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# Academic Firm – A Pilot Program in Facilitating Regional Economy Transformation

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Science parks and their businesses: new models, new opportunities

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# Academic Firm – A Pilot Program in Facilitating Regional Economy Transformation

## Executive Summary

Since the onset of the economic reforms in 1978, China has disrupted the manufacturing sector from being a marginal player on the global stage to a world-manufacturingpowerhouse. In the second quarter of 2010, China became the world's second-largest economy behind the United States. Economists generally attribute much of China's economic growth to two main factors: large-scale capital investment (financed large domestic savings and foreign investment) and rapid productivity growth, due to the reallocation of resources to more productive uses . China's ability to disrupt mass production domain could be described as the collaborative efforts of "people + infrastructure ". A digital revolution is rapidly taking root in China. In a few short years, China has gone from being a minor player in the Internet era to a full-fledged participant, and now it is actually a front-runner. As of December 2014, China has around 649 million Internet users and 557 million mobile Internet users. Authors of this paper propose a new approach based upon the concepts of startup accelerator and platform ecosystem to foster an environment favorable for the creation of next generation digital disruptor to lead to massive digital disruption, at a scale and a pace most are simply not prepared for.

**Keywords***:Academic Firm,Knowledge-based Startup,Technology Transfer, Startup Accelerator, Platform Ecosystems, University-Industry linkage, Digital Disruption*

## Challenges

Since Deng's four modernization in 1978, China's strategies have been focusing on establishing STPs (Science and Technology Park) /Hi-Tech Development Zones as the economic growth engines and enhancing indigenous research and innovation capabilities in promoting the university-based research and commercialization. Starting year 2000, many Chinese STPs and Hi-Tech development zones have gone through the process of transforming themselves from functioning as industrial production bases to regional knowledge ecosystems favorable for innovation and entrepreneurship. The score on the transformation is mixed. This is due to two factors[1]:). Pursuing economic growth, GDP, was the singular agenda and strategy at every level - national, regional, and municipal[2].). Most of the STPs/Incubators/Hi-Tech development zones were and operated and managed as government-run real estate property. Therefore, attracting "profitable or affordable" tenants is becoming the major task of the government park management team.

Meanwhile, in an export driven economy,most of China manufacturers take orders from western companies that have designed products for their home markets. And many Chinese companies have no involvement with product development, innovation, market research, and even packaging. Changing from focusing on manufacturing process to the whole product life cycle management requires much diverse set of skills and talents in engineering disciplines and program management as well.

Similarly, the key role of universities, as of today, center not so much on cutting-edge innovation but on adaptation and redevelopment of foreign technologies/products. The fundamental problem is that the university-industry linkages, as of today, remain at a nascent stage with limited effects on technological progress. This has to do with the nature of the collaborative work, the rapid globalization process, and the growth of China's own domestic enterprises since late1990s. By the 2000s, many global MNCs have brought in more advanced products with the Chinese market in mind. As a result, the industrial sector, to a large extent, has resorted to relying on imported core technology in which local universities can play limited role at best. Universities' own weak endogenous innovative capacities further undermine their roles in industry. 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. In fact, based upon the database[4], 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.

## China's Digital Revolution

A digital revolution, the result of more than half of China's 1.3 billion people being connected via mobile phones, the internet, or both, is rapidly taking root in China and is having profound impact and even more on China's modern development, socially, culturally, politically, economically, and globally. In a few short years, China has gone from being a minor player in the Internet era to a full-fledged participant, and now it is actually a front-runner. Internet and mobile phone use, in particular, has skyrocketed.China now, as of December

1. For example, agricultural reforms boosted production, freeing workers to pursue employment in the more productive manufacturing sector.
2. Cheap labor was another term to describe this
3. This refers to the technologies required to produce and distribute goods, distribution partners, supply chains, and physical infrastructure, such as international shipping companies and container ships, etc.
4. Scientific production according to the SCOPUS database and patent registration on USPTO database covering all fields of science and technology (1996 – 2007)

