Entrepreneurs Synergy, Innovation and Formation of Industrial Clusters: A Case Study from Shanxiahu, China

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Abstract

Industrial cluster reflects a course of China economic development from 1980s, and it is especially observed in the rural area of China, which offers an explanation why since the 1980s some Chinese industries are so competitive in the world, as well as suggests successful model for inclusive development in China that allows people to highly participate in, and meanwhile to benefit from.

This paper mainly focuses on the case of a freshwater pearl industrial cluster in Shanxiahu town of Zhejiang, China, which clearly demonstrates the evolution course of this industrial cluster, characteristics of its innovation and the agents of the industrial cluster formation. It is proved that the synergy of entrepreneurs in both public and private sectors and their ability of innovation are key drives on the success of industrial clusters. And the ability of local government to promote and sustain entrepreneurship and incentives to reconfigure resources to adapt to changing circumstances yields long-term economic growth, regardless of geographic scale.

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Key words

Industrial cluster; Entrepreneurs Synergy; Innovation; Shanxiahu town; China

An introduction: Shanxiahu and the freshwater pearl industry

The biggest center for freshwater pearls culturing, processing and trading in China is located in Shanxiahu town, Zhuji County, Zhejiang province. The town is in northeast of Zhejiang Province which has been transformed from an underdeveloped hamlet to the center of a booming freshwater pearl industry over the past four decades. It has accounted for up to 80% of the Chinese freshwater pearl output and 73% of the world output at present, and the total value of freshwater pearl output reached RMB 14.847 billion in 2007. As shown in figure 1, the output in Shanxiahu has increased dramatically from 1 ton in 1983 to 400 tons in 2008.

Source: Statistical Yearbook of Zhuji County (2009)

Shanxiahu town with a total area of 42.56 km² and a total population of 28,809 is one of the smallest towns in Zhuji County, Zhejiang Province, which does not have abundant natural resources. In 2008, about 97.4% of the local residents were rural households, and the arable land per capita was only 0.067 ha. As shown in Figure 2,
Shanxiahu had been leading the surge of net income per-capita for rural residents in Zhuji, Zhejiang and even China over the last three decades. In 2008, the GDP of Shanxiahu hit RMB 1.6729 billion, and the total fiscal revenue was RMB 0.1398 billion, and the rural residents’ net income per-capita reached RMB 21,317 (3.5 times and 1.38 times higher than the national level and the province level respectively).

Figure 2: The Per-capita Net Income of Rural Residents in Different Level

![Graph showing the per-capita net income of rural residents in different levels]

Source: The data of Shanxiahu Town are from Statistical Yearbook of Zhuji County (1990, 1995, 2000, 2005, 2009), and the data of national level, Zhejiang Province and Zhuji County are from “Glorious History--Zhuji Economic and Social Development Report from New China ”.

The pearl industry in Shanxiahu has 40 years history. After decades of development, it has formed a relatively complete industrial chain. From pearl oyster feeding and raising to pearl products processing and marketing, the industry chain has almost contained all types of enterprises relating to pearl products. The turnover of the pearls has rocketed from RMB 497 (the first trade) in 1972 to RMB 4.8 billion in 2008. And in figure 3, Shanxiahu has formed a highly specialized and coordinated industrial cluster consisting of fodder suppliers, pearl oyster feeding enterprises, raising enterprises and workshops, nuclei disposal enterprises, pearl cultured enterprises and

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2 Source: The data of town level from 1985 to 1991 are the average of Xijiang Town and Mihu Town, the predecessors of Shanxiahu Town, the former ones merged into the latter in 1992.

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3 The data of town level from 1985 to 1991 are the average of Xijiang Town and Mihu Town, the predecessors of Shanxiahu Town, the former ones merged into the latter in 1992.
households (over 3000), pearl processing enterprises and workshops (over 3000),
pearl products design, R&D and distribution companies, and numerous specialized
pearl-related intermediary organizations. These enterprises, institutions and household
workshops are linked together via pearl oyster market and pearl products market.

