Sub Theme: Entrepreneurial University and Triple Helix’s Development
The role of Entrepreneurial University in Regional Inclusive Innovation System: Evidence from China

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Abstract: Inclusive growth is an indispensable solution for China’s future development. China’s 12th Five Year Plan (2011-2015) placed great emphasis on “inclusive innovation”. In the view of most preview researches, the university, which plays central role in other innovation system, is excluded from inclusive innovation system. This paper makes an attempt to conduct a case study on Zhejiang University that carried out inclusive innovation operation in the rural areas in China, in order to find the key role of Entrepreneurial University played in regional Inclusive Innovation system. The results show that not like traditional research-orient university, entrepreneurial university plays a critical role in selection, improvement and diffusion of technology, dissemination and absorption of knowledge, access to science & technology knowledge, primary intermediary service, training skilled labor, educating and offering high level talents in regional inclusive innovation system. And inclusive innovation provides entrepreneurial university with competitive advantage difficult to imitate by taking full advantage of enormous consumption, production, entrepreneurship potential contained in poor people.

Keywords: entrepreneur university, inclusive innovation, regional inclusive innovation system
1. Introduction

A new form of innovation that has been given the label ‘inclusive innovation’ is growing in developing countries. As often with new phenomena, it has different names that reflect different emphases and have also been given other labels including ‘pro-poor innovation’, ‘below-the-radar innovation’, ‘grassroots innovation’, ‘BoP (base-of-the-pyramid) innovation’, and more (Horton, 2008; Kaplinsky et al, 2009; Kaplinsky 2011; Cozzens and Sutz 2012; Ramani, Sadre Ghazi, and Duysters, 2012). Mainstream innovation is associated with increasing inequality while inclusive innovation is associated with reduced inequality. Growth in the reality of this alternative or modified form of innovation has been matched by a growth of political and academic interest, driven particularly by both an actuality and a heightened perception of rising inequality. That inequality – as well as being inherently problematic – is also seen as holding back social and economic development in the long run (Stiglitz 2012).

There were growing engagement with inclusive innovation by international organizations such as the World Bank (2013) OECD (2013), and UNDP (2014), by multinationals enterprises alongside large- and medium-sized firms, examples of these innovations include the Tata Nano, the Sakshat $35 web notebook, the Hrudayalaya Heart Hospital, Discovery Health, Ushahidi and new business models in such activities as microfinance, rural electrification, crowd sourcing through mobile telephony, and health insurance (Chataway, Hanlin and Kaplinsky, 2014). and also by national governments such as China and India (OAPM, 2011). Inclusive innovation (and by extension inclusive growth) has been widely acknowledged as a goal of public and business policy. For example, The concept of inclusive growth and inclusive innovation is very much at the center of China’s 12th Five Year Plan (2011-2015), and is taken as an attempt to transform Chinese economic and social development model. While the Government of India cites inclusive growth as the overarching objective of legislation and budgetary allocations; it provides significant resources towards programmes that ‘[reduce] poverty and [create] employment opportunities, access to essential services especially for the poor, equality of opportunity, and empowerment through education and skill development’ (Planning Commission, 2006).

However, from the literature of inclusive innovation, formal institutions (such as universities and research institutes) are less forceful within low-income markets (Foster and Heeks, 2013) or even are excluded from regional inclusive innovation system (SHAO, XING & TONG, 2011). So the research question of this paper will focus on what does the role of entrepreneurial university played in regional inclusive innovation system.

Actually there already are some research on the role of entrepreneurial university to the RIS or NIS, can be illustrated into three aspects. First one, entrepreneurial university will provide mounts of manpower that can intrigue the entrepreneurial action. Secondly, it can directly make the impact by the S&T spillover. Thirdly, it will also lead the entrepreneurial culture to move forward, from 0 to 1, also from 1 to 2.
The remainder of the paper will be organized as follows: Section 2 will briefly review the literatures about inclusive innovation and entrepreneurial university, background of case study and framework will be expatiated in section 3. More details of case study will be given in section 4. Finally in section 5, we will raise the conclusion and give rich discussion including the limitation of the paper.

