Regional Innovation Ecosystem Building: Cases Study from China

Luo Hui, Zhang Li, Shi Lei, Ruan Cao
National Academy of Innovation Strategy, CAST, Beijing, China

Abstract--**This article discusses how to build a regional innovation ecosystem in China. Based on a literature review, it puts forward a theoretical framework to analyze the crucial elements involved in innovation process, including the position and roles of central and local government, public actors and individual enterprises in developing innovation activities, the dynamic interactions among different stakeholders. The framework also highlights how the rules and policies influence actors' behaviors and the innovation environment.**

Both quantitative and qualitative research methods are used in this article. The authors conducted several national surveys to collect data. Besides, they choose Beijing Zhong Guancun and Shenzhen Special Economic Zone as two cases to deeply elaborate on how a region develops itself into an innovation ecosystem. The article also presents some comparative findings from cases in China and the Silicon Valley and Route 128.

The article concludes that changes of rules are crucial for innovation ecosystem building, and interaction among stakeholders contributes a lot to rules changing. The article also gives suggestions on how to support innovation and manage this change towards an innovation ecosystem through more systematic and tangible rules and policy, adequate inclusion and interaction with different stakeholders, as well as more public understanding and engagement.

I. INTRODUCTION

With the economic development and technological improvement, major countries and economies are attaching great importance to innovation which is regarded as the potential impetus to drive the economy. It is universally acknowledged that most breakthrough innovation won't succeed in isolation. Therefore who can be the winner in the new round of economic competition, to some extent, will depend on its innovation ecosystem can operate well or not.

With China's development strategy of innovation-drive, a lot of efforts have been made to build innovation ecosystem, especially the regional ecosystem. Thanks to their distinct innovative features in talents, geography, policies etc. Zhong Guancun and Shen Zhen have been built into typical cases of regional innovation ecosystem. Since many interconnected actors and players constitute the innovation ecosystem, it is necessary for more resources to be allocated to the region to map the ecosystem, including sufficient financial funds, substantial talents in science technology and engineering, supportive regulatory policies and competitors or partners. The mode of regional ecosystem in both ZhongGuancun and Shen Zhen will be discussed hereafter. This article discusses how to build a regional innovation ecosystem, and will have implications for both innovation practices and studies.

II. KEY CONCEPTS AND THEORETICAL FRAMEWORK

A. The concept and related research of Innovation Ecosystem

The theory of innovation is constantly evolving, new theories and terms are emerging, such as the "innovation system"[7], "national innovation system"[9], "regional innovation system"[2], "industrial innovation system", "cluster innovation system" [8]. Innovation Ecosystem refers to a community or assemblage in a certain place where constituted by creatures and the physical environment surrounds them. The innovation ecosystem theory emphasizes on integrity and the whole system. From these two perspectives, the theory can not only adapt to Ecology itself, but also applies to the evolving multidisciplinary subjects. Stanford University's Innovation Ecosystem Network has defined Innovation Ecosystem as "the politics, economics as well as the environment inside one certain organization"[12]. In the book of *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship,* said: the most distinguishing character about the Silicon Valley is that, as the habitat for entrepreneurship, the Silicon Valley is non-replicable. Thus researchers should think from an ecological perspective so that they can have a better understanding about this character. If we want to build a powerful, knowledge-based economy, we should learn how to map a powerful innovation ecosystem, other than merely simulate other Silicon Valley.

According to Martin Fransman's description, the innovation ecosystem is separated into three levels inner-enterprise, inter-enterprise, between enterprise groups and institutional environments. The inner-enterprise's strategic policies give each business unit corresponding functions and tasks. These policies encourage the cooperation and coordination among different units, which are the foundation of integrated innovation of the whole enterprise[4] (See also in Figure 1). As for inter-enterprise level, different enterprises are cooperators, suppliers, clients and even competitors to each other. Meanwhile, they interact with strategies of enterprises. On a macro-level, colleges, financial resources and intermediary agencies are corresponding respectively to the elements of knowledge-acquiring, resource accessing and knowledge-transferring required by business clusters. Through contact different entities or resources, single enterprise can actively participate in the innovation ecosystem. It is thus clear that the theoretical paradigm emphasizes on all kinds of functions. The interaction of knowledge, resources and talents between different individuals reflects the relationship of financing, knowledge distribution, technology transference, product

trading, competition, as well as the relationship between individuals and institutional environment.