Fig. 3 The Structure of Shanxiahu Freshwater Pearl Industrial Cluster

The cluster is centralizing on pearl culturing and pearl processing. The culturing area
of pearl oyster is about 27 thousand ha., which covers the country's five largest
freshwater lakes in 12 provinces, for example, Zhejiang, Jiangsu, Anhui, Hunan,
Hubei, Jiangxi, Fujian, Guangdong, Hainan province and etc.. There are over three
thousands pearl enterprises and workshops in the cluster, of which 315 are being
deep-processing processing enterprises and 162 are being trading enterprises. Their
main products are divided into four categories, namely, pearl jewelry, pearl craftworks,
pearl powder products, and pearl cosmetics. Currently, with the development of the technology, the pearl shell and meat products are also utilized by advanced enterprises.

Since the freshwater pearl business was introduced to Shanxiahu town forty years ago, increasing number of residents in this small town gradually engaged in pearl industry. In 2008 more than 81% of the workforce lives on freshwater pearl industry and related ones. It can be said that the freshwater pearl industry here contributes to fighting poverty and getting rich. And embed the pearl industry in China's development history, we will find that Shanxiahu is neither the only nor the first place tied with the pearl industry. The seeds of pearl industrial cluster have ever been generated in many regions in China, including Wei Tong, Luoyang Town in Jiangsu province and Leidian Town in Zhejiang province. Luoyang is the first town to promote the culture of fresh water pearls in large scale, and the town of Wei Tong is once a freshwater pearl trade center in China, where the first specialized fresh water pearl market of China opens. In the mid-1990s, more than two-thirds of the freshwater pearls business was completed in this specialized market. The first pearl process enterprise is set up in Leidian Town. However why does the pearl industrial cluster form in Shanxiahu town other than elsewhere? In rural areas deficient of natural resources and economic base, what are the drives of economic growth? And what kind of mechanism promotes the formation and development of industrial cluster? When it comes to explaining Shanxiahu’s success, the most meaningful issue is to rack the growth and transformation of the industrial formation and the roles of individual entrepreneurs and public sector entrepreneurs during this course. A fruitful complement, the researchers contend, would be to put Shanxiahu’s pearl industrial cluster back into the context of the historical and regional forces which have given bud and rise to it. In the following section, the researchers turn to the synergy of individual entrepreneurs and public sector entrepreneurs and its inclusive innovation through which Shanxiahu’s freshwater pearl industry has boomed.
Research questions and survey method

The regional clusters have been seen as key driving factors of economic growth and competitiveness since the concept was defined exactly by Porter (Porter 1990). The underlying concept, which economists have referred to as agglomeration economies, dates back to Max Weber’s contribution on location of industry (Weber 1909) and Alfred Marshall’s contribution on localization economies (Marshall 1920). Since then, many academics have been discussing on the importance of clusters on regional economic development. In the last decade, with the exclusively development of the world economy (World Bank 2008), scholars increasingly began to show their interest in clusters in developing countries because of their significant contributions to economic growth. The most notably contributions of them in developing economies are poverty reduction (Khalid Nadvi and Stephanie Barrientos 2004), getting over the growth constraints of capital and technology (Huang and Zhang 2007, Ruan and Zhang 2009), job creating (Shi 2007), promoting the industrial development (Hemine 1999) and the industrialization of rural region (Ruan 2009).

Then there emerge some interesting issues concerned by both scholars and policymakers: what does spark a cluster emerging and formation in one region rather than elsewhere? How do the clusters take hold and transform region economies? What are the policy prescriptions to shape the sustainable development of clusters?

Mishan (1971) attributes the emergence of clusters to serendipitous event. Krugman (1991) agrees that clusters are a result of accidental reasons, and he also argues that the origin of industrial cluster is due to the economies of scale. Even if the seed of a particular industrial cluster have emerged somewhere, whether it can grow up to a cluster still depends on the capability of local government (Lu 2006). Hence the role of government in a regional economy is extremely significant (Wickham 2005). And government’s role in cluster initiatives is a facilitator and participant. The most successful cluster initiatives are a public-private partnership (Christian 2003).
There is no doubt that clusters are generated and reinforced by a positive feedback process based on a set of advantages that arise from the geographical agglomeration of industrial activities (Rui Baptista and Peter Swann, 1998). And then, the formation of the cluster is, to a large extent, path-dependent.

