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Evolving STP/Incubator Roles in the City of Nanjing
Experimental Pioneer in facilitating the sustainable industry-university
linkages

PARALLEL 4
New business models for incubators in STPs

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“Bitter are the roots of knowledge, but its fruit is sweet. - Marcus P. Cato, 234-149 BC”

Executive Summary

China's 12th Five-Year Plan, 2011 - 2015, aims to restructure the Chinese economy by encouraging domestic consumption, developing the service sector, shifting to higher value-added manufacturing, conserving energy, and cleaning up the environment. This implies the economy growth structure has to shift from “attracting investment to center on production infrastructure and export-led” to “focusing on the establishment of research and development infrastructure to revitalize innovation”. This paper argues that strengthening the university-industry linkages and developing inter-firm learning capacity are the two key ingredients to achieve the successful transformation and thus using the “Global Institute for innovation and entrepreneurship” as an experimental laboratory to pioneering the approaches in fostering regional environment suitable for building up the two key capabilities.

Emerging roles of STPs and challenges

The globalization of economic activities is spurring on the dispersion across the globe of company production bases and also triggering the searching for new business creation towards strategic positioning of knowledge intensive research and development bases. Many advanced industrialized regions in which areas that have functioned as industrial production bases are now shifting successfully from mere production bases to regional knowledge ecosystem favorable for innovation and entrepreneurship.

Starting year 2000, the National 10th five-year plan, China made the changes in its policies to facilitate the shifting of regional economy from “economic development through attracting investment and centered on production infrastructure” to “economic development focusing on the establishment of research and development infrastructure to revitalize innovation”. Many Chinese technology development zones have targeted to go through the process of transforming themselves from inside from simple production bases for large quantities of materials to production bases for more sophisticated, high value added products by not only developing a more sophisticated industrial structure, but also through the promotion of a high level of knowledge intensive production bases. The score on the transformation is mixed. Many of them have fallen short on their goals and faced many challenges to overcome. Simply, changing from focusing on manufacturing process to the whole product life cycle management requires much diverse set of skills and talents.

Emerging roles of Universities and challenges

In many countries, ‘the region’ emerges as a new strategic site for economic and social development where universities are expected to play a critical and challenging role. More than a training site for the next generation of leaders and educated workforce, university research is central not only to expanding the frontier of knowledge through publications, patents, and prototypes, it also contributes to regional economies through technology commercialization, problem solving, and providing public space for knowledge exchanges and application. The latter is being viewed as the 3rd mission of university in the knowledge economy.

Since the onset of economic reforms in 1978, China’s strategies for enhancing indigenous research and innovation capabilities have in part involved the promotion of university-based research and commercialization, particularly by elite institutions to which the central government provides the most funding. The initial results had been promising. Enterprises affiliated with universities were among the earliest high-tech producers in the 1980s and 1990s. Some of the most successful high-tech firms, such as Lenovo and Founder, stemmed from such roots. Encouraged by the early success, Chinese government continued to invest considerable energy and imagination in promoting local universities as critical agents of technological progress. Yet, the potential of generating widely used technological patents or commercialized products have been very limited. There is clearly a mismatch between the ambitious goals of the state and the reality of industry, institutional structure and market place. The fundamental problem is that the university-industry linkages, as of today, remain at a nascent stage with limited effects on technological progress. The key role of universities so far centers not so much on cutting-edge innovation but on adaptation and redevelopment of foreign technologies/products. Even the elite universities in China are often behind the curve of commercialized technology in a globalized economy, even if some of their scientific research may be cutting edge.