2. Literature review

Trapped in a cycle of poverty and disenfranchisement are classified as living at the base of the pyramid (BoP) (Prahalad, 2004). The terms ‘inclusive innovation’ and ‘innovation for inclusive growth’ interchangeably to address innovations that create or enhance opportunities to improve the wellbeing of those at the BoP. George, McGahan and Prabhu (2012) define inclusive innovation as the development and implementation of new ideas which aspire to create opportunities that enhance social and economic wellbeing for disenfranchised members of society. Foster and Heeks (2013, 335) define inclusive innovation simply as ‘the inclusion within some aspect of innovation of groups who are currently marginalized’.

The other kind of definition is about which ‘aspect’ of innovation the marginalized group is to be included in. The main contrast is between those who think exclusion can be addressed simply in terms of innovation outputs vs. those who think marginalized groups must be included in innovation processes. A more differentiated view is shown in the ‘ladder of inclusive innovation’ Heeks et al. (2013), there should be six level for inclusive innovation, that is: Intention/Consumption/Impact/Process/ Structure/Post-Structure. The levels are akin to steps on a ladder because each level involves a gradual deepening and/or broadening of the extent of inclusion of the excluded group in relation to innovation. In general, each level accepts the inclusion of the levels below, but pushes the extent of inclusion further.’(Heeks et al. 2013, 4–6)

No matter how to define "Inclusive Innovation", however, its core focus is the structures and processes required to develop and deliver innovative technologies(goods and services) incorporating the needs and interests of the poor. And it has novel features including significant involvement of the private sector and global value chains, the development of poor consumers as an accessible mass market, growth of technological capabilities within developing countries, and the involvement of new technologies (Kaplinsky, 2011; Cozzens and Sutz, 2012). Within the literature, one finds four aspects of inclusivity that are highlighted (Utz and Dahlman, 2007; Altenburg, 2009; Cozzens and Sutz, 2012):

- Inclusivity of innovation precursors: for example that problems to be addressed by innovation are of relevance to the poor.
- Inclusivity of innovation processes: for example that the poor are involved in the development of innovative goods and services.
- Inclusivity of innovation adoption: for example that poor consumers have the capabilities to absorb innovations.
- Inclusivity of innovation impacts: for example that innovative goods and services have a
beneficial effect on the livelihoods of the poor.

A number of authors have shown the potential for SoI ideas to be extended to encompass some of informal structures and processes typical of poor communities (for example, Chaminade et al, 2009), others have identified the potential relevance of SoI concepts for understanding innovation for the poor in developing countries (for example, Mackintosh et al., 2007; Altenburg, 2009). That is because inclusive innovation faces challenges such as lack of market information, deficiency in knowledge and skills, imperfect institutional system, backward infrastructure, limited access to financial services, etc. All these constraints cannot be solved by one single enterprise, it needs support from many other stakeholders such as government, NGOs, local communities, research institutes, universities, financial institutes and intermediary institutions, to construct regional inclusive innovation system (SHAO, XING & TONG, 2011).

Looking at studies of inclusive innovation in developing countries, we see a greater emphasis on non-traditional, demand-side innovators. This includes informal sector workers (Nichter and Goldmark, 2009) and lead users (Cheneau-Loquay, 2010) who are incrementally innovating to adapt new technologies to the needs and circumstances of local consumers. In some cases, SoI’s conception of innovation actors has been extended, for example, to incorporate innovation intermediaries who stand between original suppliers and final consumers (Klerkx and Leeuwis, 2009). They are mainly conceived as information/knowledge brokers, typically connecting to formal research and development organisations (Winch and Courtney, 2007). BoP markets are being served, a much richer network of intermediaries must be created, a network that must produce a whole set of minor adaptive innovations in order to ensure inclusivity: technology adoption and use and impact within those markets. Key intermediary roles, which have been essential to enable adoption and use of new technology by low-income consumers (Foster and Heeks, 2013). Fleck (1993) utilizes the term ‘innofusion’ to cover the process of bringing inventions into use, then George, McGahan and Prabhu (2012) raised the concept of ‘inclusive innofusion’: what has to date been rather a missing link between a new invention and its widespread adoption by low-income consumers.

SoI frameworks may therefore encompass a broad range of innovation actors as inclusive innovation would require. But we need to supplement that theoretical potential with more specific detail: about who exactly the actors are in practice; how they connect to the supply and demand side of the system; and what the systemic contribution of their innovative activity is.