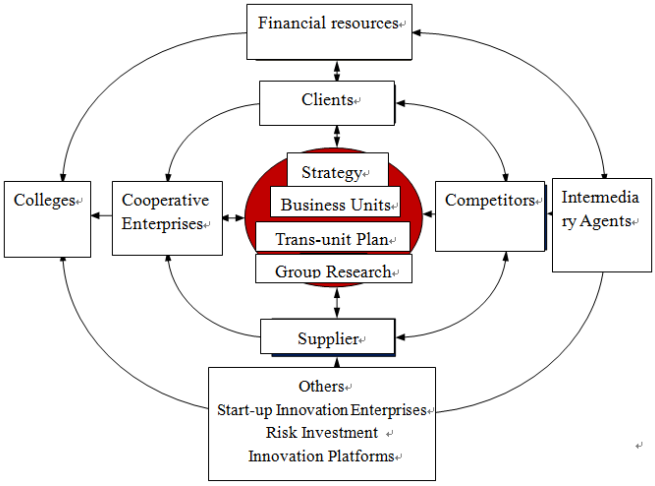

Figure 1- 1 The General Frame Diagram of Innovation Ecosystem

It is a more practical way to observe technological innovation and certain issues from the perspective of innovation-ecosystem. In the process of innovation, the actors interact with the environment which forms an organic whole. Innovation relies not only on the actors (enterprise for instance), the cooperative partners and competitors (from both upstream and downstream), but also on colleges and scientific research institutions which provide innovation resources, intermediary agencies and risk investments providing services. Also, the timeliness allocation of resources, a mature and matching market, a realistic target of innovative rules are all imperative conditions to guarantee the smooth operation of an innovation ecosystem.

B. Major characteristics of Innovation Ecosystem Theory

In some certain way we could say Innovation Ecosystem Theory evolved from national innovation systems theory.The term National Innovation System was first used as early as the year 1987 by C.Freeman [5]. He used this term to explain the reason why Japan's economy and technical strength could rapidly surpass other western countries after the World War Two. He believed that, the state innovation system can be described as a network which jointly constructed by the public and private agencies. Inside this network, the launching, introducing, modification and improvement can all be conducted through activities and interactions among various components. In 1920s, OECD launched the National Innovation System Research Project, and announced two reports: The Knowledge Based Economy and The National Innovation System. According to OECD definition of the concept, national innovation systems emphasize the linkages and interactions among the actors involved in innovation for improving technology performance are as important as investments in research and development. It put on direct attention to the linkages and interaction within the overall innovation system [9].Furthermore, the operation of an innovation system relies not only on the technological innovation inside every single institution, but also on the constantly strengthened relationship between colleges and industries. Hence, the government should proactively engage in innovation. It should introduce policies and measures which can facilitate the more close cooperation between colleges and enterprises and promote the further development of innovation. Colleges, industries and governments should integrate into one "Triple Helix"[3].

When talk about the linkages and interaction, we have to think about the innovation diffusions among different stakeholders, as Rogers pointed out, diffusions of innovation is a process of socialization, a process of communication among different individuals about new ideas and new feelings[13].

Besides the above research theories, Innovation Ecosystem Theory also put lot of efforts to discuss the exchange with environment. We conclude some characteristics in the following:

(1) Emphasize on the importance of Environment. Regard environmental elements (such as resources, administer, strategies, leadership and culture) as decisive factors to the smooth operation of the innovation ecosystem.[1][16]

(2) Emphasize not only on the inter-subject interaction, but also on interactions between subject and the environment. Consider innovation ecosystem as the interaction among all elements inside one environment other than affairs within one single subject. Russel believed that in an innovation ecosystem that is composed of various subsystems (such as trans-organization, politics, economics, environment and technology), these subsystems would interact with each other. This interaction is beneficial to the innovative atmosphere which will catalyze and facilitate the development of innovation[14].

(3) Emphasize on promoting the competitiveness through synergetic development. Adner believed that an innovation ecosystem has the character of collaboration and integration. It can integrate innovative achievements from various enterprises into one customer-oriented program. The system emphasizes on the synergistic effects generated by innovation marketing process. Through this, it indicates that the effective operation of ecosystem lies on the synergetic development among different elements[1][16].

(4) Concentrate the above Platforms. Platform can be regarded as a strategic choice and organizational form under the background of Internet economy. It is a kind of open while closed dynamic art. It enables the elasticity of enterprises whenever they take part in innovation activities. Thanks to the Platform, these activities can co-evolve with the changing technology and market. Chen Siqin has proposed a model of technological innovation system based on Innovative Platform. This platform was constituent by the core layer, development and application layer and innovative platform. [15]

C. Innovation Ecosystem as the national strategy

Innovation Ecosystem uses biology and gives different understanding about different participants inside a system. Hence, more and more scholars and policy-makers have accepted this kind of understanding. It has become a policy language among governments.

