Global Journal of Management and Business Research: B
Economics and Commerce
Volume 14 Issue 8 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

On the Interest Subjects of Independent Innovation in the Manufacturing Industry in Northeast China

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Abstract- This paper identifies the interest subjects for the innovation system of manufacturing industries in northeast China, including manufacturing enterprises, governments, industry chain users, universities and research institutes, financial institutions, and intermediary organs. Therefore, analyzing the interest subjects promoting independent innovation activities in manufacturing industries in northeast China is an effective means to choose elements of industrial innovation impetus.

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GJMBR - B Classification : JEL Code: L60

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On the Interest Subjects of Independent Innovation in the Manufacturing Industry in Northeast China

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Abstract- **This paper identifies the interest subjects for the innovation system of manufacturing industries in northeast China, including manufacturing enterprises, governments, industry chain users, universities and research institutes, financial institutions, and intermediary organs. Therefore, analyzing the interest subjects promoting independent innovation activities in manufacturing industries in northeast China is an effective means to choose elements of industrial innovation impetus.**

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I. Introduction

As the cradle of China's industry, northeast China, known as the equipment department of the People's Republic of China, plays a significant role in the development of China's industry. Many large equipment manufacturing enterprises are located here, including Harbin Electric Corporation, Hafei Motor Co., Ltd., Harbin Measuring & Cutting Tool Group Co., Ltd., China First Heavy Industries, Qiqihar Heavy CNC Equipment Co., Ltd., Qiqihar No. 2 Machine Tool Co., Ltd., First Automobile Works Group, Changchun Railway Vehicles Co., Ltd., Shenyang Machine Tool Co., Ltd., Dalian Machine Tools Group, Dalian Shipbuilding Industry Co., Ltd., Northern Heavy Industries Group Co. Ltd., Shenyang Aircraft Industry Co. Ltd., Shenyang Blower Works Group Corporation, Shenyang Tebian Electric Apparatus Stock Co., Ltd., and AVIC Shenyang Liming Aero-Engine Group Co., Ltd. They have provided a large number of technical equipment for different national economic sectors and national defense construction and trained large quantities of talents (Boulding, W. and M. Christen, 2003). However, in spite of these achievements, the manufacturing industry in Northeast China encounters a problem. Specifically, many of its products which are not highly technological cannot meet the market demands due to the long-term shortage of technological investment and independent innovation capability. As a result, some significant technological equipment and basic components need to be imported. The spending on these imported equipment and parts constitutes about 30%-70% of the profits, which makes the development of the manufacturing industry in Northeast China dependent on import. Therefore, insufficient independent innovation and low technological level of products have greatly constrained the long-term development of the manufacturing industry in Northeast China. Besides, it has become the bottleneck of improving core competitiveness and building Northeast China into a world-class manufacturing base.

On the basis of literature review and field investigation, this article finds that the root cause of deficient independent innovation in the manufacturing industry in Northeast China is the lack of impetus for innovation. It is well known that impetus is the premise of all activities. Without it, there can be no independent innovation activities in the manufacturing industry in Northeast China. Thus, this article explores the interest subjects in independent innovation of the manufacturing industry in Northeast China.

II. Interest Subjects in Independent Innovation of the Manufacturing Industry in Northeast China

Interest subjects in independent innovation of the manufacturing industry in Northeast China refer to social organizations or social roles that participate in, support, and play an important part in independent innovation activities. To be specific, they are independent innovation R&D subjects, investment subjects, activity implementation subjects, and risk subjects. They together form a complicated dynamic structure within which they are interrelated in diversified ways. Such interest subjects include manufacturing enterprises, governments, industry chain users, universities and research institutes, financial institutions, and intermediary organs that are correlated and also the origins of the motivation for independent innovation in the manufacturing industry in Northeast China (ZhangKun, 2003).

a) Manufacturing enterprises

The manufacturing industry in Northeast China comprises a large number of enterprises with the same or similar pattern of production and management. As

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the most important subjects of independent innovation, they serve to invest in independent innovation, carry out the R&D activities, and commercialize innovative technologies. Any form of industrial independent innovation needs to realize the final value through enterprises. Hence, any enterprise carrying out independent innovation activities can be the interest subject. Speaking of the independent innovation of an enterprise, it does not mean the enterprise needs to fulfill everything through R&D, pilot test to production. Instead, they can utilize external forces and resources through open technology import and various forms of cooperation to bring forth new ideas in products and technology, improve organization and management, and expand the market and profits (Baron, David P, 2001).