2014, has 649 million Internet users, and 557 million mobile Internet users. China's Internet users spend an average of 3.7 hours a day surfing the Internet. The infrastructure of China's digital network is advanced and sophisticated, thanks to the boom in the ICT market in the past two decades; almost all of the Chinese "netizens" have broadband access to the Internet and close to 87% are mobile users. The magnitude and speed of these developments have outpaced the common understanding about digital life in China.China has the greatest number of mobile Internetand Internet users in the world and these users live in cities of all sizes. The mobile App down load is rated number 1 in the world. Although overall penetration remains much lower in China than in developed countries, a steep adoption curve will ensure continued growth for years. China's enthusiastic adoption of digital devices and services will have implications that transcend the technology, media, and communications industries. Every company operating within China must understand the digital and online habits of its customers—or risk losing them.

China's path into the digital era is unique. The nation embraced the Internet late but is today a trendsetter, in large part because of its youthful population. Most Chinese users bypassed Web 1.0, e-mail, and the early days of electronic commerce, jumping immediately to Web 2.0—the land of virtual communities, personalized content, and viral growth patterns.To a large extent, Web 2.0 is regenerating the Internet. Users are more actively contributing to construction of the Web by means of all sorts of innovative applications. In particular, it has opened a brand new chapter of Web services based on virtual social networking. In essence, Web 2.0 is NOT just about linking URLs; it is about people. Contrary to the commonly held view that China trailed behind the developed world in the digital revolution, the country is actually leading many developments of applications on converged digital networks, including the Internet, communications networks, and media. Online social networking has become an integral part of many people's lives and a natural extension of personal communications. Connecting with friends is cited as one of the most important reasons for people to visit social networking Websites; furthermore, these sites are becoming an interactive platform for people to create, exchange, and share ideas. Web 2.0, defined as a service-oriented architecture that encourages, explicitly or implicitly, human interactions and participation, through which knowledge and content are generated, disseminated, shared, and used over network applications. The success of Web 2.0 is based fundamentally on what is known as network effects. Technically, Web 2.0 is nothing new. It is more a new way of leveraging the fundamental strengths of the Web to turn applications into platforms that encourage users to interact with one another. Through this mechanism, China has emerged a great deal of grassroots reporters. Their efforts have triggered several important policy changed to further enhance the quality of people's life in China.

In many ways, Chinese users are international trendsetters largely because of the youthfulness of its digital community compared to developed countries: more than two-thirds of China's netizens are under the age of 30, and the majority grew up in a digital world that benefited greatly from China's economic reform and opening-up policies. The rise of the so-called digital natives in China has formed a powerful force in the society today. Most of them have their own perspectives on their lives, following their own hearts pursuing their dreams.

The rise of digital giants in China such as Alibaba, Trecent, and Xiaomi has set path for the younger generation to follow. It is they, the seed of future digital disruptor, to leverage the digital infrastructure to disrupt the mass customization domain.

## The Rise of the Platform Ecosystems (Platform Economy)

Nokia was sold to Microsoft. Blackberry lost $1 billion, laid-off 4,500 employees, and was sold itself to a

private equity group. Barnes & Noble is parting company with the Nook and struggling to survive. These firms once offered great products but are still having hard time to sustain their business.Meanwhile, companies like Twitter, with an ecosystem of more than 1 million apps, filed its IPO to raise $1 billion. Google's Android grows stronger and is moving beyond smartphones to power cars, home electronics, and wearable accessories. A thriving Amazon and Kindle continue to transform publishing. In the hotel industry, Airbnb poses a serious threat to the revenues of established players and is disrupting the housing market.Nokia, Blackberry, and Barnes &Noble are failing not because of they do NOT have great products to offer, instead, they failed to recognize in today's networked age, competition is increasing over "platforms"; Build a better platform, and you will have a decided advantage over the competition.

