The Technological Theory and Empirical Study on Private Enterprises Based On Elements Based On Data Analysis

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Abstract. Technological innovation is a synthesis of various elements. Faced with actual challenges concerning technological innovation of private economy, along with the analysis of technological innovation elements, we have carried out empirical study on technological innovation and operated benefit data of 34 scaled private enterprises, validate that the input on researchers, fund investment, output efficiency are all at play when it comes to upgrading private economy. In doing so, we advance intension-oriented development, innovation on financing channels, and industry-University-research institute strategic cooperation.

Keywords: Element Vision Private Corporation, Technology Innovation Mechanism Empirical Study

1. Introduction
Since the reform and opening-up in 1978, the private player has started from the ground up, got through eventful episode along the way, and taken root deep after trials and tribulations with its share in GDP, technology patent, technological innovation, new products development has exceeded respectively 60, 65,75,80percent [1]. The private economy has given a strong boost in industrial mix, technological innovation and industrial reorientation. There are an array of scientific studies focused on private economy which covers its development strategy, competitive capacity, policy incentives, institution transformation and so on, but merely a few pinpoint the technological innovation effect and dynamic mechanism of private economy. Technological innovation. Technological innovation is an integrated process starting from the design of products to market application that engulfs the birth of new ideas, research and development, production and promotion. It is essentially an integration of economy and technology. Technological innovation is an comprehensive system composed of variant elements. Nevertheless, due to the diversification of research visions and methods, scholars at home and beyond have varied assessment on elements and effects of technological innovation in the enterprises. For example, Wang Weixing(2018) [2]has taken private enterprises on GEM as samples, then calculated the date of private enterprises from 2014 to 2015 year based on DEA, so as to study the influence that internal financing, debt financing, equity financing have on innovation efficiency of company which then be divided into groups to identify the links between innovation efficiency and financial portfolio. Qu Jing(2019) [3] analyzed the internal relations between technological M&A data.
and innovation performance with 113 M&A data of listed companies during the year 2011 to 2016. Alongside that, she tapped into the regulation of heterogeneity in strategic match and technological disparity. The study shows that whether it is complementary technological M&A or alternative one could go a long way towards innovation performance. Chen Can(2020) [4], on the basis of field interview and questionnaire, from which he derived five factors on technological innovation capacity of manufacture-oriented private enterprises, has made empirical study on variation of those interfering factors on enterprises scale, management mode, the life cycle stage of enterprises and business intensity. Zhong Wei(2018) [5] started with attribute reduction and reduction evaluation index from field, input, output, to marketing, management on technological innovation, successfully put forward evaluation index system of technological innovation among manufacturing interests. Apart from the analysis of real plight the private economy encounters while progressing technological innovation, we have looked into how technological innovation effects private economy through empirical study based on econometric models. As a result, we have verified the correlation between R&D personnel input, fund investment, output efficiency and upgrading of private economy.

2. The Realistic Challenge of Technological Innovation of Private Economy
(1) The management system is not perfect and the quality of managers needs to be improved
Funded on private fund-raising with moderate size, private enterprises are premature in management, leading to lack of managerial knowhow of some executives. Moreover, private enterprises, generally speaking, attach greater significance to profit maximization while paying trivial attention on talents cultivation and technological innovation because of its internal system any external environment. This has given rise to the dearth of technological capacity and initiative as well as core patents. Some high-tech enterprises are also saddled with this issue.

(2) Private enterprises are small in scale and difficult in financing
Confined by its body scale and market access, private enterprises will be retarded by overwhelming restrictions to expand its business arms in the stage of development, which adds to already severe internal financing. For large bank entities, oftentimes, they would never invest on small-sized private economy bearing high cost and risk [6]. Therefore, external financial plight will also engulf private economy. Consequently, it is inevitable for private owners to put money in sectors which is less cost but quicker field. That means they don’t have sufficient venture capital to invest on technology in the long run. For that matter, private enterprises are struggling to revamp its technology.