In 1994, the Clinton government proposed the first formal presidential report which was related to science policy. It was called Science in the National Interest. In the report, it said that science and technology are more like one ecosystem rather than a production line. In the beginning of 2003, the U.S. President's Council of Advisors on Science and Technology (PCAST) made a formal propose on the concept of innovation ecosystem. In January2004, PCAST published the report of *Sustaining the Nation's Innovation Ecosystem : Information Technology Manufacturing and Competitiveness*. It is said a nation's leading status of technology and innovation depends on an energetic and dynamic Innovation Ecosystem. To maintain the healthy status of innovation ecosystem of the U.S., the government should for one part, strengthen the R&D capability of the country which includes the support to fundamental researches, the endeavor to coordinate with state governments and the new mode of Bell Labs. For another part, the government should improve the education status of the labor force in the country. They should cultivate adequate scientists, engineers and skillful workers. Thirdly, the government should be responsible for promoting the entrepreneurial climate as well as improving infrastructure[10].

In June2004, PCAST published the second report *Sustaining the Nation's Innovation Ecosystem*: *Maintaining the Strength of Our Science and Engineering Capabilities.* The report indicates that America's economic prosperity and the leading status in the global economy lies to a meticulously-made innovation ecosystem. The system roots in several prominent elements: inventors, technical personnel and entrepreneurs; up-and-coming labor force; world-class research universities; productive R&D center (either industry-funding or federal-aid); energetic risk-based capital industry; government-funded fundamental researches that focus on highly-potential fields. One core driving factor of the innovation ecosystem is the country's strength on science, technology, engineering and mathematics techniques. However, due to the transforming global talent pool and losing global market shares of technical talents, the ecosystem of America has been facing with major threats[11].

D. Theoretical Framework

On the basis of literature review above and the practice of innovation ecosystem, we assume the global ecosystem framework is constituent by four parts: the corporate domain, the industry domain, the nation domain and the globe domain. (See Figure 2-1).The corporate domain focuses on the innovation within the enterprise, it is more related with strategies of the business, and how the innovative collaboration operates in it. This domain is the very basic for the whole innovation system, because it is widely recognized that the enterprise are always sensitive to breakthrough technologies. While the second layer, namely the industry domain, is generally where the regional innovation ecosystem exists. It is more than a solely innovation of separate enterprise, it is the innovation cluster where customers, investment agencies, cooperators, competitors and suppliers habitat. In the national innovation domain, scientific community, universities and colleges, governmental agencies,

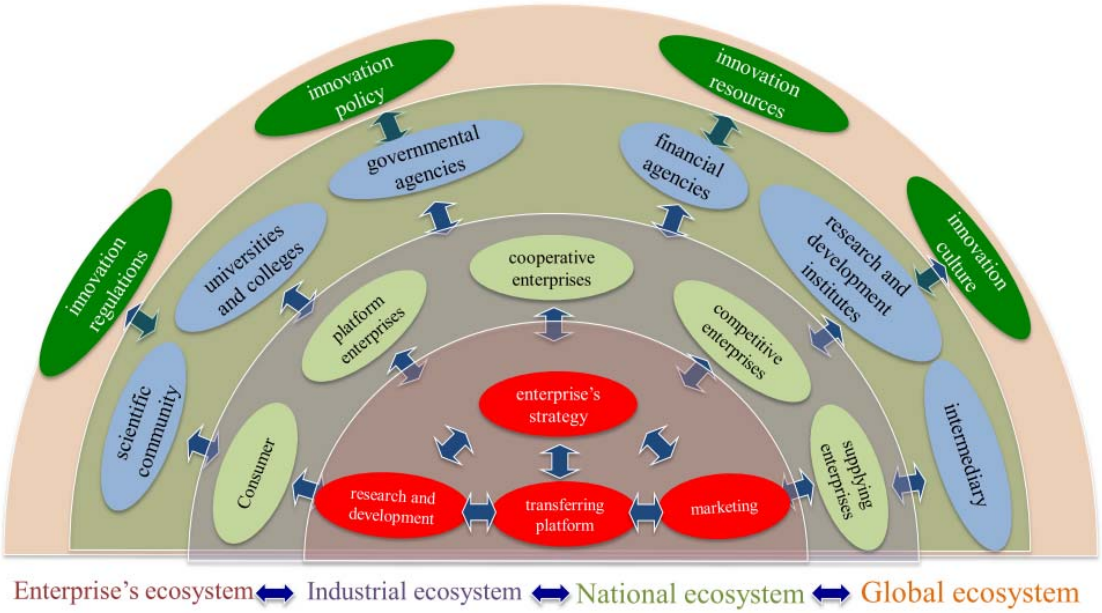

Figure2- 1 Global Ecosystem Framework

financial agencies, R&D institute and intermediary agencies are involved. The most outer level is from the perspective of the globe. It is composed of innovation regulations, innovation policy, innovation resources and innovation culture. The four parts as a whole establish the mapping of the global innovation ecosystem.

