

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.

Index terms— northeast region; manufacturing industry; independent innovation; interest subjects

1 I. Introduction

s 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 Author: School of Economics and Science, Chang Chun University of Science and Technology, The first building 403room, Satellite road 7989, Chang Chun, China. e-mail: zmzsl0118@163.com 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.

2 II. Interest Subjects in Independent

43 Innovation of the Manufacturing Industry in Northeast China

44 Interest subjects in independent innovation of the manufacturing industry in Northeast China refer to
45 social organizations or social roles that participate in, support, and play an important part in independent
46 innovation activities. To be specific, they are independent innovation R&D subjects, investment subjects, activity
47 implementation subjects, and risk subjects. They together form a complicated dynamic structure within which
48 they are interrelated in diversified ways. Such interest subjects include manufacturing enterprises, governments,
49 industry chain users, universities and research institutes, financial institutions, and intermediary organs that are
50 correlated and also the origins of the motivation for independent innovation in the manufacturing industry in
51 Northeast China (ZhangKun, 2003).
52

3 a) Manufacturing enterprises

53 The manufacturing industry in Northeast China comprises a large number of enterprises with the same or similar
54 pattern of production and management. As A the most important subjects of independent innovation, they serve
55 to invest in independent innovation, carry out the R&D activities, and commercialize innovative technologies.
56 Any form of industrial independent innovation needs to realize the final value through enterprises. Hence, any
57 enterprise carrying out independent innovation activities can be the interest subject. Speaking of the independent
58 innovation of an enterprise, it does not mean the enterprise needs to fulfill everything through R&D, pilot test to
59 production. Instead, they can utilize external forces and resources through open technology import and various
60 forms of cooperation to bring forth new ideas in products and technology, improve organization and management,
61 and expand the market and profits (Baron, David P, 2001).
62

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

4 b) Governments

70 That the government serves as an interest subject of independent innovation in the manufacturing industry in
71 Northeast China is determined by the features of the manufacturing industry and the historical factors in this
72 region. Firstly, the generic technology of the manufacturing industry has the attribute of public goods and
73 great spillover effect. Generally, a single enterprise will not undertake the R&D tasks, and then the government
74 will carry out independent innovation activities directly in this industry as the subject, making itself the direct
75 participant in the independent innovation activities in the manufacturing industry in Northeast China. Secondly,
76 the manufacturing industry in Northeast China started under the influence of the planning system and developed
77 in the transitional period. In this regard, many of its state-owned enterprises are still strongly dependent on the
78 government that guides and safeguards the independent innovation in the manufacturing industry in northeast
79 China. Thus, the government plays an important role in the independent innovation, technology import, and
80 technological transformation of such enterprises. They not only serve as the "visible hands" in the manufacturing
81 industry in Northeast China, but also provide significant guarantee for it directly (Arino, A., de la Torre, J. &
82 Ring. P. S, 2001). c) Industry chain users Within the manufacturing industry in Northeast China, there are still
83 the passive ideas of waiting, relying and demanding. Yet, along with the development of the market economy,
84 independent innovation activities are more determined by demands of industry chain users. For instance, there is a
85 symbiosis between the main engine enterprises and parts companies in various fields of the manufacturing industry
86 in Northeast China. On the one hand, the technical requirement of main engines determines the orientation of
87 dependent innovation in parts. On the other hand, the technological development of parts influences and restricts
88 the innovative development of main engines. Therefore, industry chain users are vital interest subjects of the
89 independent innovation in the manufacturing industry in Northeast China. Their demands are the fundamental
90 starting point and driving force of independent innovation activities.
91

5 d) Universities and research institutes

92 Universities play a fundamental role in independent innovation activities in the manufacturing industry in
93 Northeast China. They undertake the tasks of R&D, spreading knowledge, and training innovative talents for the
94 manufacturing industry continuously. There are numerous famous universities in Northeast China, including Jilin
95 University, Harbin Institute of Technology, Dalian University of Technology, Northeastern University, Dongbei
96 University of Finance and Economics, Harbin Engineering University, and Northeast Normal University. These
97 universities not only cooperate with enterprises for scientific research, but also cultivate scientific and technological
98 talents for the manufacturing industry in Northeast China. Take the auto industry as an example. Three
99 universities and colleges in Northeast China now offer automobile specialty, i.e. Jilin University, Changchun
100 Automobile Industry Institute, and Harbin Institute of Technology. They serve as important educational bases
101

102 of auto talents in China, training tens of thousands of technical personnel annually, which have greatly promoted
103 the independent innovation activities in the manufacturing industry in Northeast China.