(3) The development of private enterprises is unbalanced and innovative talents are scarce
Creative talents perform exceedingly crucial function in technological innovation of private enterprises. It is already been seen disparities among regions of private economy, additionally, private enterprises usually nestle aloof from business center and education heartland, therefore the living environment and wage standards are lack for attractiveness to innovative talents [7]. Quite a few specific innovative talents are required for the purpose of upgrading technology of private management economy. However, less intension are being paid to those people in practice. To some extent, it hinds the development of innovation capacity of knowledge-based talents, forcing knowledge elements to the verge of market [8].

3. Mechanism Analysis and Demonstration of Technological Innovation in Private Economy
Technological innovation is a system composed of many factors, such as talents, funds, system construction, output efficiency, innovation atmosphere, science and technology foundation. To study a system, we must know the relationship between the major elements and build a systematic model structure. Therefore, from the perspective of factor composition, this paper establishes the model structure of the technological innovation effect of private economy from the perspective of talent, capital and output, and empirically analyzes the impact of technological innovation on the transformation and development of private economy, and confirms whether R & D personnel investment, fund investment and output efficiency can promote the transformation, optimization, upgrading and development of private economy. This data comes from the econometric analysis of 34
private enterprises in Xiangxi and Xiangnan industrial transfer demonstration zone for 5 consecutive years. Limited to space, this paper only describes the empirical process.

The explanatory variable of economic model is technological innovation, and the explained variable is the optimization and upgrading of economic transformation. What it reflects is the technical innovation level index of private enterprises, which generally covers the actual situation of R & D staff input, fund investment and activity output efficiency. The actual indicators of R & D staff input include two indicators: one is the equivalent of every ten thousand R & D personnel engaged in related work and the other is equivalent to full-time equivalent of every ten thousand R & D personnel engaged in related work; for the above evaluation indicators, the weights are 0.6:0.4 by using expert weighting method. The investment status covers the internal and external expenditures of R & D funds for every 10000 staff engaged in relevant work. Activity output efficiency refers to the number of patent applications, the number of invention patent applications, the number of scientific and technological papers published, the number of effective invention patents, the number of industry standards and other indicators per 10000 employees engaged in related work. Similarly, the expert weighting method is used to determine the weights are 0.45, 0.15, 0.3 and 0.1.

When the explanatory variables are clear, we should consider other factors that may affect economic development and add them to the econometric model as control variables. Considering that there are some differences in the management level and technological innovation level of different scale enterprises, it is included in the enterprise scale index for comparison and reference.

1) Set model

In this construction, the optimization and upgrading of economic transformation is regarded as the explanatory variable PETU, the input of R & D personnel, the input of R & D expenses, and the activity output rdop are the explanatory variables, and the average gross output value of the enterprise is PESC as the control variable. In order to compare the private economy and the non-private economy, this paper constructs two optimization and upgrading impact models of private economy and mixed economy.

(2) The model form is as follows:

PETU1z=C1+h1lnPESC1r+e1r(1)
PETU1z=C1+a1RDHR1r+b1RDFD1r+h1lnPESC1r+e1r(2)
PETUt=C+aRDHRr+bRDFDz+gRDOPr+hlnPESCz+jDr+er(3)

Where C is a constant term, Er is a model error term, DZ is a dummy variable, when DZ is equal to 1, it is a private economy, and when DZ is 0, it is other economies.

3) Empirical results

Through Eviews econometric analysis software, the paper estimates the parameters of private economy and mixed economy data. According to the result table 1, it can be found that the significance of private economy technology innovation model at 10% level is not obvious. After analysis, the reason why the private economy is not significant is that the sample data of private economy is small, so the overall test of the model is not obvious. Considering that the technological innovation of private economy and non-private economy should be consistent for the transformation and upgrading of economic development, we use the method of dummy variable and add the data of non-private economy. The result of parameter estimation shows that the overall model is quite significant at the level of 15%. Generally speaking, technological innovation can promote the development of private economy.
Table 1. Results of model parameters of private economy and mixed economy