We used to live in a world where commerce flowed linearly. Firm added value to products shipped them out and sold them to consumers. Producers and consumers held very distinct roles. Value was created upstream and flowed downstream. Platforms are distinct in that they are often associated with "network effects". These network effects make the platform, and the complements, increasingly valuable (and profitable) as more users, application developers, device makers, and other ecosystem players such as advertisers adopt the same platform. The value of the platform and complements can grow exponentially with positive feedback loops. Consider the market for smartphones. Nokia and Blackberry both have been a shadow of their former glory. Their products and technology lagged Apple and the Android ecosystem. But, the triumph of Apple and Android is NOT from features and functions. It is from the app store on which external developers create value. Microsoft has gotten excellent reviews for the technology in its new phones when they were released, but it is the ability to create successful platform that will determine its ultimate success. In reality, a smartphone today is NOT a phone per se; it has become a channel (or a ticket) entering the Cyberspace. The ongoing migration from product and service competition to platform-based competition and collaboration in many industries and markets is driven by forces such as modularization of products, services, and processes; software embedding and ubiquitous networking of everyday objects. What served firms well in product-based markets can become their Achilles heel in platform-based markets.

Today, three of the top five US firms by market cap – Apple, Microsoft & Google – run business platforms. We are in the midst of a seismic shift in business models, powered by the Internet and a generation of connected users.Platform firms are networked ecosystems that connect multiple players, provide tools for them to contribute and interact, and rules that govern participation. Facebook, Uber, and Ebay typify such network platforms.

A platform, as defined by S. P. Choudary, is a plug-and-play business model that allows multiple participants (producers and consumers) to connect to it, interact with each other and create and exchange value. The most important aspect of this definition is to understand that:
1.It is about a business model: A product development usually draws talents from a "limited" number of pools.

2.Plug and play: It is talking about something that external participants can plug and play into. Producers can "plug-in" and create on top of a platform. When consumers "plug" into a platform, the platform serves them what is more relevant for them. So developers create apps on top of Android, writers creates articles on top of Medium, hosts create room availability on top of Airbnb, and sellers create goods on top of Etsy, Ebay and Taobao. Consumers plug in and are served what they're looking for.

3.Interactions: The core role of the platform business is to enable interactions between the participants that connect to the platform. Everything that the platform does should encourage these participants to participate and create and exchange value. The interaction is the fundamental unit of analysis on a platform. Some platforms may have multiple parties connecting to it and many different types of interactions. But all platforms

will have a core interaction

Finally, firms that can leverage external capacity arepoised for tremendous return on assets.

Platform opportunities are all around us. Industries like Education, HealthCare, Insurance, and Legal Services, are ripe for disruption. In an increasingly connected future, platforms will only grow in importance. We need to construct the frameworks and rules to allow everyone a fair shot at success in this new world.

## The Rising of Startup Accelerators

Over the past 10 years, a new method of incubating technology-based startups has emerged, driven by investors and successful tech entrepreneurs, the accelerator program. This accelerator program model comprises five main features. The combination of these sets it apart from other approaches to business incubation:

•An application process is open to every interested party, yet highly competitive
•Provision of pre-seed investment, usually in exchange for equity.
•A focus on small teams not individual founders, in general a team size is limited no more than 3.
•Time-limited support comprising programmed events and intensive mentoring.
•Cohorts or 'classes' of startups rather than individual companies.

The major focusof the 3-month time period is to go through an evidenced based process with the goal of gaining insight of the feasibility to offer the new product/service, more precisely,to work on the problem/solution fit problem[5].

The rise of accelerator programs is closely associated with the changing economics of starting up. Costs associated with early-stage tech startups have dropped significantly in the last decade, creating an opportunity to invest with very small amount money compared to previous eras of investment in digital business. Angel investors and venture capital investors have supported accelerator programs because they create a pipeline of investable companies, scouting for and filtering talent and connecting them with a concentrated stream of mentors and strategic resources. The connections they create have a positive effect on the local ecosystem in which they operate, providing an engine to stimulate the economic growth in the region.