However the theories still can not explain when the same type of cluster seed in two proximal regional by accidental event, and why one region succeeds, while another fails. Therefore, understanding the formation and development of the industrial clusters requires tracing the nature, origin and dynamics of historically rooted institutions (Nelson 1994, Zysman 1994, Feldman and Scheuder 1996). Scott (2004) examines the early genesis of the Hollywood motion picture industry in California and found its success attributes to a highly successful business model. Through discussing the origins of the pharmaceutical industry in the Mid-Atlantic region, Feldman and Scheuder (1996) give three speculations why one place overtook another: the superior marketing and distribution capabilities, a highly competent immigrant community and the firms’ adaptive capabilities to breakthroughs in technology. In their following study, Feldman Francis and Bercovetz (2005) argue that entrepreneurs are the key factor of creation and evolution of technology-intensive clusters. But the study on impact of entrepreneurs on rural labor-intensive cluster creating and taking hold is sill infant. In rural region of developing countries, one of the most important agents of the industrial formation is “progressive peasants” (Chari 2000). However, the research on the impact of entrepreneurship on formation of clusters at the town level is both theoretically and empirically scarce due to conceptual, theoretical, and methodological limitations. The former literatures don’t reveal the relation of entrepreneurship in private and public sector, and their synergy effect.

In this research, the concept of public sector entrepreneurship is defined as ‘the process of creating value for citizens by bringing together unique combinations of public and/or private resource to exploit social opportunities’ (Morries & Jones, 1999).
The individual entrepreneurship refers to the entrepreneurship occurs in private sector. Research exploring the definition of inclusive innovation is still in its infancy.

In this paper, it is hypothesized that the success and sustainability of a cluster will be as a result of the synergy of the public sector entrepreneurs and individual entrepreneurs and their ability of innovation to construct the supportive local environment.

Since both public sector entrepreneurship and the synergy of the entrepreneurship are infant research issues, a theory-building approach along with the method of a case study have been chosen. To deal with the problems of validity and reliability, this study has applied the triangulation principle proposed by Yin (1994). Multiple sources of evidence were used including:

**Archival Records**
The research is started with contacting the regional bodies responsible for the development and management of freshwater pearl industry, such as local government, some leading enterprises and specialized pearl industry associations. This first-round contact has provided some data and policies relevant to the development of freshwater pearl industry in a history view.
In-depth Interviews

In-depth interviews were conducted among the key persons including government officials, the first and second generation entrepreneurs and farmers whoever contributed to and benefited from the development of the freshwater pearl industry in Shanxiahu.

A document Analysis

The researchers have collected and analysed most of the national and local government policies related to pearl industry, such as industrial planning policies, financial policies, technology promotion policies and tax policies etc.

Structured Interviews

Structured interviews were conducted among the owners and the senior managers of the enterprises or workshops selected. Each interview, which normally lasted for approximately two hours, was divided into two sections. The first section aimed to explore the effect of the local government during the development of the enterprise or workshop, and the second section targeted to find the inter-firm relations. Finally, the data were categorized according to data source (interview, documents, and archival records) by following Eisenhardt’s (1989) recommendation that when a pattern from one data source is corroborated by the evidence from another, the finding is stronger and better grounded.

Interpretative History of Cluster Genesis in Shanxiahu Town

1 Emergence Stage (from the late of 1960s to the late of 1980s)

The genesis of the freshwater pearl industry in Shanxiahu started from an accidental event in the late of 1960s. In 1969, a farmer named Mugen HE, living in Changle Village, Xijiang Town³, was inspired by that a lot of farmers in Jiangsu Province had become rich by culturing pearls when he visited his father-in-law, and finally decided