Framework for Innovation Ecosystem - Globally Networked University - Industry Linkages

As illustrated above, China industry is dying for the technology transfer and the “know how” from business and technology management from local universities. The university-industry relationships found in the developed countries as patenting, licensing, formation of startups, informal exchange, consulting, contract research, and joint research agreement are not a common practices in China. More distinct to China is the development of “university-run enterprises” as a major form of university-industry linkages. Motivated by the success stories of Silicon Valley and Route 128 of US, Many regional technology programs in China start to put more weight on promoting technology transfers from universities to the local industry. In fact, based upon the database¹, the percent of “patent registrations/scientific production (%)” of China is 2.15, whereas, that of US and Japan are 53.00, 63.75 respectively. The technology transfer and commercialization are becoming urgent and critical issues around the University-Industry Linkage.

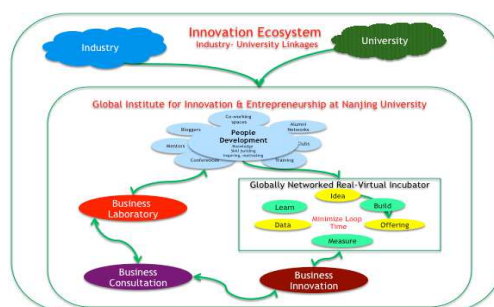


Figure 1

The Global Institute for Innovation & Entrepreneurship at Nanjing University² is a collaborated effort from three international well-known universities and is targeted as an “Academic Firm” focusing on maximizing and/or optimizing knowledge & innovation. It serves as a global platform to facilitate the brain circulation among academia and industry through establishing/enriching university - industry linkages that are essential for building up regional knowledge ecosystems, with clear objective to act as a catalyst supporting the evolution of the STPs and Incubators around the city of Nanjing and thus facilitating the creation and development of new knowledge-intensive companies and accelerating the pace of cutting-edge technology transfer from universities to industry as well. To achieve this, the Institute has developed programs around four major pillars - Business Laboratory, Globally Networked Real-Virtual Incubator, Business Consultation, and Business Innovation. The overall architecture is depicted as figure 1.

Business Laboratory - Lean thinking based entrepreneurial education/training program

Nurturing high-expectation entrepreneurs is one of the key tasks of the Institute. Inspired by the work³ of Steven Blank and Eric Ries, the Institute has setup a Business Laboratory, which is a joint effort among the Institute and the Nanjing Enterprises, especially those technology-based startups. It also serves as a training platform for SMEs (Small Medium Enterprise) that are in need of transformation from either technology and/or management areas. The goal of the laboratory is to provide a “guided” environment for students to perform entrepreneurial experimentation, which means students could put their business concept to an experiment and thus stimulates students to build upon that concept as it has been experimented in lab.

The business Lab offers courses available to all the students at the Nanjing University initially and then would make it available to all the university students around the city of Nanjing through collaboration effort with other universities. The course is modeled the course “How to build a startup”⁴ developed by Steven Blank. A graphic representation of the curriculum is depicted as figure 2. Office visiting startups, open dialogue with seasoned entrepreneurs, and meeting angel investors/venture capitalists are also included as parts of the curriculum. Business model canvas, the concept introduced in the book, Business Model Generation, by Alexander Osterwalder in 2010, and customer development process, developed by Steven Blank, are the two essential key concepts and tools to allow student to put propositions/assumptions derived while developing their business model, which are largely based upon their perceptions/guessing, to validate until they find one that is repeatable and scalable (it continues to iterate and pivot



Figure 2

¹ Scientific production according to the SCOPUS database and patent registration on USPTO database covering all fields of science and technology (1996 - 2007)

² The institute was co-founded by Nanjing University and NYU/Poly jointly in October 2009 with the mission to foster an environment favourable for innovation & entrepreneurs. With the recent joining of Warwick University, UK, new name, Global Institute for Innovation & Entrepreneurship at Nanjing University will be used.