III. CASE STUDIES AND FINDINGS: BEIJING ZHONGGUANCUN AND SHENZHENSPECIAL ECONOMIC ZONE

A.Beijing ZhongGuancun

As the capital of China, Beijing is has a unique advantages in economy and science and technology compared with other cities within China. The expenditure of Beijing R&D reaches 128.66 billion Yuan, which occupies 6.03% of the regional GNP, coming as the first in the whole country [19].

ZhongGuancun Science Park, namely ZhongGuancun National Self-independent Innovation Demonstration Zone, is located in the northwest of Beijing neighboring Peking and Tsinghua University which are the most prestigious and influential universities in China and a few profound science and technology institutes afflicted to Chinese Academy of Sciences and Chinese Academy of Engineering. It is originated from "ZhongGuancun Electronic Street" in early 1980s. In May1988, the State Council approved the establishment of Beijing New Technology Industrial Development Experimental Field, since then, it became the first Chinese High Tech Park. Later, it is promoted to ZhongGuancun National Self-independent Innovation Demonstration Zone by the State Council in 2009, which was also the first Nation Self-independent Innovation Demonstration Zone in China.

With the development of over 20 decades, ZhongGuancun with sufficient educational intelligence and human resources and stronger demonstration modeling effect has proved to be an innovation cluster where more than 20 thousand high-tech enterprises including Lenovo and Baidu dwell. Presently it generated the six clusters including Internet of next generation, Mobile Internet, Satellite Application, Biology and Health, Energy Saving and Environment Preservation, Rails and Transit. In 2014, the volume of technological contracts in ZhongGuancun is over 310 billion RMB Yuan, rising 10%, occupies 40% of the total of the country. According to the statistic data, the expenditure of 2014 entrepreneurial technological activities of ZhongGuancun reached 154.05 billion RMB Yuan, in which over one hundred million ran to 251 enterprises for technological activities expenditure [21].

Right now ZhongGuancun has generated into a regional innovation ecosystem, where enterprise act as driving force for technology innovation, universities and institutes are the knowledge innovation, government emphasizes on the regulatory innovation and innovation culture cultivating, and the intermediary agencies provide innovation services. These actors interact with each other and eventually integrated into a dynamic system. At the debut of establishment of ZhongGuancun Science Park, it seemed that most innovation actors namely enterprises seldom collaborated with each other. With some enabling innovation policies introduced by Beijing Municipal government, incubators and innovation parks established, multiple actors are attracted and participate in the regional innovation ecosystem, the industrial chain gradually tended to be complete. In the field of technology, they sometimes can compete and supplement each other, exchange the substance and energy just like living organism depending on the food chain.

With IT industry as the leading force in ZhongGuancun, more rising interdisciplinary industry are interwoven. To tackle the global problem of energy insufficiency, R&D investment flow to the energy conservation technology, in the meanwhile favorable and supporting policy are set up to lead the business to uprising industries such as mobile internet, digital audio and video technology etc. Eventually ZhongGuancun Science Park has now developed into an innovation network where software development, information service, cultural and creative industries, integrated circuit are integrated with high efficiency of industry and significantly push the upgrading of this region.

By observing ZhongGuancun Science Park, its special features can be concluded as follows [20]:

- Location advantage: being the central zone which connects the east, middle, west and northeast of China, the fourth largest districts, and the pivot of transportation and information in our country.
- Technology advantage: gathering half of the academicians of the Chinese Academy of Sciences and Chinese Academy of Engineering, a third of our national scientific research institutes, and a third of technological patents of innovation, hence, ZhongGuancunhas now become the world's second largest high tech science park, right following Silicon Valley, and is also approved by State of Council as National Self-independent Demonstration Zone.
- Cultural advantage: the number of museums and theaters is the largest, the added value of cultural innovation industry occupies as high as 21% of GNP.
- Educational advantage: being adjacent to many world's prestigious colleges, such as Tsinghua University, Peking Universality, and the number of colleges here is top around the country.
- Talent advantage: the number of professional technological personnel and the number research and development scientists and engineers are both the largest in our country.
- Economic advantage of headquarters: the assets of all the headquarters of multi-national corporations, large state-owned enterprises and banks etc in Beijing roughly occupies 40% f the total of Beijing.
- Service industry advantage: the added value of service industry reaches as high as 75.7%, in which, the

productive service industry occupies as least 70%.