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³ the predecessor of Shanxiahu Town, in 1992, Xijiang Town and Mihu Town in Zhuji County merged into Shanxiahu Town.
to take a try. Although the pearls culturing technology had been prevailing in Luoyang and Wei Tong Town in Jiangsu Province, HE’s experience was not as smooth as imagined because of the technology protection restriction. During the period of 1969 and 1971, his try of learning pearl culture technology failed three times until he made an acquaintance with a pearl oyster collector from Jiangsu who taught him mature techniques of pearls culture. Ultimately, HE harvested his first batch of peals in late 1972 and then earned RMB 497, a large sum of money at that time. Unlike Kokichi Mikimoto, HE was as generous as to share his successful experience with his fellows. As another agent of the peal industry, the local government did not sit idly, in contrast they invited HE to impart pearl culturing techniques on the farmers study class. And it was the first cooperation between individual and public section entrepreneur through which the threshold of “knowledge spillovers” for the initial industry development was largely eliminated. Following Mugen HE, the growing number of farmers in Xijiang Town involved in pearl industry, and till present, over 80% of the workforce in Shanxiahu Town has engaged in this industry.

The development of specialized market has an important role in the formation and development of industrial cluster (Sun & Wang, 2009). In Shanxiahu town, the pearl cluster and the specialized pearl market are developing synchronously. And the market has expanded for six times since the mid of 1980s. The most modern one is the sixth generation of specialized pearl market--China pearls and jewelry city, which intends to be a international pearl jewelry trade center. The market is constructed in two phase.

Phase I project has a total construction area of 160,000 square meters consisting of 2380 booths. A large number of pearl enterprises are attracted. So far over 1000 shops have been open, serving customers from over 60 regions and countries. The market directly promotes the sale of the pearl products, the turnover of the freshwater pearl in this specialized market reaches about RMB 5 billion in 2009. Furthermore, the

The father of the Japanese pearl who invented the pearls culture technology.
transaction costs are lower, and the operational efficiency is improved. It provides a platform not only for trading but also for information exchange to the small and medium enterprises:

The leading enterprises may get the price and market information through round table meeting, for our small enterprises and workshops, we mainly get the price and demand information in the specialize market through communicating with the customers and partners face to face. We sometimes buy pearls produced in other provinces to sell in this specialized market because of our advantage to access to the market information. (Interview with a small workshop owner)

The history of the specialized reflects the synergy of private and public sector entrepreneurs successfully. The first specialized pearl market was built in Wei Tong Town, Jiangsu Province in 1984, but for the farmers in Shanxiahu, it was neither convenient nor cheap to enter the market because the distance between the towns and the market and entrance fee (RMB 2). To sell the pearls quickly, Zhonghua ZHAN, a farmer, who lived in Xijiang town, with other farmers in the same community, set up the first pearl market in June 1985. Although it had only about 50 booths, it attracted more than 500 traders everyday. Unfortunately, the pearl market had to be closed only after 20 months. From Oct. 1985 to July 1986, the State Economic and Trade Commission, SAIC and The State Council General Office promulgated three notifications on the unified management of pearls. According to the regulations, all pearls should be operated by China Art-Export Co, Ltd. exclusively, the trans-regional circulation was prohibited and all the pearl markets should be removed. The whole pearl industry was in hot water then. In this situation, the former Xijiang government lobbied the higher authorities actively when the officials in Luoyang and Wei Tong were waiting for the instructions from the central government. Finally the higher level authorities compromised. “Xijiang Agricultural Product Market” which actually was a pearl market was permitted in March 1987. This market was the second generation specialized pearl market in Shanxiahu. The number of the booth was only 20 at the
beginning, and increased to 30 later. The daily traders were as many as 1,000. But the Central government policies were not been adjusted as that the pearls had to been transacted through gray market if not in Xijiang market. Then another farmer named Qiaojiang HE stood out to strive for the interests of farmers.

