

Grassroots Innovation, Characteristics, Status Quo and Suggestions*

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Abstract This paper, based on the exploration of the characteristics of folk innovation, provides thorough analysis of its status quo in China. The author holds that there exist many problems in the innovation among individual folks, non-governmental scientific research institutions and private enterprises, and that in view of Indian experience in folk innovation development, the entrepreneurial culture and innovative spirits to encourage venturing and failure toleration should be developed and carried forward.

Key words Grassroots innovation; Innovation-oriented country; Mechanism innovation; Cultural reconstruction

1 Introduction

The term “grassroots” was introduced to China in the 1980s, and is interpreted as the general public with neither authority nor knowledge in social economics. Similarly, grassroots innovation can be defined as the innovative activities of improving products, techniques and crafts in a random and extensive way by the grassroots people who have grasped the corresponding techniques and skills. It is a flash in the common people and embodiment of their wisdom.

However, grassroots are customarily equated with folks in China, while “folk” is a concept as opposed to government. In this way, the definition given above seems to be narrowed. Therefore, according to the characteristics of China’s scientific and technological management system and the status of national innovation system, we can redefine folk innovation in a broader sense as the technological innovation by the individual folks, non-governmental research institutes and private enterprises. (Figure 1) Therefore, grassroots innovation in a broad sense includes not only the individual innovation among the individual folks, but also the collective innovation by private research institutions and private enterprises.

2 Analysis of Characteristics of Grassroots Innovation in China

2.1 In terms of subject, grassroots innovation is the bottom-up innovation starting from the grassroots

Grassroots class refers to the disadvantaged class as opposed to the mainstream elite class; the grassroots entrepreneurs are those who once were shoemakers, blacksmiths and tailors; The grassroots economy refers to the small and medium-sized economy and peasant agriculture. The term grassroots itself entails the meaning of non-mainstream or non-dominant and the grass-root. As the subjects of grassroots innovation, the individual folks, non-governmental scientific research institutions and private enterprises all come from the grass, and their innovation inherits China's traditional culture and embodies the folk wisdom. Because of the non-occupational, non-professional and non-secure characteristics of individual folks, and self-development feature of non-governmental scientific research institutions, they realized their independent innovation and development through self-financing. The private enterprises are characterized by non-governmental investment self-oriented development.

2.2 In terms of motive, grassroots innovation is a spontaneous and interest-driven

Grassroots innovation is not that led by government, but it is a spontaneous one from the craftsmen and peasants with crafts and skills. From the perspective of system theory, Hayek defines self-organized and self-generation system as the spontaneous order produced by the interaction among the internal power of the system. The spontaneous self-generated order originating from the internal power is

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usually out of order, different from the stable man-made order and construction order. The folk self-generated innovation is self-organized and self-generated system, whereas the governmental innovation pushed by government is the stable man-made and construction order. In fact, generally society progressed following the pattern: “stability and order - disorder and imbalance—new stability and order...” Obviously, the spontaneous folk innovation is the starting point to promote governmental innovation. For self-generated innovation, various definitions were given from different perspectives. According to the dynamic model created by Hicks: endogenous innovation of the first generation—elements of scarcity—the second generation innovation—more stable order, self-generated innovation was interpreted as the self-generation caused by the element of scarcity. Rosenberg, from the perspective of the imbalanced development of techniques, the uncertainty of manufacturing ring and resources supply, interpreted it as the self-generation induced by bottleneck; Schmookler put forward the market demands-led innovative model, and defined it as the self-generation guided by market demands. We hold that, whatever it is caused, elements of scarcity, bottleneck or market demand, it is interest driven. Therefore, we interpret it as the interest-driven self-generated innovation.