The manufacturing industry is the principal part of great industry. It has complicated industrial structure and involves various fields. Compared with agriculture and service industry, it has a much longer industry chain. Therefore, the relation between the upstream and downstream enterprises in the manufacturing industry in Northeast China is quite intricate. On the one hand, these enterprises compete with each other through independent innovation. On the other hand, they accelerate technological upgrading through imitation. In this way, the capacity of independent innovation in the manufacturing industry in Northeast China can be improved comprehensively.

b) Governments

That the government serves as an interest subject of independent innovation in the manufacturing industry in Northeast China is determined by the features of the manufacturing industry and the historical factors in this region. Firstly, the generic technology of the manufacturing industry has the attribute of public goods and great spillover effect. Generally, a single enterprise will not undertake the R&D tasks, and then the government will carry out independent innovation activities directly in this industry as the subject, making itself the direct participant in the independent innovation activities in the manufacturing industry in Northeast China. Secondly, the manufacturing industry in Northeast China started under the influence of the planning system and developed in the transitional period. In this regard, many of its state-owned enterprises are still strongly dependent on the government that guides and safeguards the independent innovation in the manufacturing industry in northeast China. Thus, the government plays an important role in the independent innovation, technology import, and technological transformation of such enterprises. They not only serve as the “visible hands” in the manufacturing industry in Northeast China, but also provide significant guarantee for it directly (Arino, A., de la Torre, J. & Ring. P. S, 2001).

c) Industry chain users

Within the manufacturing industry in Northeast China, there are still the passive ideas of waiting, relying and demanding. Yet, along with the development of the market economy, independent innovation activities are more determined by demands of industry chain users. For instance, there is a symbiosis between the main engine enterprises and parts companies in various fields of the manufacturing industry in Northeast China. On the one hand, the technical requirement of main engines determines the orientation of dependent innovation in parts. On the other hand, the technological development of parts influences and restricts the innovative development of main engines. Therefore, industry chain users are vital interest subjects of the independent innovation in the manufacturing industry in Northeast China. Their demands are the fundamental starting point and driving force of independent innovation activities.

d) Universities and research institutes

Universities play a fundamental role in independent innovation activities in the manufacturing industry in Northeast China. They undertake the tasks of R&D, spreading knowledge, and training innovative talents for the manufacturing industry continuously. There are numerous famous universities in Northeast China, including Jilin University, Harbin Institute of Technology, Dalian University of Technology, Northeastern University, Dongbei University of Finance and Economics, Harbin Engineering University, and Northeast Normal University. These universities not only cooperate with enterprises for scientific research, but also cultivate scientific and technological talents for the manufacturing industry in Northeast China. Take the auto industry as an example. Three universities and colleges in Northeast China now offer automobile specialty, i.e. Jilin University, Changchun Automobile Industry Institute, and Harbin Institute of Technology. They serve as important educational bases of auto talents in China, training tens of thousands of technical personnel annually, which have greatly promoted the independent innovation activities in the manufacturing industry in Northeast China.