B. Shenzhen Special Economic Zone

The innovation ecosystem of Shenzhen was formed through the continuing interaction between market and government after the reform and opening-up policy. It was created neither by direct intervention nor by the spontaneous creation of the market itself. Beside this fact, it is true that different governments have played important roles inside the innovation ecosystem. The government has been attaching importance to the technological capability and innovative power which gave continual support to the development of electronic products. The government would incisively capture the loopholes of existing ecosystem and remedy them with new policies. This entrepreneurial state is exactly one of the reasons for the success of Shenzhen.

Of course, the innovation-favored ecosystem in Shenzhen is the result of coordination and integration by different forces. Forces like system designed by public-owned enterprises, resolution of leaders, convergence between upstream and downstream industry chains and open culture, abundant social capitals.

Firstly, a relatively perfect market economy could provide a good platform for innovation ecosystem. As a special administrative region, Shenzhen has been the leading pilot city in both economic openness and market perfection. All kinds of product and services can be sufficiently tested and competed. Non-market factor has a relatively less impact on innovative competition. Those consumer-demanded products with exceptional performance tend to gain market share in a fair competitive environment.

Secondly, the flourishing financial industry has provided corporations in Shenzhen with great convenience. However, the fundamental scientific research strength in Shenzhen was not powerful, hence researches undertook in this region were mostly applied researches on commercial affairs. If the fundamental research could not get market loan in commercial market, corporations can raise reciprocal funds from profitable financing institutions to support goal-oriented R&D activities. As one of the financial centers in China (and close to world financial center—Hong Kong), Shenzhen could guarantee corporations acquiring initial capitals for innovative research. It is true that Shenzhen government has been attaching great importance to building government-funded projects which had attracted top-level talents to settle down in Shenzhen. The *Peacock Plan* launched in October, 2010 was an example. By concentrating on the development of Shenzhen special economic zone, the plan aimed at promoting pillar industries (such as advanced technology, financing, logistics and culture) and cultivating strategic emerging industries (such as new energy resources, internet, biology, new material and so on). It gathered many top-level enterprise talents and teams from overseas. The *Peacock Plan* targeted at building Shenzhen into a overseas talents-welcoming city with dynamic and lively entrepreneurial activities.

Thirdly, Shenzhen as well as the cities in the Pearl River Delta have formed a complete industrial chain which has largely reduced the cost of finding upstream and downstream firms.

Fourthly, Shenzhen has built a good platform for public participation in innovation. Taking the *Maker Center* in Huaqiangbei in Fudian District of Shenzhen for example, the 5000-squaremeter center located in *Huaqiang E-World* has established Maker Academy, Maker Incubator, Maker Coffee, and Road Show Hall and so on. All these facilities form a small maker ecosystem which provides multi-purpose services for entrepreneurs. The center constantly holds academic communications, trainings and combinations of venture capital investment resources. Meanwhile, through introducing pioneering incubator operation pattern services, the center has lower the risks for entrepreneur team. Li Nuofu, executive manager of the Maker Center said that the center is planning to introduce venture capital funds which will help entrepreneur teams solving financial problems and raise the success of entrepreneur activities.

The typical case of Hax coming to Shenzhen may best illustrate the dynamics of Shenzhen as a regional ecosystem. Hax (originally named Haxlr8r) is a hardware acceleration incubation project under the venture capital fund of SOS Ventures. In 2012, HAXLR8R（Named Hax in 2015）moved from the Silicon Valley to Huaqiangbei. The company recruited many hardware entrepreneurs from all over the world. It had an intensive 111-day-incubator in Shenzhen. Up to now, the company has incubated six stages which included 65 projects. These included Smart Light Yeelink, Robot Platform Makeblock, Mini aircraft Flexbot, Intelligent Cushion Darma, USB Spark and so on. In 2015, the company changed its name to Hax. Haxlr8r is the abbreviation for Hax Accelerator. Without the word Accelerator, it means the company needs to do more. The name also indicates the transformation of the company. After changing the name, Hax proposed a new project—the Hax Boost. The project intended to help hardware entrepreneur companies to find appropriate distribution channel and cooperative partner. In fact, ever since moving to Shenzhen, Hax has been seen from the angle of industrial chain. Hax used to indicate that, for an entrepreneur company searching for the exploitation of the next iPhone, Shenzhen might as well be the optimum settling city.