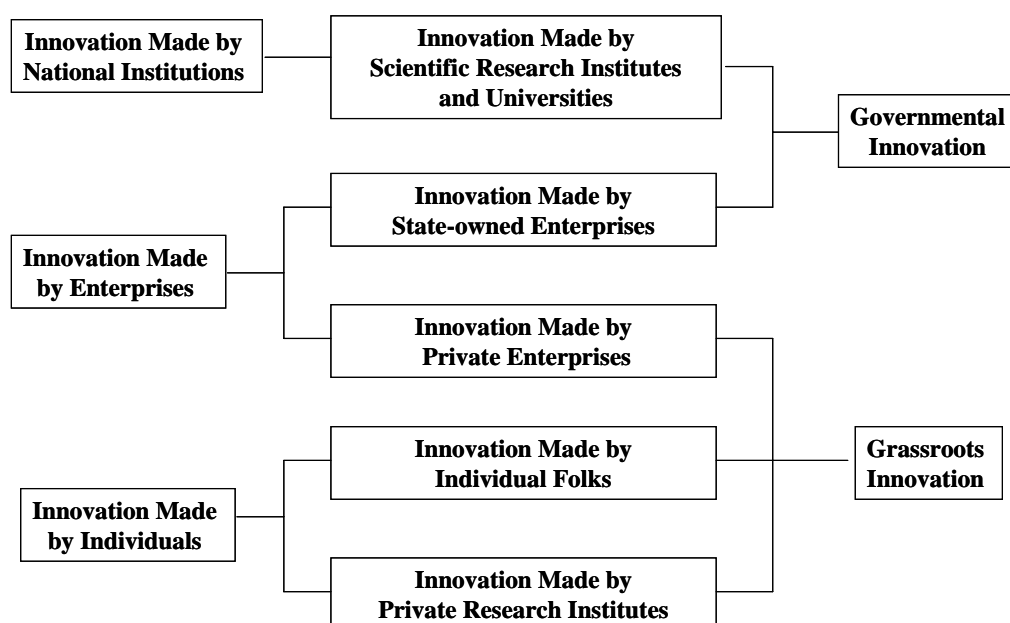


Figure 1 Definition of Grassroots Innovation

2.3 In terms of method, grassroots innovation advances gradually starting from direct experience

The innovation process is summed up as a linear model, "Basic Science - Applied Science - Manufacturing - Sales", by traditional research, which views that scientific progress is a necessary condition for technological innovation, and science and industry hold a highly-dependent relationship. With the expansion and in-depth of the research, people have had doubts about this, first of all, Nelson and Levin and others overthrew the conclusion of highly-dependent relationship between science and industry through practical investigation, followed by Rosenberg's assertion for a technical independence, who thought that technology itself is a group of knowledge about some events and activities, and it is not only from the use of knowledge in other areas. And "It was a rule in the past that technical know-how went ahead of scientific knowledge, and it remains so to a certain extent nowadays." In fact, we had known how to operate a furnace before we knew the combustion principle; we had produced good seeds and poultry before DNA was found; we had made aircrafts fly in the sky in the absence of fluid mechanics and so on^①. These typical examples of grassroots innovation have not only overthrown the linear model, but also shown a new innovative process starting from direct experience. Based on this research, Klein and Rosenberg further put forward the "Chain Link - Return Model" to incorporate grassroots innovation methods starting from direct experience into the main methods of innovation, as

①From Liu Xielin's Economics of Technological Innovation, China Economic Publishing House, 1993, Beijing.

opposed to the innovation starting from scientific advancement promoted by the government. According to the SPRU's demarcation between innovations, we believe that grassroots innovation is a kind of small innovation which advances gradually and continuously. Most of these innovations are from the hands of workers and farmers who are directly engaged in production activities, being technological innovations; they are re-allocation of resources within the original system and can not break the original balance to make significant increase in productivity.

2.4 In terms of type, grassroots innovation is the practical low-cost innovation based on technology

Grassroots innovation is not intended to achieve leading-edge technology, nor a technology-oriented innovation. On the contrary, the grassroots innovation emphasizes on the practicality and economic innovation. Innovation, made by folk individuals and non-governmental research institutes, are mainly development on new technologies, new products, and new processes to solve problems in real life based on the actual needs of the country and people. This kind of innovation is generally functional to people's actual use with broad potential market space. And innovation of private enterprises is mainly direct market-oriented innovation. For private enterprises, especially technological private enterprises, innovation is fundamental for their survival in market. Fierce competition and pressure for survival lead to a direct and effective incentive to actively explore their practical market-based innovation. Grassroots innovation is not a major technical change, nor an unprecedented breakthrough, but it is a process innovation in technology-based improvements of products, technologies, and processes etc. Grassroots innovation is practical, which features process innovation to determine its low cost. The outcome of grassroots innovation is low in technology, easy to imitate, difficult to be identified in technology, and poor in sustainability of product development, which can improve production conditions and quality of life for general workers at low cost, especially for the residents in poverty-stricken areas, so as to help improve productivity, reduce work intensity, save production costs and enhance product quality.