The relations between inclusive innovation system actors have in some ways been relatively ‘arms’ length’ market relationships, SoI frameworks of inclusive innovation systems have tended to focus on informal institutions, particularly those that deal directly with innovation (Foster and Heeks, 2013). Therefore, the ideas from the literature review are concluded: formal state institutions play a role in inclusive innovation but much less directly; those formal institutions are less forceful within low-income markets, partly because of implementation gaps, and partly because of the
rich informal institutional system that shapes behavior in and around these markets. (Foster and Heeks, 2013)

3. Case study

In this paper, we sampled Zhejiang University as the very case, which is considered to be the most important entrepreneurial university and among the top 3 universities in China. Zhejiang university located in the historical and picturesque city of Hangzhou. Zhejiang University is a comprehensive research university with distinctive features and a national as well as international impact. Research at Zhejiang University spans 12 academic disciplines. With 36 colleges/schools, Zhejiang University has 14 primary and 21 secondary national leading academic disciplines.

3.1. Philosophy: make the impact through knowledge, make the development through service

It is a tradition of Zhejiang university to be the engine of social development. As early as the Anti-Japanese War in the 1930s, ZJU was forced to move west, ZJU has made great contribution to the areas along the way. After the founding of new China, especially since the reform and opening up, the social service capacity of ZJU has been constantly improved.

The reason why ZJU kept giving back to the society can be narrowed into two aspects. The first one, thanks to the consciousness of scholars. The faculty of ZJU has the academic spirit of doing research based on the grounded issue. The other one is the complex of thanksgiving. Since the government provided plenty of policy and resources for ZJU, so in turn ZJU found it is the own duty to feedback. Facing national and regional needs, ZJU established the social service system, including talent cultivation and training, industrial technology research and promotion, agricultural technology extension services, public policy consulting, medical and health services and international cooperation. Among these issues, it is the very work of ZJU to construct an inclusive innovation system via focusing on agriculture, rural areas and farmers.

3.2. Solid support: build the inclusive innovation organization system

In order to form an inexhaustible impetus to construct inclusive innovation system, ZJU put efforts on a series of organizational design. Among them, the local cooperation office is the entity of work, agricultural disciplines support is the foundation, agricultural think tank is the navigator, and classified management of the personnel system is the stimulus.

3.2.1. Entity: Local Cooperation Office

Local cooperation office of Zhejiang university is Founded in August 2005, which is the first professional institution in China aims to be responsible for the social service. The agricultural development through technology & education department is right for carrying on duty of inclusive innovation.

Moreover, in January 2006, Zhejiang university has set up a local cooperation committee, deputy secretary of party committee standing as the team leader, organizing multi-sectoral participation to form the working group to coordinate local cooperation work. In hence, local cooperation office and
local cooperation committee collaborate from within with forces from outside, pushing the inclusive innovation forward.

3.2.2. Basis: discipline

Promote inclusive innovation can't make bricks without straw, Zhejiang university always make the impact relying on the solid disciplinary system, which reveals the unique advantage of science and technology when entrepreneurial university promote inclusive innovation.

The College of Agriculture and Biotechnology (CAB), Zhejiang University was established in July, 1999 after the four universities in Hangzhou were merged to form a new Zhejiang University in 1998. There are five departments in the college, namely Agronomy, Plant Protection, Horticulture, Tea Science and Applied Bioscience, which offer both undergraduate and graduate education programs. There are nine institutes established under the relevant departments namely, Crop Science, Biotechnology, Insect Science, Pesticide and Environmental Toxicology, Vegetable Science, Pomology, Landscape Architecture, Tea Science and Nuclear-Agricultural Science. There are 226 employees in the college including 81 professors and 79 associate professors.

Moreover, Zhejiang University gives full play to the advantages of interdisciplinary. The department offers a postdoctoral work station, a doctoral degree program in agricultural and forestry economics and management, a master's degree programs in agricultural and forestry economics and management, a co-built master's program in industrial economics as well as two undergraduate programs in agricultural and forestry economics and management, and rural regional development. The department actively involved in research areas such as Agricultural Industrial Organization and Institution, Resource and Land Management, Agricultural Economy and Policy, Agricultural Product Trade and Supply Chain Management.

