innovation. This is composed of four building blocks: the (skills and role of the) innovator, business development, facilities and funding (Picture 1).



Picture 1- Innovation Ecosystem Canvas

Case study- Isfahan Science and Technology Town (ISTT)

Establishment of Isfahan Science and Technology Town (ISTT) in Isfahan was a move initiated by academia, industries and the provincial government with supports offered by the central government. ISTT not only has created several STPs and Technology Business Incubators in the region, it has also been able to influence the regional development plans due to its organizational structure which has the provincial government of Isfahan as the head of its executive board. ISTT's proximity to Isfahan is a remarkable advantage for firms and industrial units in the region, enabling them to establish links with the universities and industries in the region and to expand their economic activities.

Also, ISTT's proximity to Isfahan University of Technology provides a mutual advantage and opportunity for industry and university. The collaboration between researchers from the university and professionals from the industry results in regional development through the advancement of regional technology.

According to the characteristics of this region, ISTT's mission can be defined as:

● To provide opportunities for improving collaboration between industry and university to apply knowledge in industry.

● To support and lead new technologies toward regional sustainable development (environmentally friendly technologies)

● To provide opportunities for generating, developing and transferring new technologies and creating the basis for knowledge-based economic development in region by knowledge-based enterprises.

In order to accomplish its mission, ISTT's top management develops and runs several solutions and programs. For instance, international relations and commercialized technologies program. ISTT has also run a program called Technology born Industries since 2009, aimed at developing technologies needed for high tech industries by attracting venture capitals in the region.

According to the innovation ecosystem canvas and the ISTT's mission, ISTT position as the lead player in Isfahan innovation ecosystem could cover most of the blocks in this canvas. ISTT by participating in running the university-based pre-incubators and incubators and sharing more than 2 decades of experience helped the higher education institutions. ISTT every year runs different workshops, presentations and events to promote entrepreneurial culture in most of universities in the province. These events try to walk the researchers and university faculty members through commercialization and basic steps of running business. In addition, commercialization and technology transfer department in ISTT provides different types of services for innovators to protect their ideas and find the proper solution to commercialize.

In Start stage, pre-incubation program has been developed to help entrepreneurs test their ideas, develop their teams and validate the market. Pre-incubation is one of the most successful and applicable solution for most of the small regions and cities around the province which help people to get familiar with the basics of entrepreneurship and innovation. ISTT helps local governments to develop entrepreneurial culture and restrains talent capital from these regions to lager cities. By offering limited seed funds and its expertise, ISTT corporates in running more than 12 pre-incubation centres and local governments provides the physical infrastructure which motivate entrepreneurs to start their businesses in their own regions.

In Develop stage, ISTT runs incubation program to help startups develop the prototype, expand the team, test the market, and pivot. ISTT as a public organization access to the governmental budgets to cover part of seed money needed to create a new venture in incubation program. ISTT runs more than 10 incubators in different fields (like art, agriculture, ICT, advanced materials, culture) and locations to cover most of the expectations from entrepreneurs in the society. As ISTT tried to cover most of the technology fields in the incubation program, its network among the industries is developed properly. ISTT create a well-known brand among the established businesses and industries which can be useful for the startups to access to the end-users and customers. Besides, ISTT provides the reliable network among the large R&Ds, labs, and technology-based startups which can facilitate the access to the source of innovation and IPs for its clients (entrepreneurs). In funding block, ISTT arranged access to the different financial resources (like banks, VCs, Public institution) through its network. Also, ISTT established its own investment foundation which ease access to the low interest loans for its clients.

ISTT as a pioneering organization, is a combination of many Science Parks and Incubators. Science parks in ISTT were designed to propose services to mature and established businesses. The services in Growth stage are more centralized on the development. The regional partners in this stage are mostly from industries, private institutions, VCs and private service providers.

Moreover, ISTT defined a structured internationalization process which help established ventures to access to international and global opportunities.

Moreover, ISTT plays a critical role as a public funded organization to moderate and lead the governmental strategies and financial resources. As the head of ISTT executive council is the governer, ISTT could perform influencial role in designing and implementing regional and provincial master plans which resulted in developing sustainable innovation ecosystem in region.

Conclusion

it seems that the true role of ISTT has been to create and develop the innovation ecosystem by spreading out the culture of innovation and providing related infrastructures and networks. It can be clarified that the highest priority of the ISTT is coordinate the regional innovatin ecosystem, attract more local qualified players and start finding the invaluable opportunities to motivate international players to be part of this ecosystem.

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