In 1988, I wrote an article entitled "the voice of a farmer" and mailed it to 18 media organizations. With Changle Village as an example, I demonstrated that farmers could get rich by freshwater pearls culture. This article was published by the internal reference of the Xinhua News Agency. The publication of the article caused great concern of the higher level government. And the article was reprinted by other media later. (Interview with Qiaojiang HE in new Changle Valliage, Shanxiahu Town)

Due to the HE’s efforts, the central policies were revised soon after that. In 1989, pearls were listed as agricultural products and were allowed to be traded by private companies and self-employed people according to the regulations issued by provincial government of Zhejiang. And central government's policy restriction was abolished in 1992. It was worth mentioning that before the policy was changed, people in the other regions were waiting for the preferential policies. Disappointedly, they had been waiting in vain for over two years. During that period, the pearl industry had made a key progress under market guidance in Shanxiahu Town, which was the second cooperation between individual and public sector entrepreneurs, and protected the sprout of the pearl industry through institutional innovations. Table 1 demonstrates that the local government acted as the sponsor of the second, third, forth and fifth generation specialized pearls market. Although this type of government behavior is against the laws of market economy, the government-run market mechanism effectively protects peal industry in terms of the central government control and provides market-building investments for the whole industry. In conclusion, the survival of pearl industry in Shanxiahu Town is thanks to the institutional innovation by synergy of individual entrepreneurs and public sector entrepreneurs. The removal of political, institutional impediments to the poor groups’ access to opportunities is
one of the most salient features of inclusive development (Amartya Sen, Gu 2010).

Table 1 the transition of the pearl specialized market in Shanxihu Town

<table>
<thead>
<tr>
<th>Market change</th>
<th>Time of establishment</th>
<th>The initial number of booths</th>
<th>Investors</th>
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<tbody>
<tr>
<td>The first generation</td>
<td>1985</td>
<td>50</td>
<td>Zhonghua ZHAN and his partners</td>
</tr>
<tr>
<td>The second generation</td>
<td>1987</td>
<td>20</td>
<td>Xijiang Town government</td>
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<tr>
<td>The third generation</td>
<td>1990</td>
<td>686</td>
<td>Administrative Bureau for Industry and Commerce of Zhuji Coury, Xijiang Town government</td>
</tr>
<tr>
<td>The forth generation</td>
<td>1992</td>
<td>1134</td>
<td>Administrative Bureau for Industry and Commerce of Zhuji Coury, Shanxihu Town government and Zhuji Jewelry Company</td>
</tr>
<tr>
<td>The fifth generation</td>
<td>2001</td>
<td>2000</td>
<td>Administrative Bureau for Industry and Commerce of Zhuji Coury, Shanxihu Town government and Zhuji Jewelry Company</td>
</tr>
<tr>
<td>The sixth generation</td>
<td>2008(Phase I)</td>
<td>2380</td>
<td>Man Sang Group(HongKong), Zhejiang Shanxiahu Pearl Group CO.,ltd, RUANS Group Co.,ltd, Zhejiang Shanshui Jewelry Co.,ltd, Zhejiang Grace Peal</td>
</tr>
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</table>
Another contribution of the synergy of private and public sector entrepreneurs to the development of the pearl industrial cluster is cutting the poor’s access to technology down. The first pearl culturing technology threshold is eliminated by the first synergy of Mugen HE and the local town government. In the history of the industry, another technical breakthrough is the successful development of culturing technology of *Hyriopsis culingii* \(^5\) by Zhirong SHEN, a farmer in Leidian Town, Deqing County, Zhejiang Province in 1976. But he neither applied patent nor diffused it to the residents outside his villages until Qiaojian HE recognized the importance of the technology to Shanxiahu residents. In order to obtain the technology, HE opened a pearl oyster transaction market in Shanxiahu in Oct. 1987. In this market, the *Hyriopsis culingii* and its culture technology were bundled for sale. Due to that the pearl oyster only survived for seven months, the pearl culturing technology utilizing *Hyriopsis culingii* was introduced to Shanxiahu Town and was prevailing quickly, and was eventually cultured in a large scale. At present, an invisible pearl oyster market has been formed in Shanxiahu.