It is obvious that Shenzhen has a favorable innovative ecosystem which shows in the following aspects. First, the geographical location is wonderful. Shenzhen locates in the Zhujiang Triangle Zone. It is adjacent to Hong Kong and has the most complete marine outfall. These make Shenzhen the capital of electronic industry. Secondly, it has the most complete industrial chain, world-leading consumer electronics production and supply chain. From the upstream components supplier to the fundamental module provider, to the downstream solution-partner factories, Shenzhen has it all and could provide a hardware entrepreneur with all materials and elements. Thirdly, Shenzhen gathers professional

personnel all over the world. Hardware entrepreneurs gather in Shenzhen. With large amount of smart phone and tablet manufactures, the average daily flow rate of professional personnel can reach 500,000 to 700,000. Fourthly, Shenzhen is the industry vane of hardware industries. All new products, prices and index are released in here. Fifth, Shenzhen is the city where the art of Shanzhai (cheap copy) phenomenon started. Shanzhai products are mostly hided with inspiration and brilliance. This art could be applicable in other products. Sixth point, in Shenzhen, the cost, which is vital for all entrepreneurs, can be relatively low.

C. Main Findings by comparing with Silicon Valley and Route 128

1) Silicon Valley

The Silicon Valley is the habitat for the spirit of innovation and entrepreneurship. It has far-researching and profound influence on science and technology innovation in America and the whole world. In the past few decades, entrepreneurs who carried the dream of changing the world had been making continuous efforts in creating new technology and business modes. These efforts in turn hastened the establishment of many new industries and world-influencing companies and changed the business modes of the world. Since the middle of the 20th century, the Silicon Valley had begun to make a figure. Up till now, the place is still full of innovative activities. There are four major reasons behind this phenomenon.

First, the Silicon Valley has been making continuous innovation in its advantaged industries which can explore the direction of future development.

Secondly, the Silicon Valley has been gathering excellent talents all over the world which in turn create the highland of innovation.

Thirdly, The Valley advocates the culture of trial and error. It does not anticipate the projects to work out at the beginning. On the contrary, it encourages projects to make experiments, make modifications, and experiment again. Projects should establish the R&D process of fast reaction and risk-taking. Entrepreneurs should never fear failure and never stop trying.

Fourthly, the Silicon Valley advocates the innovation spirit of be prepared for danger and never stop trying. Everyday, the Silicon Valley would come up with several achievements which could propel the development of the world's scientific development. Entrepreneurs in Silicon Valley believe that "products always find places for improvement" and "one should never stop innovating". It is just this spirit that encourages entrepreneurs in Silicon Valley from generation to generation and makes the Silicon Valley world's largest innovation region. [18]

2) Route 128

Route 128 is located in the suburb area outside Boston. With the total length of 108 kilometers, it is a semicircle-shaped express way. Along the route gathers a large amount of institutes and companies which focus on high-tech research and development. These companies are what make the route the world's famous electronic industry center. Hence, Route 128 is also named the High-tech Express Way of America.

Yuan concluded the Route 128 area has the following advantages[17]:

1. It has its own characters. Making a general survey of high-tech parks throughout the whole country, including Route 128 and Silicon Valley, we can learn that not all high-tech parks are large and all-embracing. On the contrary, each of these high-tech parks has its own characters. Not all industries in Boston area are in dominant positions. For example, Route 128 area used to be famous for its military products and electronic products. Recently, it is famous for biomedicine studies.

2. It has competitive first-class universities. To give an overview, we can see that the development of Route 128 area is inextricably related to the two excellent universities — Harvard University and Massachusetts Institute of Technology. As the intelligence backup force for the development of Route 128 area, Harvard, MIT, Boston University, Northeastern University, University of Massachusetts have been taken a widening participation in innovation studies. Together, they have continuously push forward patent archives and given powerful support to the development of enterprises. The development of Silicon Valley in western U.S. also demonstrates that the source and foundation of the innovation power in one area depend largely upon those competitive first-class universities in this area.

3. It has a relatively complete industrial system. Route 128 locates in New England. The local industrial development in this area is relatively earlier than that in other areas. It has a solid industrial foundation and supporting enterprises as well as well-equipped ancillary facilities. The relationship among local enterprises, financial institutions and educational mechanisms has been maintained in an open-hearted and exotic manner. This in-turn makes resources in different mechanisms unite together with little effort and forms network interaction structure.

4. It has powerful political and financial support from government. Through the whole development of Route 128 area (especially during the starting period of high-tech enterprises), the government (especially federal government) had been providing preferential tax policies, R&D fund and government procurement which had helped the development of this area.