³ The Four Steps to the Epiphany and The Startup Owner's Manual by Steven Blank and The Lean Startup by Eric Ries

⁴ “How to build a startup” - www.udacity.com/course/ep245

until it does). It is at this point that the business needs a business plan: a document that articulates the model, market, competition, operating plan, financial requirements, and other well-understood management tools. Through the program, the students are expected to get familiar with the following five essential principles of Lean thinking:

1. Define value precisely from the perspective of the end customer, in terms of a specific product, with specific capabilities, offered at a specific price and time
The starting point is to recognise that only a small fraction of the total time and effort in any organisation actually adds value for the end customer. By clearly defining Value for a specific product or service from the end customer's perspective, all the non-value activities - or waste - can be targeted for removal.
2. Identify and Map the Value Stream
The value stream is all the specific actions required to bring a specific service or product through three critical activities in any business. This represents the end-to-end process that delivers the value to the customer.
3. Create Flow by Eliminating Waste - Typically when you first map the Value Stream you will find that only 5% of activities add value, this can raise to 45% in a service environment. Eliminating this waste ensures that your product or service "flows" to the customer without any interruption, detour or waiting.
4. Design and provide what the customer wants only when the customer wants it
This is about understanding the customer demand on your service and then creating your MVP (Minimal Viable Product). The MVP is:
 - a tactic for cutting back on wasted product/service team hours
 - a strategy to get the product/service into earlyvangelists hands as soon as possible
 - a tool for generating maximum customer learning in the shortest possible time
5. Pursue Perfection - Creating flow and pull starts with radically reorganizing individual process steps, but the gains become truly significant as all the steps link together. As this happens more and more layers of waste become visible and the process continues towards the theoretical end point of perfection, where every asset and every action adds value for the end customer.

The Business Laboratory is to foster special focus on high-expectation entrepreneurship because of its oversized impact on economic growth. According to the Global Entrepreneurship Monitor, less than 7% of nascent entrepreneurs expect to employ fifty or more employees with five years; however, the economic impact is disproportionately positive as high-expectation entrepreneurs are responsible for up to eighty percent of total expected jobs by all entrepreneurs. Rapid experiment iteration and rapid solution prototyping go hand-in-hand for the high-expectation entrepreneur,

Globally Networked Real-Virtual Incubator

The incubator is a part of the Nanjing University Science of Technology Park located at the Xianlin District of the city of Nanjing. The incubator is setup not only to grow knowledge-intensive startups, but also serve as an experimental collaboration platform for establishing industry-university and firm-firm working relationship, especially in the area of emerging technology development. Therefore, open boundaries, education without border, new connections, physical and virtual journeys into other places and disciplines are all the key ingredients in setting up the incubator. This is also the co-operative environment where participants can cultivate new business ideas and turn them into commercial realities.

The incubator would host the following types of residents, already have some of them:

- 3s in the 321 initiative
These are the technology-based entrepreneurs who have the desires to setup their start-ups at the city of Nanjing. The joint Institute incubator is one of the places that they could choose to begin their journey. These tenants have their products/services in mind already and some of them even have their prototype done
- Business Lab graduates
Students who have completed their startup courses offered by business lab and would like to carry on their entrepreneurial endeavour. These students could be university students or entrepreneurs who would like to setup their startups
- SME employees who are participating the technology transfer programs. The program could be initiated from the SME side or from the University side

Given the nature of the Institute, the incubator would embrace the creation of an inter-culture context of mobility and integration, oppose to a multi-culture context of immigration and separation.

Encouraged by the success of WMG⁵ (Warwick Manufacturing Group) working model, we come to believe that the key to achieving the successful economy transformation is to fostering and developing close partnership between university and industry to create the endogenous capability required for some specific industry. And also the approach taken should be focusing on not only the product technology but also the end-to-end solutions to the customers; more precisely, the value network of the focused industry. The industry we have in mind is the automotive industry, especially the “Telematics in Vehicle” area to begin with. Simply, with the trend towards software control and networking within complex electrical and electronic systems, Nanjing city has rich resources and knowledge in areas such as automotive electronics, networking technologies, and software technology. To facilitate the effectiveness, we are adopting a program used by WMG and is depicted in the figure 3.