We usually buy mature pearl oyster and re-cultured them to get big pearls.  
(Interview with a pearl farm in New Jucheng Village, Shanxiahu Town)

2 Development Stage (from the late of 1980s to the mid term of 2000s)

After pearls transactions were permitted in Zhejiang Province in 1989, the industry entered into a period of rapid development. After the first registered factory named Zhejiang Zhuji Xishi Pearl Powder Factory, an increasing number of individual entrepreneurs are selected to be a registering enterprise. Most of the enterprises appear to have started with personal funds rather than venture capital. The

\(^5\) A kind of pearl oyster that can cultured more quality pearls than Cristaria plicata introduced by Mugen HE.
growing number of related firms in the region provided work and asset sharing opportunities, and in the same time made the industry diversified. Second-generation entrepreneurs, benefiting from the knowledge and experience gained by the first-generation entrepreneurs and their initial efforts, began to shift their attention to high value-added products. For instance, Zhejiang Fenix Pearl-biotech Co., Ltd. developed a product named "all-natural nano pearl powder" which passed the ISO9001 quality system certification and drug GMP certification. The products penetrate Japan, United States, Australia, Thailand and Serbia market successfully. The other example is Changshengyuan Health Products Co., Ltd., which developed a pearl fiber shirt successfully by cooperating with Donghua University, in this way, and further created a new processing technology and a new market for low-grade pearls.

The far-sighted second generation entrepreneurs endeavor to cultivate a group of leading enterprises which drives the emergence of mini enterprises and workshops. Table 2 reveals that the number of enterprises increases speedily from 1995 to 2009. Although over 98% of the pearl enterprises are mini and small ones, noticeably the number of large ones tripled during the year of 2000 to 2005.

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<tr>
<td>Mini(Less than 8 employees)</td>
<td>605</td>
<td>874</td>
<td>1436</td>
<td>2042</td>
</tr>
<tr>
<td>small(9-50)</td>
<td>287</td>
<td>859</td>
<td>981</td>
<td>1327</td>
</tr>
<tr>
<td>medium(51-100)</td>
<td>5</td>
<td>18</td>
<td>30</td>
<td>39</td>
</tr>
<tr>
<td>large(more than 100)</td>
<td>2</td>
<td>4</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>total</td>
<td>899</td>
<td>1755</td>
<td>2459</td>
<td>3425</td>
</tr>
</tbody>
</table>

Table 2 Distribution of enterprises by number of workers employed, Shanxiahu Town, 1995, 2000, 2005 and 2009
But the development of the industry is neither a deterministic nor a smooth progress. In the development stage, the pearl industry faces greater challenges from technology transition, resources scarcity and the shock of macroeconomic. During the early 90s, the main problems troubling the industry are the pearl oyster’s disease and the pearl quality. The deterioration of water quality results in the spread of the pearl oyster’s disease, and at that time, the quality of the pearls is not good enough. Most of the pearls are small with diameters less than 6mm. In this case, a farmer called Xiaofa HE, general manager of Shanxiahu Company, finds the threat and the opportunity hidden in it. He united two large pearl culture farmers, Limiao Wang and Fengming Zhou to develop the high-grade pearl culture technology and the disease control methods. Soon, these two problems have been addressed. Besides, they find that extending the culturing cycle (re-culture the Hyriopsis culingii) is a good way to get jewelry pearls. This is another major breakthrough in the field of pearl oyster technology. What are the public sector entrepreneurs doing at that time? They also find the crisis and committee to solve these problems through investing in pearl research institute. The first pearl research institute is run by government but unfortunately it fails lastly. Then the government motivates Fengming Zhou to set up and manage the Shanxiahu Pearl Culture Research Institute in 1992. The Institute was funded by the government, and experts in the universities from Shanghai and Hangzhou was invited by Zhou. And he records more than 100 video tapes about the pearl culture technology and diffuses to farmers without any charge, which is an institutional innovation by synergy of individual entrepreneurs and public sector entrepreneurs. One of the results is the breakthrough and diffusion of technology. Technological innovation itself is the exclusive, but the institutional innovation may

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6 The pearl whose diameter is equal or more than 10 mm is regarded pearl jewelry class. The others are general ones.
inclusive (Huang, 2010). The other result is reversing the industry threat into industry opportunity. The ability of perceiving opportunities (BLANCHELOWER et al. 2001) and threats (RUAN, ZHANG and WEI 2010) and subsequently acting upon them are the most significant factors affecting entrepreneurship. In the case of Shanxiahu, the individual entrepreneurs and public sector entrepreneurs are both active and integral component of the cluster.