5. It has great infrastructure and environment. Transportation around Route 128 area is convenient. The environment is this area is clean and mild. The infrastructure facilities in around this area are well-equipped. Boston is also one of the most important financial centers in U.S. For scientific enterprises, this area is a great area to settle in. They could encounter with investors very easily. The clients are also gathered around here. Besides, the elemental education in this area is relatively good, which attracts a lot of R&D

personnel and investors settle down here.

3) Findings

Compared with Silicon Valley and Route 128, China's regional innovation ecosystem building has different features：

Firstly, the openness of Chinese regional innovation ecosystem and the diversity of talent resources are lower.

Silicon Valley, based on the powerful economic, educational and cultural resources, absorbs innovation and entrepreneurial talents around the globe. 2013 Silicon Valley Index [6] shows that almost 60% of Silicon Valley talent in 2011, especially in Santa Clara and SandyMateo, are from Asia, and over 64% of the talents are with the educational background of science and engineering in 2011. Currently there are plenty of talent attraction programmes on trial in China, and more efforts have been taken to attract the talents, and the number of returned overseas talents is growing every year, however, due to China has strict limits to the Hukou in super large cities, such as Beijing, Shenzhen etc, ZhongGuancun and Shenzhen mainly absorb the domestic talents, and the innovation entrepreneurial working staff, without Beijing Hukou or Shenzhen Hukou, accounts for a half in both cities, the innovation talents in both Beijing and Shenzhen are mainly local and less of diversity. Moreover, according to the survey held by China Association for Science and Technology regarding the performance of "Public Entrepreneurship and Innovation" Policy, the entrepreneurial intention of Beijing technological working staff is lower than the average level of the whole country, 8.7% of which does not have the entrepreneurial intention, 42.9% has the entrepreneurial intention but has not started yet, 6.4% has the initial entrepreneurial plans, while only 2.5% has already started their businesses. Some interviewees in the survey claim that the restriction in Hukou, to some extent, lowers the migration of people. Without Hukou either in Beijing or Shenzhen, it is much harder for persons to solve the problem of housing ,purchasing cars and choosing better school for their kids. Fortunately, the Beijing municipal government has realized the bottleneck question and has attempted to solve the problem that restrict the moving of people, especially for the person who have the high-quality jobs. Some favorable measures to the talents will be taken, which means the higher quality jobs they get, the easier for them to get Hukou. By means of which, Beijing tends to attract more talents with high educational background to facilitate the building ZhongGuancun or even Beijing into a regional innovation ecosystem.

Secondly, resources of innovation are different. Silicon Valley is the original innovation, and the birthplace for new technologies and new industry states. Most of the new-technology enterprises located in Route 128 were from first class lab in universities. For example, Olsen from the MIT Lincoln Laboratory established DEC company, Wang An who founded the famous Wang An company comes from Harvard University. However, most of the enterprises in Beijing and Shenzhen are in the process of "Innovation Follows Strategy", and some technologies, together with new industry states, are introduced from Silicon Valley, US, and have been localized after their entrances into China, and then to be re-innovated. However during the past years new trends of original innovation have emerged that more enterprises made more input in the R&D and solve the emergent problem, for instance, a biological company named KEXING in ZhongGuancun developed the virus vaccine during the SARS epidemic crisis, contributing great efforts to combating the disease.

Thirdly, integration and upgrading of the industry chain needs the products with cutting-edge technology

Beijing is devoted to promoting the industrial structural adjustments, on the basis of technology industry, and focusing on the strategic new industries, such as new-generation information technology, new energy and new material etc; however, compared to other technological innovation centers, industrial chain is still in the deployment and promotion stage, and there are not many superior technological innovation enterprises and products with international competitiveness; the agglomeration capability of the cutting-edge innovation factors is not strong enough; and the numbers of high-quality innovation talents and innovation teams are still too limited. It seemed that there would take some time for Zhongguancun to develop into a regional ecosystem as healthy and sustainable as Silicon Valley, where the whole industry chain is fully available.

Fourthly, government and policy play a more important role in China. The emergence and development of Silicon Valley mainly relies on the spontaneity of the market mechanism, whilst the emergence of the innovation ecosystems in Beijing and Shenzhen is more featured with the guidance of the government. To some degree, the government in China either municipal level, provincial or even state level is more powerful and accustomed to making use of the policy as a tool to promote the development of the industry and the market. It is more effective in China because the market there is still not fully matured, in most cases, the government's choice might be more visionary and comprehensive. However the weakness is also apparent that government's choices reflected in its policy in some place bring less vigor to the market thus adverse to the maturity of the market mechanism. In the Silicon Valley, however, the market can make a full play where start-ups are facing the risky failure all the time in the competitive market. Government's decision-making may cultivate a rather orderly market in a short time, while the selection resulted in the market competition might be more advantageous to the sustainable development of the regional ecosystem.