The programs should be built based upon the foundation of working in partnership with business from the following two perspectives:

- Developing a deep working programs targeting the SMEs working around the Automotive Industry in the NJ metropolitan area, then
- Developing an automotive industry consortium, consisting of global players⁶ in the automotive industry, focusing on building up the “glocal” innovative ecosystem at the city of Nanjing

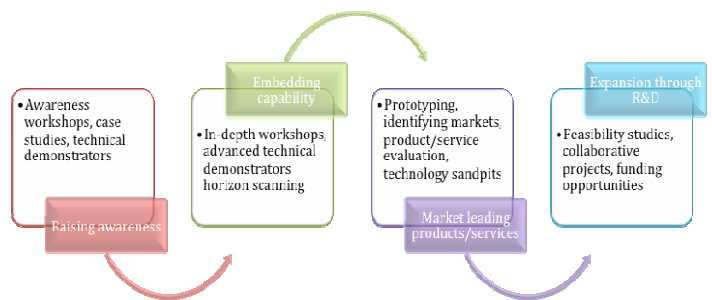


Figure 3

Business Laboratory and Globally Networked Real-Virtual Incubator are the two major pillars for promoting the close working relationship between industry and university. They go hand-in-hand, to some extent it is the realization of the program illustrated in figure 3.

Further Thoughts

The experiments work performed in the Institute would give Nanjing local entrepreneurs, financiers, and policy makers a deeper understanding of the innovation framework to nature high-expectation entrepreneurs and for the industry-university linkages as well. However, the Institute is an independent entity located in Nanjing China and is managed by professional management and also three international well-known universities, especially WMG has brought rich experience in establishing and managing industry-university linkages. For a “home grown” STPs/Incubators, they are facing some other challenges: some of them are unique to China and some of them are facing for every developing or transitional Country. Some of them are list below:

Challenges for STP/Incubator Evolution

The failure for the transition for many of the STPs/Incubators falls into basically into two category; one is related to the management issue and the other is related to the capabilities of those tenants residing inside the STPs/Incubators.

Management Related Issues

1. STPs/Incubators Need to Be Business Base

⁵ WMG, part of the University of Warwick, provides innovative solutions to industry and is international role model for how universities and business can successfully work together

⁶ The effort should get started from the key players in China’s market first and then expanding to the worldwide

In China, most incubators are supported and managed by government, or in some cases by universities. Unfortunately, these government/universities bodies are inherently not business-like organizations. In fact, they are often too bureaucratic to successfully promote a business incubation program.

To be successful, an incubator must be run like a business. That means being nimble, adjusting to the market and reacting quickly to changing conditions. Achieving this kind of agility usually means hiring someone with a background in running companies in a startup environment rather than someone with an academic or bureaucratic background.

To provide further support, incubators should establish boards of directors or advisors made up of experienced business people who can provide valuable business acumen to the incubation program, as well as assisting client companies where possible. In addition to assistance on management, entrepreneurs need access to legal, accounting and financial advisors, as well as to professionals familiar with structuring and financing new companies and preparing them for growth. To work with leaders in these sectors the incubator management needs a background and network based in the business community.

2. Hire the Right Management

Having a successful former entrepreneur or individual who worked closely with start-up companies at the helm of an incubator is important for many reasons. Incubator clients will need been-there, done-that advice, not academic theory or government “guanxi.”

While incubators can be looked as economic development projects or even as real estate ventures, they are businesses that need to run by professionals who are experienced in meeting the needs of the companies that serve as their client base. With good management, incubators can be profitable ventures that bring development into their communities.

3. Fit the Incubator into the Regional Big Picture - Path Dependence or Path Creation?

Encouraging the growth of small business requires a coordinated environment. Managers of incubators or better yet, the leaders of the communities establishing the incubators should consider whether the existing industry clusters in the area contain the elements necessary to support new businesses in a particular industry. If the area has no businesses related to solar energy, then setting up a solar energy incubator is not likely to be successful.