3 Development Status Quo of China's Grassroots Innovation

3.1 Innovation made by individual folks is the basis of resources in the development of China's grassroots innovation, but in difficult circumstances

According to 2005 statistics, sixty-five percent of all China's patent applications came from non-service inventions made by individual folks, so innovation made by individual folks has become an important part which is indispensable for the country and people to achieve independent innovation. However, individual grassroots innovation in China still faces great difficulties, mainly reflected in:

Poor environment for innovation. Grassroots innovation has attracted the attention from the government, but the support efforts are obviously not enough without relevant policies; Grassroots innovators are marginalized as they lack a wide range of social recognition and support. In 2006, some scholars submitted the proposal entitled "Another Important Force in Modernization of China's Science and Technology - Non-Governmental Science and Its Development Issues" to the CPC Central Committee and State Council, which received the instruction of Premier Wen Jiabao and attention from the leadership of Chinese Association for Science and Technology, and it was reported on the front-page of Science and Technology Daily on May 14, 2006. This shows that grassroots innovation has attracted the attention of the relevant functional departments, but China has not promulgated specific policies and measures to support and promote grassroots innovation, in spite of rapid growth of national funds into the scientific research, grassroots innovation has still not been supported financially, remaining in a self-generated state. And the innovative actions made by grassroots innovators fail to get widespread recognition and support from the society, the grassroots innovators is marginalized in a dissociated state;

Poor subject for innovation. Grassroots innovators have high enthusiasm for innovation but limited level. They lack organization and guidance between each other and necessary communication, in particular, there is no communication and exchange platform for folk grassroots innovators and professional researchers. Grassroots innovators have very high enthusiasm for innovation, and they hold a firm and indomitable mind on innovation in order to resolve realistic difficulties or to achieve their ideals, but they are born in grassroots after all, their level is limited, and their innovative actions can not follow a scientific research paradigm to express their innovative fruits in a substandard way, so the fruits are difficult to be accepted by the scientific community. The grassroots innovators also lack an inter-related social network between each other, which hampers cooperation between them to promote learning, and made them fail to receive mutual spiritual support and encouragement in case of crisis or failure. There is no communication and exchange platform for folk grassroots innovators and enterprise

researchers, so that grassroots innovation lack professional guidance and standards, which is not conducive to grass-roots innovators in optimization of their innovative fruits, and also hinders them from continuing to push their own innovations to more logical conclusions.

Poor conditions for innovation. Grassroots innovation and industrialization still lacks a running system and mechanism for investment and financing, such as venture capital, security, investment, equity etc., to be in poor transformation channels. Although grassroots innovation is a kind of low-cost innovation, but it still needs the necessary financial support. At present, China has no financial support for grassroots innovation basically. This makes a large number of grassroots innovations not transform into real economic and social benefits, what is more serious, it takes away the necessary conditions for the innovative actions, which hampers the development of innovative actions from the source. This loophole in the system also shows that national public policy agencies have paid little attention to grassroots innovation with potential in the creation of employment opportunities and elimination of poverty.

Poor benefits for innovation. Good and bad innovations mix together. They are difficult to hold professional assessments. The transformation channels are poor. Their intellectual property rights are difficult to be protected. As a result of the specialty of grassroots innovation, the grassroots innovative fruits are huge in number with good and bad ones mixed together. This leads to great difficulty in professional assessments, added by the lack of funds, it is very difficult to transform the fruits. Moreover, grassroots innovations are relatively simple in general, which are easy to imitate and mainly cover a number of design changes, and grassroots innovators generally have poor education. All these make the protection of intellectual property rights very difficult. It constrains the benefits of China's grassroots innovation to a large extent.

