Probe into the Interactive and Coupling Relationship Between Technical Innovation and Institutional Innovation

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Abstract Technical innovation and institutional innovation are indispensable to the development of enterprises. From different points of view, different schools of thought have different theories on the relationship between technical innovation and institutional innovation. What is the relationship between them? Which is more important? Based on the fact that technical innovation and institutional innovation are interactive and have dynamic contradictions, this essay probes into this kind of relationship. On the one hand, technical innovation is the base and motive of institutional innovation. It both supports and restricts the institutional innovation. On the other hand, institutional innovation guides, supports and protects the technical innovation. In view of this, the essay proposes that technical innovation should be regarded as a decisive factor to push forward and decide the change and innovation of institution and make a reality interactive and coupling relationship between them.
Key words Technical Innovation; institutional innovation; Coupling; interactive

1 Introduction

Since 1990s, enterprises in China have attached more importance on technical innovation than ever. Whatever traditional industries or high and new industries, technical innovation is the core of long-term competition which is in accordance with the international trend. However, in order to develop the enterprise and society, it is not enough to innovate technology. Institution as a service provider of important economic value will surely be adjusted with the innovation and change of technology, with the dynamic growth of economy. Many literatures all stress that institutional innovation is more important than technical innovation. The new institutional economists as represented by North hold that institutional change is more significant than technical change [1]. When talking over the development of China, Wu Jinlian emphasizes that institution is more important than technology [2]. For a long period of time, economists are disputing with each other on weather institutional innovation decides technical innovation or the latter decides the former. Therefore, it is necessary to analyze the relationship between technical innovation and institutional innovation, to probe into the important role the institutional innovation plays in the rapid change of technical innovation.

2 Theories on Technical Innovation and Institutional Innovation

2.1 Techno-determinism and institutional determinism

Techno-Determinism, represented by Veblen, insists that technical innovation is the dynamic factor of economic growth and change of technology will determine the change of institution. As for the relationship between technical innovation and institutional innovation, Veblen considers that physical environment (technology) decides the institution. As far as the attribute is concerned, institution is a customary way of thinking; it will vary with the change of physical environment. Physical environment constantly change while institution is the outcome of previous process. So anyway, institution cannot follow the pace of changing technology. In addition, institution tends to become conservative and generally keeps its state unless it is forced by physical environment to change. When stressing that change of technology decides the change of institution, Veblen admits that institutional innovation has some effects on technical innovation. In his opinion, old institution has either bad or good effects on technology, while institutional innovation will drive forward the technical innovation.

Institutional Determinism, represented by North, stresses that institutional innovation is more important than technical innovation. North underlines that institutional innovation decides technical innovation rather than the latter decides the former. A good institution can promote technical innovation, but poor institution lets the technical innovation deviate from the right path. He thinks that such factors as technical innovation, economics of scale and capital accumulation are not determinants for economic growth, but just show that institutional innovation determines the economic growth. He points out that it is the progress of institution such as patent system, which is established to protect technology, that promotes the development of technology. The improvement of institution will propel innovation; in the

end the rate of personal returns preaches the social rates of return.

2.2 Views of western and Chinese scholars

Some western scholars expound that technical innovation and institutional innovation are interaction. Kuznets, the famous economist of growth of economics fully realizes the important role the institutional adjustment play in the progress of technology and economic growth .He considers that advance of technology is prerequisite while the adjustment of institution and social ideology are sufficient for economic growth. .In his speech delivered when he was awarded Nobel Prize in 1971, he points out that the development of states economy can be defined that the productive capacity which continuously expands the provision of all kinds of economic commodities that people need has been increased. The increase of productive capacity relies on the advanced technology and adjustment of institution and ideology which one needs develop advanced technology [3]. Ruttan also deems that it is no use arguing weather institutional innovation decides technical innovation or the latter decides the former. Technical innovation and institutional innovation are interrelated and interdependent; one should analyze them in continuously interactive logic.

Fu Jiayi suggests that the pattern and way organization are determined by the attribute of technology and institution. Organizational form, scale and structure must be innovated to meet the requirement of technical innovation. Furthermore, organizational innovation can accelerate the creation of new technology speed of its application and in the end enhance the quality of technical innovation. As the cooperation of all sectors of enterprises is involved in the course of technical innovation, the initiative of members of these sectors will certainly influence the effects of technical innovation. Old organization is under the relationship among the responsibility, right, obligation of old technology, old organization should break barriers that do not fit certain requirements of the development of technology. Organizational innovation offers chances to rearrange production factors, enhances the rate of resources utilization ratio and in the end guarantee the success of technical innovation [4].