Research institutes promote independent innovation by providing knowledge and technology supports through developing new products and technologies. The focus of their work is to explore the most important research subjects and remove key technological barriers with technical expertise. For instance, Changchun Equipment & Technology Research Institute is the sole technological equipment research organization that can proficiently apply the SHAPE module into the tooling of body in white including the generation, extension, and suture of complex surfaces. Besides, many new technologies it develops each year are applied in First Automobile Works Group. In addition, the MI Ninth Design &

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Research Institute Co., Ltd. has developed the techniques of three-dimension design, three-dimension pipeline collision inspection, and three-dimension production line and logistics simulation, which have been widely used in various projects. It has provided technological support for automobile manufacturing enterprises and promoted the independent innovation of the automobile manufacturing industry.

e) Financial institutions

Experience around the world has shown that favorable capital market and financial environment serve as the basis and guarantee to realize the vigorous development of science and technology, and greatly improve the industrial scientific and technological innovation capability. Financial institutions, one of the sources of funding for the manufacturing industry, play an important role in the independent innovation of the manufacturing industry in Northeast China. Moreover, it strongly supports to improve the commercialization, industrialization, and internalization of high-tech products in the manufacturing industry in Northeast China (ZhaoJingjie, Pangbo, 2006).

For example, China Development Bank has been putting more efforts in industrial innovation since 2005. It strongly supports the development of high-tech enterprises and independent innovation projects through strengthening credit construction. The manufacturing industries it supports with great efforts are equipment manufacturing industry, shipbuilding industry, and automobile industry. With its support, leading enterprises like Shenyang Machine Tool Co., Ltd., Shenyang Blower Works Group Co., Ltd., and Northern Heavy Industries Group Co. Ltd. with strong independent innovation capabilities have achieved rapid development, playing a leading role in promoting independent innovation activities in the manufacturing industry in Northeast China. Currently, its high-tech venture capital loan has been a significant loan product to support the independent innovation and scientific and technological development of the manufacturing industry in Northeast China. Besides, the successful innovation of the manufacturing industry has brought abundant revenues to China Development Bank.

f) Intermediary organs

Intermediary organs are professional organizations providing communication, coordination, and consultation services for manufacturing enterprises in Northeast China and other related organizations to enhance the industrial innovation capability and competitiveness of the manufacturing industry, but they do not take part in the production and business activities directly. However, when the industrial innovation and development reach a certain scale, intermediary organs like industry's associations, training organizations, productivity promotion centers, innovation centers, information service centers, scientific and technological centers, and network centers are bound to come into being. Forming a supporting system for the normal operation of the industry, they are lubricants for the smooth functioning of the market economy. Their principal function is to provide intermediary services to lower transaction costs, particularly information costs, which is conducive to the flow of knowledge within the industry. Therefore, they play the bridging and supporting roles in the manufacturing industry.

Up to the end of 2009, 217 productivity promotion centers have been established in Northeast China, constituting 12.12% of the total in China. Among them, 31 are demonstration centers. The services they provide can be classified into six types, namely consultation service, information service, technological service, training service, talents and technological intermediary services, and technology-based training enterprises. As the transmitters of information, the intermediary organs, including productivity promotion centers, can provide information related to independent innovation and accelerate the flow of information, and besides, they can also provide prediction and evaluation services for manufacturing enterprises to carry out independent innovation activities. Thus, they are important interest subjects of the independent innovation activities in the manufacturing industry in Northeast China.

This article makes an analysis of the interest subjects of independent innovation activities in the manufacturing industry in Northeast China to identify the driving factors in the independent innovation motivation system of the manufacturing industry in Northeast China. There are eight driving factors, including influence of entrepreneur's innovation capabilities, promotion of industry chain demands, impetus of the added-value of industrial technology, support of policies for industrial independent innovation, advocacy of industrial independent innovation talents, drive of industrial independent innovation technologies, guarantee of industrial independent innovation fund, and adhesion of industrial independent innovation information. How to make such factors play a driving role in independent innovation and better promote the independent innovation activities in the manufacturing industry in northeast China will become a topic for further research.

III. Conclusion

This paper identifies the interest subjects for the innovation system of manufacturing industries in northeast China, including manufacturing enterprises, governments, industry chain users, universities and research institutes, financial institutions, and intermediary organs. How to utilize the role of these subjects in promoting innovation activities in northeast manufacturing industries to promote the development of

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innovation activities in these industries will be a new research topic.

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