## Framework for linking University Research with SME Transformation

In response to the China 12th FYP (Five Year Plan), Nanjing city government has taking a proactive step in building up "a new mind" talent plan – 321. It aims to recruit 3000 world-class entrepreneurial leaders globally, select 200 entrepreneur-led technology-based enterprises, and accelerate the acquiring of 100 well established scientists into the central government sponsored "Thousand Talents Program" in the next three years. The goal, with these recruited talents, is to boost the creation of an innovative community to build up an endogenous growth capability and thus lead to the transformation of Nanjing metropolitan into a sustainable innovate-based economy. The city government has also provided "preferential" supporting programs to speed up the progresses for these 3s, 2s, and 1s. We'll only briefly highlighted 3s and 2s. As follows:

5. Many startups fail not because of not having a product to offer, but, the product does NOT meet enough customers' need for their business to survive. To better address this phenomenon, the startup community comes up this term "problem/solution fit" problem.

•3s – known as “Leader in science and technology entrepreneurship”

Three types of entrepreneurs fall into this category: i) a subject matter of expertise, with broad prospects for market development, and has also established him/herself as a leader in the field of technology, ii) a person owns intellectual property rights or master in some specific technology and has demonstrated leadership in product development, iii) has start-up experience and is familiar with product technology and project management and desire to start their new venture here in the city of Nanjing

•2s –Known as "Prominent Technology based SMEs”

It is targeting to a more mature entrepreneurs and also their start-up is up running with high potentials to succeed. In one sense, the selected ones are the entrepreneurial scientists. On top of the preferential policies applied to the 3s, the 2s also benefit from another 8 polices related to three areas; namely, 1. The fiscal and financial special support – a premium package to relief their finacial burden so that they would be able to get focused on their product development, 2. special support for the development of science and technology in terms of funding for new emerging technology so that they could enhance their enterprise ability to continuously innovate, 3. special support for the establishing their R&D teams such as making custom-made seasoned advanced technology, business, and management training available to them to allowed a world class team be established timely.

Nanjing city government has setup our Institute as the “Technology-based Entrepreneurs R&D Center” providing programs to enrich their innovation capability and capacity. Sarting last year, our Institute has started out a pilot program facilitating the conversations among2s,3s, and Nanjing local university research faculties/students trying to establish a “capability” building or a technology transfer project.The following is what has been setup.

Transformation Model – A progressive framework in developing endogenous capability and capacity of the 2s and 3s.

We have divided the “transformation” process into four different stages: Raising Awareness Stage, Embedding Capability Stage, Leading Market Production/Service Stage, and Expansion through R&D Stage.

Figure 1

## Raising Awareness Stage

The goal of this stage is to create/promote the awareness ofthe “demand and supply” issue from both sides. This initial stage is actually divided into two sub-stages: the internal awareness stage from each concerned party and the mutual conversation stage among all the concerned parties.The internal awareness stage from the 2s and 3s lies in an effort to re-evaluate its own existing business model with the goal in identifying the areas for further enrichment or reengineering. Whereas the awareness stage from the university side lies in the re-evaluation of their science R&D and/ or new knowledge created from the perspective of applicable potential areas. After performing the internal awareness stage, we’ll move into the next mutual conversation stage.

The goal in the conversation stage is to provide opportunities for concerned parties to
1.Get to know each other at both the personal and professional levels
2.Explore/exchange potential areas for developing endogenous capability and capacity. Informal and formal

events such as new technology demo, workshop, and case study are being held on a regular basis
The deliverable of this stage is to come up a “matching” project to get jointly prototyped (incubated). A project team would be formed consisting of
a.A project principal (usually a university research faculty, or an IP inventor),
b.An entrepreneurial student from the principal’s research project team,
c.And one or two tech members from 2s (or 3s, SME) team

## Embedding Capability Stage

This stage is to provide the identified project team from the Raising Awareness Stage to go through the University-Run Acceleration/Incubation program. This would be an intensive 3-month acceleration program as described in the above mentioned startup accelerator section. At the end of the 3-month program, the team would go through an evaluation process to determine to continue for further development or be terminated. If the project is determined to proceed further, the involved 2s (or 3s) will begin to join in a more proactive role in exploring the product/market fit problem, more precisely to asset and expand the size of the market for the new offering. Meanwhile, the involved 2s (or 3s) could determine this new product to be adopted into its core capability or as an complementary to its existing offering to get started moving into platform oriented enterprise. The whole process of this stage and next stage is depicted as figure 2