The diffusion of the technology breakthrough accelerates the expansion of the freshwater pearl industry which however results in the shortage of human resource and water resource. To meet the employment needs of local enterprises, the government encourages and organizes them to recruit employees from outside the province. Table 3 describes the change in the labor force source of the pearl industry in Shanxiahu Town. The proportion of the workforce from outside the province rises from 16% in 1995 to 30% in 2005. This has spawned institutional innovation. Some business men from the labor export provinces set up their intermediary organization branches in Shanxiahu. Those organizations are called labor offices which are highly profitable private organizations. Taking Shandong Office for instance, it is established by a man from Zaozhuang, Shandong province and responsible for delivery and management of workers who are dispatched to the enterprises in Shanxiahu. The office charges the enterprises which receive the services commission and management fees. Although the management fee is 1 Yuan per person per day, many enterprises, such as RUANS Group, still purchase services from the Labor Office of Shandong. This office is one type of the institutional innovations fostered by cluster, and its role is mainly reflected in four aspects:

1. It links the labor demand in Shanxiahu with the labor exporters in other provinces.
2. It reduces the transaction cost of recruitment for the enterprises in the cluster.
3. It cuts down the cost of employee management for the enterprises in the cluster.
4. It helps the workers from other provinces increase the sense of belongings,
and enhance employee satisfaction.

*We must go to other provinces to recruit workers before the Shandong Office established, it is costly... Since we received the service from the Shandong Office, the stability of the workers is enhanced greatly.* (Interview with the human resources manager or RUANS Group)

| Table 3. The source of labor force of pearl industry in Shanxiahu Town, 1995, 2000, 2005 and 2009 |
|-----------------------------------------------|-----|-----|-----|-----|
| Employee from Shanxiahu                       | 5987| 9906| 10340| 12501|
| Outside Shanxiahu but within Zhuji           | 521 | 678 | 981 | 1217 |
| Outside Zhuji but within Zhejiang             | 217 | 318 | 350 | 420  |
| Outside Zhejiang                              | 1257| 2356| 4958| 5489 |
| Total                                         | 7892| 13258| 16629| 19627|

Source: Author’s survey at the Industry Office of Shanxiahu Town Government in 2010.

| Table 4. The distribution of pearl culture water area of the pearl industry, 2000, 2005 and 2009 |
|-----------------------------------------------|-----|-----|-----|
| In Zhuji(ha.)                                 | 2000| 3333| 2667|
| Outside Zhuji but within Zhejiang(ha.)        | 8000| 10000| 11333|
| Outside Zhejiang(ha.)                         | 10000| 11765| 9333|
| total(ha.)                                    | 20000| 25098| 23333|

Source: Author’s survey at the Industry Office of Shanxiahu Town Government in 2010.

The solution for water shortages also reflects the synergy of individual entrepreneurs
and the public sector entrepreneurs. In late 1990s, some entrepreneurs actively exploit and leased the water field outside the province to culture pearls. At the same time, the local government proposes an idea of pearl industry expansion named "Based on mountain lakes, to the whole of China". Supported by the entrepreneurs and the government, more and more farmers in Shanxiahu leave for other provinces to culture pearls. As a result, many pearl farmers have changed the culturing pattern from extensive one to intensive one. Table 4 shows the distribution of pearl culturing water area of the pearl industry in Shanxiahu in 2000, 2005 and 2009.

3 Upgrading Stage (from the mid term of 2000s to present)

In the turbulent and competitive environment, whether an initial cluster matures or declines is contingent on the ability of the clusters dealing with crisis. If the crisis triggered the collective actions of individual entrepreneurs and the public sector entrepreneurs, it will lead to the upgrading of industrial cluster (Ruan, Zhang and Wei, 2010). The upgrading process of pearl industrial cluster confirms this view.