3.2.3. Navigator: think tank

The Center for Agricultural and Rural Development (CARD) was founded by Zhejiang University and it's under the direct lead of the university. The main purpose of its foundation is to exert the superiority of research in agricultural and rural modernization as well as the advantage of research in regional economy. The main functions of CARD are organizing research projects, scholastic communication, training up high level talents, consultation for momentous decision, training of human resource, publishing the research works and spreading research performance.

CARD is not only to promote inclusive innovation via providing intellectual guidance, but also make effective influence on government decision-making to win system space of inclusive innovation system.

3.2.4. Stimulus: personnel system

After all, to promote inclusive innovation is basically to motivate the faculty and to cut loose the difficulties. Zhejiang university launch a series of policy in personnel system. Firstly, Zhejiang university formulate "series of agro-technical popularization" teachers title promotion and appraisal system. Secondly, Zhejiang university has set up one type of faculty named "Qiushidistinguished
promotion”, encouraging high level faculties to lead the transformation of high-tech achievements. Thirdly, Zhejiang university build the ‘agent’ team, who are specialized in technology transformation.

3.3. Make the impact: build up inclusive innovation popularization system

The four golden elements make joint effort to promote inclusive innovation. When it comes to the science and technology popularization system of inclusive innovation, which means stepping into the real world, Zhejiang university have embodied four modes.

3.3.1. Mode I: talents conveying - agricultural extension center
Zhejiang university agricultural extension center is set to focus on agriculture, rural areas and farmers, and consisted of experts and professors of agro-technical popularization. Zhejiang university take the center as an important platform service place. Through organization promotion team, Zhejiang university constantly convey the talents to transform scientific and technological achievements. At present, nearly 100 teachers as well as the external marketing researchers serve as staff.

3.3.2. Mode II: knowledge disseminating - agricultural science and education demonstration base
Zhejiang university set up more than 60 agricultural science and education demonstration bases (>1000 Mu) in Zhejiang province. The demonstration bases rely on faculties’ expertise to promote cooperation. In hence, professional knowledge disseminate from the experts to farmers, then they work together to facilitate joint development.

3.3.3. Mode III: technology spillover-cooperation promotion center
Zhejiang university set up several cooperation promotion centers in rural areas. The center mainly send chief experts in local leading agriculture industry, focusing on the introduction of advanced technology and integrated innovation of suitable technology. They also pay great efforts to the experimental demonstration of new technology.

3.3.4. Mode IV: industry expanding - agricultural experts incubator
Zhejiang university encourage the promotion of faculties' knowledge, technology and patent involved in the industrialization of agriculture science and technology. So agricultural experts incubators are established in hangzhou, huizhou, lishui. The incubator integrate university, company, base and peasant household, make best configuration of land space, capital and technology. It is a must to say the mode is successfully replicate in the western region.

4. Performance

In promoting the construction of inclusive innovation system, Zhejiang University fully relies on its academic strengths and makes inclusive innovation system presenting the booming trend of "A single spark can start a prairie fire" through serving characteristic industries and establishing research base in and out of the province.

4.1. Technology Transfer: Agricultural Technology Transfer Centers Construction

As of 2015, Zhejiang University transferred s hundreds of technical achievements and provided training and consulting services for tens of thousands of local peasants through 10 agricultural
technology transfer centers in the poor rural areas in Zhejiang province and neighboring Jiangsu Province.

4.2. Foster industry: support development of regional characteristic industries

By depending on the firm basic science research and making agricultural technology promotion center and other bases as fulcrum, Zhejiang University combining with regional characteristics supports and fosters the development of industrial innovative development to achieve a two-dimensional coverage of region and industry.