2.3 Marxist political economics

The unity of opposites on the productive forces and production relations is an important part of Marxist Political Economics. As technical innovation falls into the category of productive forces and institutional innovation falls into the category of production relations, the dialectical unity with productive forces and production relations reflects the relation between technical innovation and institutional innovation. (1)Productive forces determine the productive relations. Where there is productive forces there is production relations. The development and change of productive forces decide the development and change of production relations. According to Marxist Political Economics, technical innovation falls into the category of productive forces and institutional innovation falls into the category of production relations, so technical innovation determines the institutional innovation. (2)Production relations adversely affect the production forces. When production relations conform to the level of productive forces, it promotes the development of productive forces .If it cannot, it hinders the development of productive forces. The same is true with institutional innovation. Institutional innovation has counteraction on technical innovation. When existing institution meets needs of technical innovation, it advances technical innovation. When it cannot conform to the requirements of technical innovation, it blocks the development of technical innovation. (3) The Production relations must conform to the state of productive forces.

Although existing production relations determine the level of development of productive forces, when productive forces is conditioned by old institution, it will break down the old production relations and establish and develop new production relations which correspond with its development. The new productive relations could be established and strengthened only when it satisfies the needs of new productive forces. Similarly, if technical innovation has been restricted by existing institution, technical innovation will propel the reform of existing institution to make the new institution conform to the requirements of technical innovation.

3 Technical Innovation is the Base and Motive of Institutional Innovation, both Supports and Restricts the Institutional Innovation

Technical innovation provides the sources with the economic growth, offers the economical activities new production possibility frontier and presents new demands to the institutional innovation. During past two centuries, technology innovation makes the production create the increasing returns to scale within limits which makes the complex pattern of economic organization profitable. As a by product of economy of scale, the change of technology create factory system and industrial

agglomeration which establish urban industrial society Environmental pollution, ecology destroying and transportation congestion are just three more obvious outcomes of revolution of industrial agglomeration. These negative externalities will inevitably promote institutional innovation. As Fig 1.

The ratio of cost to profits has an important role in propelling technical innovation. Only when expected yield overweighs the expected cost, the motive of institutional innovation comes into being. On the contrary, if expected yield is lower than the expected cost, the society will not have impulse to innovate institution. The influence technical innovation exerts on the yield and cost shows as follows: (1) Technical innovation not only increases the potential interests brought by institutional innovation and decreases operation cost of the change of certain institution. Particularly, advancement of technology quickly lowers information cost and makes the institution which aims to improve the market and facilitate the circulation of commodities profitable. (2) Stream of income created by technical innovation becomes a part of requests s of institutional innovation. Technical innovation makes it possible mass production, decreases production cost and incurs high transaction fees. If one totally uses market exchange, expensive transaction fees will offset the advantages brought by technical innovation. Therefore potential interests gained from the new and more efficient technology will drive forward people to innovate the institution. For example transportation of 19th transportation, carriage and manufacture requires capital-intensive management, Modern stock corporations, and multinational corporations are rightly the reform of institution that correspond to the technical innovation.

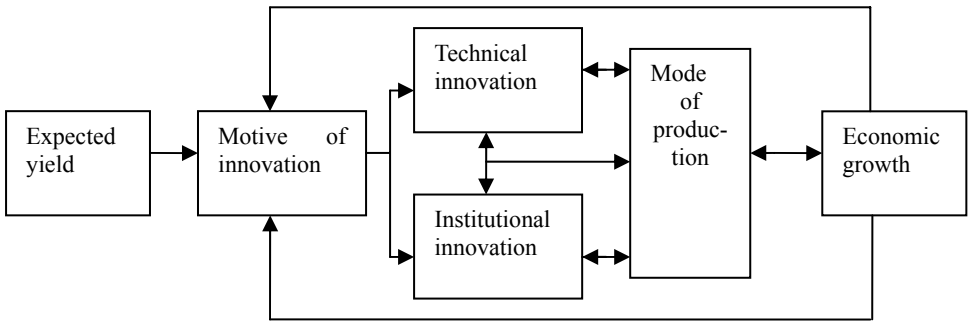

Figure 1 Technical Innovation Supports and Restricts the Institutional Innovation

All above tell us that technical innovation determines the structure and change of institution while institutional innovation is strongly controlled by technical factors.