| Explained variable | Economic transformation and upgrading |  |
|-------------------|--------------------------------------|---|
| Model type        | Private economy (1) | Private economy (2) | Mixed economy (3) |  |
|                   | coefficient           | Standard error      | coefficient       | Standard error | coefficient       | Standard error |  |
| C                 | 0.3691**              | 0.1245              | 0.7162**          | 0.2456         | -0.2715*         | 0.1604         |  |
| RDHRt              | 0.2688                | 0.2056              | 0.2436            | 0.2309         |                   |                |  |
| RDFDt              | -0.3295               | 0.2455              | -0.1493           | 0.2360         |                   |                |  |
| rdopt              | 0.0654                | 0.1160              | 0.0192            | 0.1421         |                   |                |  |
| pesct              | 0.4320**              | 0.1407              | 0.8658**          | 0.3016         | 0.9843**          | 0.3679         |  |
| AR(1)              | -0.3484               | 0.4108              | -0.5299           | 0.3803         | 1.0966**          | 0.3679         |  |

(4) Conclusion analysis
Through the empirical results of econometric model, we can get the following conclusions:

1. With the expansion of the scale of private enterprises and the increase of technological innovation talents, private enterprises can have sufficient human resources, financial resources and materials for healthy and stable development, and realize the continuous improvement of enterprise profits.

2. Technological innovation can improve the production and management efficiency of private enterprises, increase the competitiveness of products and achieve product differentiation.

4. Implementation strategy of private enterprises' technological innovation based on factor Perspective

(1) Promoting the connotative development of technological innovation
After the start-up period and the maturity stage, the form of technological innovation needs to change from connotative development to outward extension innovation. On the one hand, private enterprises need to concentrate superior resources, select the key links of the industrial chain for continuous development and fixed-point breakthrough, and strive to master the key core technology; on the other hand, it is necessary to establish and improve the incentive system for technical personnel in enterprises such as technical equity participation and long-term options, so as to realize the effective incentive and stable development of technical personnel, and build a long-term incentive mechanism for talents.

5. The Strategic Based On Elements for Technological Innovation of Private Enterprises

(1) Promote the connotative development of technological innovation
After entering into the mature period, the private enterprises have to upgrade its innovative mode from connotative development to extension development. On the one hand, the private enterprises should aggregate superior resources and contribute continued endeavors to be involved in core technology with knocking down every crux. On the other hand, the entity should perfect incentives policy of technology participation and long-term options for specialists, so as to realize effective incentives and stable development of talents pool, thereby building a long-term incentives mechanism for talents. [9]

(2) Expand financing channels for technological innovation
The players must explore direct and indirect financing channels if they are to raise innovation fund for technology. They are encouraged to issue stocks and invest bond to inflow capital as a way to fill the vacuum of much-needed fund for technological innovation. The authorities are supposed to make it easier for enterprises to loan from the state-owned bank, at their utmost, cutting off the possible means to finance from illegal wildcat banks [10]. The enterprises should make active cooperation with
private-owned bank, thus gaining stronger support from lender by debt-equity swap. The enterprises should intensify cooperation on technological innovation. That means they should seek harder for partners and share with resources if they are to blend technology strength with capital term for a win-win scenario.

(3) Build an alliance in production, university and research.

The private enterprises and scientific research institute are encouraged to set up technology center in various forms to empower the private owners with scientific development that is mature in technology and makes strong economic sense. In some key sectors, it is a good idea to register a strategic alliance that integrates production, university and research with established enterprises being the core part. Furthermore, we should encourage scientific and technological personnel inside and outside of system to engage with Industry-University-Research project of enterprises, so as to commercialize research findings and improve output of private enterprises. Additionally, we are supposed to establish a joint platform of Industry-University-Research with shared information in real time. It is our hope, by collective efforts, to exchange information at hand with partners. That is how we can complete the online mechanism of joint exploration and development on Industry-University-Research.

6. Conclusion
We have demonstrated that R&D personnel input, fund investment, output efficiency indeed give a strong boom as private enterprises upgrade its growth mode. We must uphold core technology in industry chain and make continuous breakthrough in connotative development, innovation of financing channels and strategic alliance of Industry-University-Research if we are to put in place the strategies of technological innovation in private enterprises.

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