3.2 Non-governmental scientific research institutions are the pilot strength of grassroots innovation, but their status is in dilemma

Non-governmental scientific research institutions in China are basically in embryo. Strictly speaking, they are the loose club-like organizations spontaneously formed by grassroots innovators. The typical ones are only a few, like Jinjiang Family of Science and Technology in Chengdu, Wuhou Family of Science and Technology. The difficulties in their development are in:

Insufficient national support. Compared to the state-owned scientific research institutions, the non-governmental scientific research institutions suffer discrimination. Although the government does not interfere with, question about or control over them (the so called "three no" policy) and provides an ample developmental space, yet they are not operating profitably because of the specialty with grassroots innovation itself, and therefore, they are in urgent need of governmental support.

Weak intermediary force. Currently, an important role played by the non-governmental scientific research institutions is to act as an intermediary, pushing the achievements of grassroots innovation to the market. But they are not doing this well, because folk innovation is isolated from enterprises.

Irrational internal organization. Non-governmental scientific research institutions are loosely organized, and the internal operation mechanism and system unsound and dynamism not strong. The personal management system in accordance with their own development is yet to be built; neither the efficient competition and incentive mechanism nor self-restricting mechanism is sound; employment mechanism that allows for promotion and quitting has not come into being. Employment and dismissing system, performance appraisal systems are relatively in embryo, which also restricts their role.

3.3 Private enterprises, medium and small-sized ones in particular are the new force, but not powerful

Lack of dynamic mechanism leads easily to the vicious circle of devaluated innovation, the enterprises expecting no innovation. Most of the private enterprises are homogeneous small and medium-sized enterprises specializing in daily necessities, along with low technology and imitating nature in grassroots innovation. There appears the situation of more innovation, production and supply, which result in lower price. In this case, the enterprises are unwilling to innovate.

The unsound risking sharing mechanism and inadequate protection of intellectual property rights refrain the enterprises from innovating. The supportive system and relevant policies are not sound, especially venture capital industry progresses slowly; Well-educated class of capital investment is far from being formed, which is not capable of partaking the innovation risks of private enterprises; Environment for the intellectual property protection is poor; The innovative achievements are not legally protected, and the enterprises are neither willing nor bold enough to innovate.

For the lack of creative talents and communication with the external scientific research institutions, and the limited research and development ability, the enterprise does not know how to innovate. The

subjects of independent innovation are those talents with dynamism and techniques ready for innovation. Without them, innovation is only on talk.

Lack of supporting financial system and the financing difficulty does not equip the enterprises well to innovate. The two important rings in private enterprises innovation, both technology research and development and the industrialization of achievements in scientific research require big capital investment. However, because of the financing difficulties, the two rings can not be realized, which causes the financing bottleneck in innovation to the private enterprises.

4 Experience of Development of Grassroots Innovation Abroad

The establishment of complete grassroots innovation promotion system: From the opening of Honey Bee Network to the creation of SRISTI, the formation of GIAN and eventually the establishment of NIF, India has stepped onto the bottom-up classic line of grassroots innovation being integrated into national innovation system. (Figure 2)

Honey Bee Network, the evacuation center for grassroots innovation in India. It records the achievements of grassroots innovation, confirms its value and provides intellectual property protection. In addition, it undertakes the tasks of spreading the achievements and appealing for policy favoring on behalf of grassroots innovators.

However, since it is a volunteer organization, a loose network, the innovators are confronted with many problems: The innovators are not acknowledged by the society; they are lacking in mutual encouragement to foster confidence; they are short of the channels to integrate with the formal science and technology system and venture capital; They lack venture funds; They lack the ideal framework of protecting intellectual property, care of formal institutions and system, and attention from the educational system, and all these problems have not been solved. Consequently, the development of Honey Bee Network calls for powerful supporters, expediting the creation of SRISTI.