4 Institutional Innovation Plays an Important Role in the Course of Technical Innovation

The important effects institutional innovation play on the technical innovation are as follows: (1)Institutional innovation can decrease the risk of technical innovation. Advanced technology is always accompanied by high risk. In view of high risk from development of advanced technology, the system of risk diversification makes it possibility to realize the scale of technical innovation. So institutional innovation is very important for decreasing risk of technical innovation. (2)Institutional innovation is one of the conditions for technical innovation. Institutional innovation can motivate the subject of technical innovation, socialize social innovative behavior, and provide innovators with rights to enjoy fruits of technical innovation and social security. (3)Institutional innovation improves and perfects the system of technical innovation. Institutional innovation of different levels, different domains and different aspects such as macro-economic policy, labor market and system for income distribution has a wide-ranging influence and establish a series of social mechanism which is helpful for technical innovation. Institutional innovation meets the requirements of technical innovation and liberates two keys of technical innovation-men and capitals. Free environment with full of opportunities offers technical innovators to maximize their potential[5].

All in all, we have full realization that institutional innovation is very important for technical innovation. As institutional economists puts it, institution is social motivate mechanism. The establishment of institution aims to decrease transaction cost and differences between personal profit

and social profit, encourage individuals and organizations innovate, and in the end push forward the growth of economy. Weather technical innovation can be successful or not depends on not only their own level of technology, the needs of market, and comparative advantages but also on weather the institution adapts to and supports it or not. Without corresponding social institution and economical conditions as guarantee, technical innovation will not efficiently push forward the development of economy. In the course of technical innovation, the institution should be innovated in order to guarantee the institutional environment for technical innovation. As any institution will delimit the scope and space where people can choose and gain information and resources of technical information, set down basic principles of social transaction and force new subject produce reasonable expected yield of innovation. What is more important, institutional innovation determines the resources of initiative of subjects of technical innovation. By changing the reward system, of the technical innovation, institutional innovation propels technical innovation and affects indirectly the growth of economy. Besides, institutional innovation help to push forward the change of mode of thinking, update values, adjust and change of several aspects of social economical life. All these changes also become important factors for technical innovation.

5 Interactive and Coupling Relationship Between Technical Innovation and Institutional Innovation

Technical innovation reflects relationship between men and objects. During the course of recognizing and changing the physical world ,technical innovation ,a kind of innovation behavior, finds new application value for certain natural objects and gives to the objects the ability to create fortune and new economic value. Institutional innovation reflects relationship between men. As an innovative activity, through micro management or the reform of way of management and change of its operating mechanism, institutional innovation adjusts the interests between men ,efficiently promotes such social economic activities as technical innovation and decreases transaction fees between men to increase the efficiency of production, allocate resources more effectively, and gain more economic and social values. According to the philosophy proposition of universal connexion, men and objects, men and men are interrelated, interaction and mutual checks. Therefore, technical innovation which reflects relationship between men and objects, and institutional innovation which reflects relationship between men, are interactive and mutual checks.

Although Techno-Determinism and Institutional Determinism are different, they are not irreconcilable. They all admit technical innovation and institutional innovation are interaction, but they place importance on different aspects. Their emphasis may change in different ages. As for the relationship between them, we should look at it dialectically rather than put undue emphasis on one side. We should follow points of Marxism on their relationship. Technical innovation and institutional innovation are dialectical unity. Technical innovation determines and promotes institutional innovation while institutional innovation has counteraction on technical innovation (see Fig. 2).

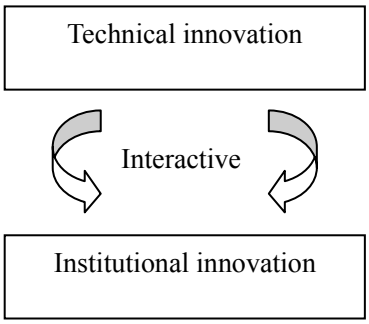

Figure 2 Relationship Between Technical Innovation and Institutional Innovation

6 Conclusions

To sum up, technical innovation is the decisive factor for economic development and the progress of society. Its state and change will decide the institutional innovation while institutional innovation affects economic development and advancement of technology by promoting or restraining technical innovation. Technical innovation and institutional innovation are mutual promotive. The former often causes institutional innovation and the latter promotes technical innovation. According to dialectical

points of Marxism, technical innovation is impetus behind the economic growth and motive force of social development. It causes dramatic or gradual change of institution. In other words, it leads to institutional innovation. In the course of institutional innovation, some formal and informal institutions protect and promote further development of technical innovation Therefore, during the dynamic development of technical innovation and institutional innovation, technical innovation is the basic decisive force. It is technical innovation that pushes forward and determines the change and innovation of institution.

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