Table 1 Regional characteristic industries supported by ZJU

<table>
<thead>
<tr>
<th>Industry</th>
<th>Area</th>
<th>Product</th>
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<tbody>
<tr>
<td>Tea</td>
<td>Anji</td>
<td>The export of tea and tea processing</td>
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<tr>
<td></td>
<td>Zunyi</td>
<td>Green tea, organic tea</td>
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<td></td>
<td>Longquan</td>
<td>Oolong Tea</td>
</tr>
<tr>
<td>Corn</td>
<td>Wuxing</td>
<td>Sweet, waxy corn</td>
</tr>
<tr>
<td>Sericulture</td>
<td>Anji</td>
<td>Mulberry, silkworm breeding and promotion of new varieties, comprehensive utilization and development of sericulture</td>
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<td></td>
<td>Nanxun</td>
<td></td>
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<tr>
<td>Fruit</td>
<td>Nanxun</td>
<td>Grape</td>
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<td></td>
<td>Deqing</td>
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<td>Quzhou</td>
<td>Citrus</td>
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<td></td>
<td>Lishui</td>
<td>Precocious sand pear</td>
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<td></td>
<td>Huzhou</td>
<td>Watermelon, muskmelon, pumpkin</td>
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<tr>
<td>Aquatic products</td>
<td>Wuxing</td>
<td>Testudinate</td>
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<td></td>
<td>Xiangshan</td>
<td>Penaeusvannamei, swimming crab</td>
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<td></td>
<td>Hangzhou</td>
<td>Turtle</td>
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<td></td>
<td>Qingtian</td>
<td>Rice fish</td>
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<td></td>
<td>GuizhouMeitan</td>
<td>Rice fish</td>
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<tr>
<td>edible fungi</td>
<td>Longquan</td>
<td>Pleurotus nebrodensis, black fungus, GanodermaLucidum</td>
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<tr>
<td>Livestock and poultry</td>
<td>Ninghai</td>
<td>Free range chicken</td>
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<tr>
<td></td>
<td>Jiaxing</td>
<td>Pig, chicken, duck</td>
</tr>
<tr>
<td></td>
<td>Guangxi</td>
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<tr>
<td></td>
<td>Yizhou</td>
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<tr>
<td>Chinese herbal medicine</td>
<td>Panan</td>
<td>Eight Zhes and rare and endangered medicinal plants (including Dendrobiumcandidum), genuinemedicinal materials, development of traditional rare medicinal herbs and high-tech products</td>
</tr>
<tr>
<td></td>
<td>Changxing</td>
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</table>

4.3. Increase income: strong guarantee increasing of peasants' income
In response to the national policy and local government, Zhejiang University creates substantial economic benefits for the local poor peasants during the process of allying local government to promote inclusive innovation system. According to incomplete statistics, gross output value agriculture and the peasants’ per capita net income rose 10.8% and 12.8% annually in Huzhou, where urban-rural income ratio reduced from 2.11: 1 in 2005 to 1.94: 1 in 2013. With the help of Zhejiang University, Anji country of Zhejiang province establishes the tea export and process base whose annual production value of tea deep processing increase 250 million yuan and the export volume achieves 15 million dollars. Similarly, economic benefits of per acre increase more than 1000 yuan in Zhejiang Wuxing corn base, where peasants’ annual income increase 20 million yuan, forming a fresh corn processing industry with million tons production whose output value is 50 million yuan per year.

5. Conclusion and Discussion

However, as yet there has been a lack of field data-based application of these ideas, to systematically understand whether standard So ideas are applicable or whether the particular features of inclusive innovation for, with and by the poor would require us to modify these ideas. Thus, in this article – drawing on the case of Zhejiang University in China– We may learn from the case study that entrepreneurial university in China plays a role in selection, improvement and diffusion of technology, dissemination and absorption of knowledge, access to science & technology knowledge, primary intermediary service, training skilled labor and educating high level talents in regional inclusive innovation system.

In hence, entrepreneurial university is proved to make great impact to enhance the regional inclusive innovation system. The reason why entrepreneurial university in China exert all the effort to IID is largely determined by the fundamental social needs. Moreover, the regional entrepreneurial culture is somehow foster the cultural state of continually feedback to society. In turn, via the reform of governance structure, this kind of cultural state can be sound put into action. Because of the very interaction, entrepreneurial university gradually grasp the leading role in the regional development, simultaneously, university gain lots of upgrading via the entrepreneurial service.

ACKNOWLEDGEMENT

The paper is supported by Chinese Natural Science Foundation of Youth project: ”Research on Evolution Mechanism of Indigenous Innovation and Incentive Policy System for Emerging Industries of Strategic Importance: from the Perspective of Knowledge Conversion”(No. 71403240) and Chinese Zhejiang Provincial Natural Science Foundation of Youth project:”Research on the path to Promote Organizational Endogenous innovation capability in University-Industry Collaboration in the perspective of knowledge creation” (No. LY13G020001)

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