104 Research institutes promote independent innovation by providing knowledge and technology supports through
105 developing new products and technologies. The focus of their work is to explore the most important research
106 subjects and remove key technological barriers with technical expertise. For instance, Changchun Equipment
107 & Technology Research Institute is the sole technological equipment research organization that can proficiently
108 apply the SHAPE module into the tooling of body in white including the generation, extension, and suture of
109 complex surfaces. Besides, many new technologies it develops each year are applied in First Automobile Works
110 Group. In addition, the MI Ninth Design & Research Institute Co., Ltd. has developed the techniques of three-
111 dimension design, three-dimension pipeline collision inspection, and three-dimension production line and logistics
112 simulation, which have been widely used in various projects. It has provided technological support for automobile
113 manufacturing enterprises and promoted the independent innovation of the automobile manufacturing industry.

114 6 e) Financial institutions

115 Experience around the world has shown that favorable capital market and financial environment serve as the basis
116 and guarantee to realize the vigorous development of science and technology, and greatly improve the industrial
117 scientific and technological innovation capability. Financial institutions, one of the sources of funding for the
118 manufacturing industry, play an important role in the independent innovation of the manufacturing industry
119 in Northeast China. Moreover, it strongly supports to improve the commercialization, industrialization, and
120 internalization of high-tech products in the manufacturing industry in Northeast China (ZhaoJingjie, Pangbo,
121 2006).

122 For example, China Development Bank has been putting more efforts in industrial innovation since 2005.
123 It strongly supports the development of high-tech enterprises and independent innovation projects through
124 strengthening credit construction. The manufacturing industries it supports with great efforts are equipment
125 manufacturing industry, shipbuilding industry, and automobile industry. With its support, leading enterprises
126 like Shenyang Machine Tool Co., Ltd., Shenyang Blower Works Group Co., Ltd., and Northern Heavy Industries
127 Group Co. Ltd. with strong independent innovation capabilities have achieved rapid development, playing
128 a leading role in promoting independent innovation activities in the manufacturing industry in Northeast
129 China. Currently, its high-tech venture capital loan has been a significant loan product to support the
130 independent innovation and scientific and technological development of the manufacturing industry in Northeast
131 China. Besides, the successful innovation of the manufacturing industry has brought abundant revenues to
132 China Development Bank. f) Intermediary organs Intermediary organs are professional organizations providing
133 communication, coordination, and consultation services for manufacturing enterprises in Northeast China
134 and other related organizations to enhance the industrial innovation capability and competitiveness of the
135 manufacturing industry, but they do not take part in the production and business activities directly. However,
136 when the industrial innovation and development reach a certain scale, intermediary organs like industry's
137 associations, training organizations, productivity promotion centers, innovation centers, information service
138 centers, scientific and technological centers, and network centers are bound to come into being. Forming a
139 supporting system for the normal operation of the industry, they are lubricants for the smooth functioning of
140 the market economy. Their principal function is to provide intermediary services to lower transaction costs,
141 particularly information costs, which is conducive to the flow of knowledge within the industry. Therefore, they
142 play the bridging and supporting roles in the manufacturing industry.

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

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

161 7 III. Conclusion

162 This paper identifies the interest subjects for the innovation system of manufacturing industries in northeast
163 China, including manufacturing enterprises, governments, industry chain users, universities and research
164 institutes, financial institutions, and intermediary organs. How to utilize the role of these subjects in promoting
165 innovation activities in northeast manufacturing industries to promote the development of ¹

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