Incubator developers must also consider whether there is sufficient access to professional service providers, capital, university technologists and other key entrepreneurial resources in a community before moving forward with a program. Indeed, an essential condition for creation and consolidation of the Knowledge Space is the existence of a “critical mass” of academic research and education resources on a particular topic in a local area.

4. Establish Goals and a Mission

Incubator developers should choose a clear mission for the project and choose well-defined goals. Many incubator projects try to support a broad variety of industries and provide services to companies and widely varying stages of development. Taking this catchall approach to development may appear to be a good way to bring in as many potential clients as possible; however, it can also be an invitation to failure.

Incubators work best when they serve specific business communities. This ensures that the incubator can cultivate the specialized expertise necessary to provide effective support to their clients. By choosing a clear focus, the incubator will also have a better chance to fostering a more effective industry cluster that will provide the kind of symbiotic growth necessary to the development of the entrepreneurs in the incubator.

Challenges facing Tenants

The economy growth structure is moving from the export-led and resource-based advantage structure of the past 30 years toward a pattern of growth that is driven increasingly by Chinese consumers and knowledge intensive and innovation-based economy. The key to achieving this will rest on enhancing the endogenous innovation capacity. However, this has also presented great challenges to the country as a whole, more precisely,

1. Production Life Cycle Management - In an export-led and resource-based economy, most of China manufacturers take orders from Western companies and they have no involvement with product development, innovation, market research, and even packaging. Changing to domestic consumption means to restructure their business

operation - from focusing on manufacturing process to the whole product life cycle management. The “know how” from business and technology management is a huge hurdle to overcome, especially for those Small & Medium size companies

2. Market Efficiency - Even though the private sector generated approximately 70% of GDP in 2005. Under the Socialist Market Economy, where to enter and how to enter the market place itself presents great challenge to them, especially for those who would like to enter into the ICT (Information & Communication Technology) industry, which is still largely dominated by the SOEs (State Owned Enterprise). For example, VOIP (Voice over Internet Protocol) is still not opened up yet in China, thus features like SKYPE does not have much room for “experimenting”. How to open up the most active and innovative ICT platform, Internet, to attract various types of talents for competition presents a great challenge for the government policy makers

Complexity of Innovation - Capacity to innovate cannot be equated to the capacity to invent. Simply, any successful innovation takes tremendous efforts across science & technology, social technology, and business management three major disciplines; more precisely, it takes a higher order capacity that includes elements such as the ability to create products based on technological breakthroughs and the ability to market those products well. At the same time, entrepreneurial firms require venturesome and resourceful customers who are willing to take a chance on their products and services. This “venturesome consumption” is especially critical in stimulating & encouraging the growth of high-tech based “domestic” enterprises and thus creating and strengthening endogenous innovative capacity. Good innovators have also exhibited critical “discovery skills” revealed in the book, “The Innovator’s DNA”⁷, written by Clayton M. Christensen and those skills have given them the unique ability to integrate and consume big new ideas (or breakthroughs), no matter where they’re spawned. Entrepreneurship is, far from being spurred for the most part by lone, heroic individuals, a social process that stems from a broad set of social and cultural conditions, which is a long-term process.

Summary

The role of universities as a center of knowledge creation and commercialization sits at the heart of the China 12th Five-Year Plan. Today, many of the Chinese STPs and Incubators are still spending their major effort in creating/managing infrastructure and buildings. It is time to move to the next step to start taking seriously the ways in which a park could stimulate technology transfer from universities or centers of research locally or globally into businesses in their park. The work done in the Institute could serve as an approach how to work with universities to either setup technology-based (or knowledge intensive) startups or to support the transformation of SMEs inside their parks. Leveraging the advances in ICT technology, building globally networked university-industry linkages through STPs and Incubators around the universities is a viable approach in enhancing the endogenous innovation capacity and thus leading to the transformation of the regional economy.

⁷ The Innovator’s DNA – mastering the five skills of disruptive innovators by Jeff Dyer, Hal Gregersen, and Clayton M. Christensen