IV. CONCLUSIONS AND SUGGESTIONS

A. Further streamlining administration and decentralizing institutes are needed.

At present, during the construction of the China regional innovation ecology, the government has played the leading

role. This is very important in the start-up stage the innovation ecosystem, however, along with the graduate operation of the innovation ecology, every factor in the innovation ecosystem is in active interactions with the rest ; due to the dynamic equilibrium characteristic of innovation ecosystem, the more the government shoulders, the functions of the other factors in the innovation ecosystem are weakened naturally, the vitality of the energy exchange is reduced, which is unfavorable to the competitions and the health operation of the ecosystem. We should encourage more stakeholders participate and interacting in the innovation process.

B. Enhancing the market open and market –oriented competitions

During the construction of the innovation regions, we need to not only guide the construction of industrial chains, but also introduce high-level competitors at the same time. Lowering the market access standard, letting more innovation entrepreneurs participate innovation in a market competitive innovation atmosphere.

C. Cultivating sound innovation culture

The establishment of innovation culture requires the tolerance of failure and the encouragement of innovation, which implies the government can not be eager for quick achievements when guiding and supporting some industries and enterprises, while releasing preferential policies to the innovation enterprises, ask the enterprises to complete some innovation achievement. A relaxed and tolerant environment is better in providing more development space for the entrepreneurs. On the other hand, we need to strengthen the protection of intellectual property rights and innovation achievement, respect of innovation achievement so that the original motivation of the entrepreneurs will be better stimulated. And as well more public understanding and engagement should be encouraged to make a better innovation culture.

REFERENCES

[1] AdnerR.;"Match your innovation strategy, pp 98-107, 2006.

[2] Cooke P.; "Regional innovation systems: competitive regulation in the new Europe", [J], Geo-forum, 23(3), pp 365-382, 1992.

[3] Etzkowitz H.; "The Triple Helix: University-Industry-Government innovation in action", (Chinese version), [M], Beijing: Oriental Publishing ,2014.

[4] Fransman M.; "The New ICT Ecosystem: Implication for policy and regulation" [M], Cambridge: Cambridge University Press, 2010.

[5] Freeman C.;"Technology, policy, and economic performance: Lessons from Japan",(Chinese version), [M], Nanjing: Southeast University,2008.

[6] Index of Silicon Valley, 2013.

[7] Lundvall B. A.; "Product innovation and user - Producer interaction", [M]; "Industrial Development Research Series",vol.31, Aalborg University Press, 1985.

[8] Malerba F.; "Sectoral systems of innovation and production", [J], Research Policy, vol:31, pp 247-264, 2002.

[9] OECD, "The NationalInnovationSystems", [R], 1997.

[10] PCAST Sustaining the Nation's Innovation Ecosystem : Information Technology Manufacturing and Competitiveness. [R].,2004

[11] PCAST. Sustaining the Nation's Innovation Ecosystem: Maintaining the Strength of Our Science and Engineering Capabilities.[R].,2004

[12] PilinkieneV., P. Maciulis;"Comparison of different ecosystem analogies: the main economic determinants and levels of impact, Procedia-Social and Behavioral Sciences ", vol:156, pp 365-370, 2014.

[13] Rogers E. M.;"Diffusion of innovations", Fourth Edition, [M],Beijing: Central Compilation&Translation Press, 2002.

[14] Russell M. G., K.Still, J.Huhtamaki,N.Rubens; "Transforming innovation ecosystems through shared vision and network orchestration", [R], Triple Helix IX International Conference, 2011.

[15] Wang Q., J. Zhao;"Entering the era of 'innovation ecosystem', Chinese social sciences today", July 31, 2013.

[16] Wessner .C.W. Innovation policies for the 21st century. Report of a Symposium[R]., 2007

[17] Yuan Z.; "The history of Boston's route 128 and the revelation and policy advice for China, Science&technologyfordevelopment", 8(5), pp 71-74, 2012.

[18] Zhang J., Rowen H., Luo H.; "Entrepreneurship and innovation clusters: Inspiration from Silicon Valley", [M] Beijing: China Science and Technology Press, 2015

[19] Beijing Bureau of statistics, National Bureau of statistics Beijing Survey Corps; "Statistics Bulletin of Beijing ",[R],2014.

[20] Ma J.; "Function of Beijing economic circle under new situation",[R] 2013, http://www.chinareform.org.cn/area/city/Report/201307/t20130724_172395.htm

[21] Zheng J.; "Release of Zhongguancun index 2015", http://news.sciencenet.cn/htmlnews/2015/10/329103.shtm