The upgrading of the pearl cluster is provoked by the economic crisis outbreak in 2008. The pearl products are mainly export-oriented in line with the consumer preferences. The economic crisis wakes some promising entrepreneurs up to realize the importance of domestic market and innovation. Then it promotes a series of cooperation between individual entrepreneurs and the public sector entrepreneurs. From 2008 to 2010, the local government enacts reward policy to stimulate the pearl enterprises upgrading. The awards cover five areas which are marketed development awards, to award the enterprises that develop domestic market, upgrading awards, to award the enterprises for joint-stock, expansion awards, to award the enterprises which have developed the derivative new pearl products successfully, the innovation awards, to awards the enterprises which establish the postdoctoral workstation and which are high-tech enterprises, brand building award, to award the enterprises implement brand strategy. Under the pressure of economic crisis and the incentive of
those policies, some promising individual entrepreneurs begin to upgrade their production line to develop high-tech productions and brand strategy. Take RUANS and GRACE for examples, the former aims to become “the largest high quality pearl supplier in the world” and “world top pearl brand operator”. And the latter becomes the China standardized freshwater pearl sample research unit, licensed manufacturer of Olympic Games in 2008 and the licensed trader of Shanghai Expo in 2010 through their efforts. Following the leading companies, more than twenty enterprises embark on brand building. Accordingly, the output of the enterprises in the cluster increase continuously. Up to 2009, the number of the enterprises with output of over RMB 0.1 million reaches 9, and with output of over RMB 0.05 billion exceeds 20.

In the economic crisis, in comparison with the large enterprises, the medium and small enterprises (SMEs) need local government’s direct support owing to their weak ability to cope with risks. Although this breaches the law of market economy, it stabilizes the development of the industry. For example, the town government of Shanxiahu loan to a small insolvent enterprise to clear away the fears, as a result this economic crisis did not cause any pearl enterprise in the cluster bankrupt, which is a type of inclusive innovation. In order to provide further help to the SMEs in the clusters, the town government allied with two enterprises in the cluster to establish a guarantee corporate. As an intermediary, the guarantee corporate not only mitigates the risks faced by banks, but also provides more possibilities of loaning from a bank to the SMEs in the cluster. This institutional innovation lowers the threshold of SMEs’ access to credit.

**Conclusions and policy implications**

Industrial cluster reflects a course of China economic development from 1980s, and it is especially observed in the rural area of China, which offers an explanation why since the 1980s some Chinese industries are so competitive in the world, as well as
suggests successful model for inclusive development in China that allows people to highly participate in, and meanwhile to benefit from.

But the causes of formation of industrial clusters are still not well understood, despite the contributions of many fine scholars. This paper takes a freshwater pearl industry cluster in Shanxiahu town of Zhejiang, China, as a case, describes the evolution of this industrial cluster and characteristics of its innovation to explain the agents of the industrial cluster formation. It is demonstrated that the synergy of entrepreneurs in both public and private sectors and their ability of innovation are key agents on the success of industrial clusters. And the ability of local government to promote and sustain entrepreneurship and incentives to reconfigure resources to adapt to changing circumstances yields long-term economic growth, regardless of geographic scale.

The conclusion that the policies and the entrepreneurs have had a joint major on the formation of industrial cluster is consistent with Feldman, Francis and Bercovitz. The evolution of the freshwater pearl industry in China proves that both individual entrepreneurs and local government played important roles during the course of cluster development. On one hand, the individual entrepreneurs are the key agent of the industrial success, since they find market opportunities and implement technical innovation. And the government’s role in cluster initiatives is a facilitator and participant, it should construct the local environment to support the individual entrepreneurs but not replace them. Therefore, government policy should reinforce existing or emerging clusters rather than attempt to create entirely new ones. On the other hand, the role of local government is very important for the diversity of the Chinese economic, from the perspective of sustainable and inclusive development, the local government should provide regulatory and (physical and knowledge) infrastructure services, that not only support the better use of resources (efficiency), but also enable broad access to opportunities (inclusion) (Gu, Wu and Huang, 2010).

Certainly, this is only the start of the topic. The authors hope that these historically
informed theories will inspire others to take a more detailed look.

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