SRISTI, the useful complement to Honey Bee Network. The main task of SRISTI created in 1993 is to find a solution to the difficulties mentioned above, including the establishment of a persistent and international registering network to help the grassroots innovators with patent registration in India and other countries, and to protect their intellectual property. It endeavors to combine indigenous knowledge and educational courses, enable the students to recognize and respect the value of grassroots innovation and traditional knowledge, and set up the schemes to award the innovators.

GIAN, the catalyst for the realization of commercialization of India grassroots innovation. Only when the innovation achievements are successful commercialized, we can consider that the innovation process is completed, thus the intact innovation chain. Yet this is neglected by the above two institutions. As a result, GIAN was set up in 1997, which aims to seek funds, connect innovators, investors and enterprises, and innovators with formal science and technology institutions, help commercial enterprises identify their favored techniques and products from the grassroots innovations. In this way, grassroots innovations are converted into products and enterprises, and their technological, economic and social values are materialized.

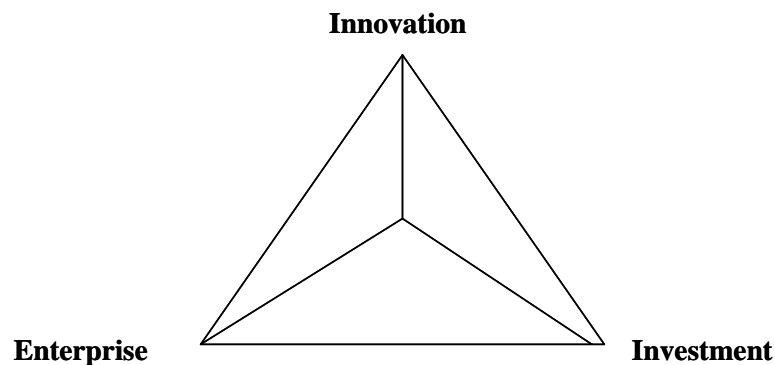


Figure 2 Golden Triangle of Innovation

Source: < <http://www.sristi.org> >

NIF, the stepping stone for grassroots innovation integrating with national technology and science innovation system. The establishment of NIF in 2000 was seen as the government's efforts to discover

and recognize the grassroots innovation and traditional wisdom, which signals that India officially incorporated grassroots innovation into national science and technology innovation system.

NIF not only complements Honey Bee Network, but also seeks to build an innovation-driven society through awarding the grassroots innovators, helps converse the innovations with economic potential into commercial products (or innovators sell their innovations and their patents to the right commercial enterprises), and assemble the innovators and the scientists and technologist from both formal and informal departments, both public and private departments to promote the further in-depth development of grassroots innovation.

TePP, persistent force for the development of grassroots innovation. TePP is the program by the government to provide financial support for grassroots innovators in order to achieve the innovation achievements. The government established a risk innovation start-up funds run jointly by NIF and Indian small industrial development bank. These funds are used to facilitate the transformation of innovators into entrepreneurs and to promote the development of potential enterprises. Obviously, what TePP is doing injects a continued momentum to the development of Indian grassroots innovation.

5 Conclusions

To promote grassroots innovation, the entrepreneurial culture and innovative spirits to encourage venturing and tolerate failure need to be developed. And the innovative wisdom of the ordinary people needs to be dug out and their enthusiasm stimulated to create a good cultural atmosphere for promoting folk innovation. What behind grassroots innovation is cultural atmosphere of innovation, the soil for innovation, the exploratory spirit and the enthusiasm for creation. The beneficial and relaxing working environments to enhance wisdom should be built and the fantastic ideas and bold thinking should be stimulated. In addition, to bridge the enterprises and innovative force among folks and build the platform for communication, exchanges and integration, one thing that should be done is to take in elements of folk innovation to strengthen the enterprises themselves, and another is to push the folk force to be professional from non-professional, and mainstream from non-mainstream. The significance of respecting and emphasizing grassroots innovation lies in the building of a supportive environment and system, encouraging the innovating activities by various innovative objects and in different fields and periods. Just as the well-known educator Mr. Tao Xingzhi once said, "Innovation can occur anywhere, any time and to anyone". I believe that the formation of such environment is not only helpful for the enterprises to play its role as innovative subjects but also helpful for the government to take advantage of folk innovation to speed up the construction of our country as an innovative country.

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