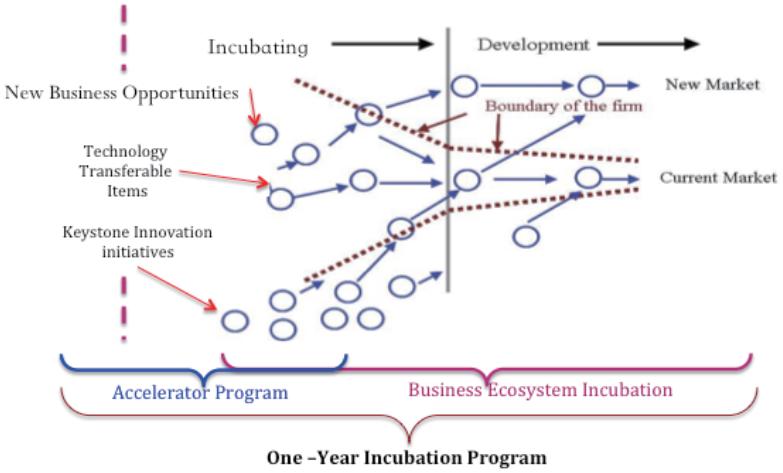


Figure 2

This is the stage to get started for the technology transfer and commercialization process. The program in this stage would also make it available to any other SMEs in the region. The structure of the incubated team is consisting of a university researcher, 2 or 3 members from the named SME that would like to develop new service/product based upon university research’s patent orspecific knowledge. However, there is also possibility for one or two of the students from the university researcher who could like to participate in the technology transfer team. More precisely, this stage usually would take from 3 to 4 months to no more than 6 months timeframe. The goal of this stage is to ensure that the product/service is meeting certain customers’ need; i.e., providing value to a small group of customers

## Leading Market Product/Service (Customer Creation) Stage

After finishing the “embedding capability” stage and passing through an evaluation process, the project is moved onto this stage. The focus of this stage is to size the potentiality of the product/service; a small size market or a considerable size of market. An extensive data analytics would get done at this stage. In general speaking, this stage might take a year or two. However, due to the nature of our Institute, we would end this stage at the end of one year since it started. From practical purposes, our Institute would still pay attention to all the graduated projects, just not as closely as they are “in” the incubator.

## Building Core Competency Stage

Once a participated 2s, 3s, or SME has completed a new product or service commercialization process. It is time for them to re-apply the lesson learned to engage in another R&D project to further develop their endogenous capacity. The new project could be a feasibility study or a collaborative R&D project. This gives the participant a good start in developing its own core competency based upon the experience gained through working with our university-industry linkage process.

## Summary

China's 12th Five-Year Plan, 2011 - 2015, aims to restructure the China 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". Creating an innovation based startups and transforming existing enterprises to knowledge-intensive firms are becoming the imperative to realizing the transformation to innovation economy.

China’s past three decades’ success is NOT just a function of cheap manufacturing. China’s success depends on a very fortuitous set of circumstances; first, with its population of over 1.3 billion relatively impoverished people, China has a very motivated base of workers who are willing to work very hard for very low wages relative to other parts of the world. Add to that the fact that these workers can expend their efforts to produce and distribute goods using technologies, distribution partners, supply chains, and physical infrastructure, such as international shipping companies and container ships, that China didn’t have to pay for because the rest of the world had already seen fit to create them. If we condense this, the formula looks like this: people willing to work for at very low cost, plus a completely developed, relatively friction-free infrastructure for value delivery, equals competitive disruption. In this networked digital age, we believe digital innovators plus digital infrastructure, which China has already put itself in a good position, would be able to create massive digital disruption, at a scale and a pace most are simply not prepared for.

This paper describes how the Global Institute for Innovation & Entrepreneurship at Nanjing University[6], residing inside the Nanjing University Science Park, is setup as an “Academic Firm”, to, base upon the transformation model developed above, to foster an environment favorable to the growth of digital disruptors in the Nanjing greater metropolitan area.

6. 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 is used.