Analysis of scientific and technological innovation influence factors affect enterprise performance

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Abstract: With the development of the society, science and technology innovation becomes the development foundation of the equipment manufacturing industry enterprises. According to the questionnaires of 29 equipment manufacturing industries in Shenyang, the paper summarises the factors that affect the enterprise performance based on grounded theory. In order to study the relationships between the influencing factors and enterprise performance, multiple linear regression analysis is conducted by Statistical Product and Service Solutions (SPSS) software.

Keywords: enterprise performance; innovation; grounded theory; multiple regression analysis.

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1   Introduction

Science and technology (S&T) innovation is the process of creating and applying new knowledge, new technology. It uses new production mode and management mode to develop and produce new products. The ability of S&T innovation has become a direct

reflection of the comprehensive national strength and core competitiveness (Xu et al., 2018b). In the era of economic globalisation, countries with strong S&T innovation ability can be in the high-end position of the world industry chain and create new industries of the national economy. Countries with more important independent intellectual property rights may lead social progress and enterprises development. The Eighteenth National Congress of the Communist Party of China clearly puts forward the "implementation of innovation-driven development strategy," and further points out the important trends of S&T innovation in the new era.

The trend of world economic development proves that equipment manufacturing is the cornerstone of economic development for the country. The equipment manufacturing industry in China has formed a certain scale, become one of the world's largest equipment manufacturing industry. However, many fields of equipment manufacturing industry are at the low-end of the global value chain. The scale of some enterprises is big but the strength is not strong enough. Low-tech products are overcapacity, lacking of the high-end technology and equipment manufacturing capacity. The ability of independent innovation is weak. Although acquired a number of overseas enterprises with strategic assets, the key technologies and core assets are still controlled by overseas enterprises (Xu et al., 2018a). It is a serious threat to long-term development and national economic security of domestic equipment manufacturing enterprises. Obviously, S&T innovation is the only solution to strengthen the development of equipment manufacturing enterprises in China.

The factors that affect the enterprise performance have been widely addressed by the literature. However, many researchers focused their work on single factor that affected the enterprise performance. There is no comparison between the factors. The factors that affect the enterprise performance can be different from each other. Some factors may have a large effect on enterprise performance and some factors may have a small effect on enterprise performance. And whether its effect is positive or negative has remained unclear. We designed our study to provide some answers to such questions.

The main purpose of this work is to explore in depth the relationship between influencing factors of S&T innovation and enterprise performance. The research is based on the questionnaires of equipment manufacturing industries in Shenyang and then according to grounded theory, to sum up the core concept. Next, Statistical Product and Service Solutions (SPSS) analysis software is used for multiple linear regression.

2 Literature review

The competitive forces from the market demand, technology market or talents are important elements to improve enterprise performance (Estrin and Angelucci, 2008). The research mainly studied the enterprise performance from the perspective of competition pressures. In addition to competitive pressures, there are many other factors that are important to enterprise performance. Customer satisfaction determined the market share of the enterprises (Velayudhan, 2004). The enterprises with flexibility and responsiveness to customers' needs more likely gain great customer satisfaction. As we know, market share reflects the profitability of the enterprise. The higher the customer satisfaction, the greater the market demand. So the market demand should be involved in the research of the enterprise performance. Bobbink et al. (2016) studied sustaining extended enterprise performance from value co-creation perspective. It mainly focuses on maximising overall

performance and necessitates inter-organisational collaboration. But how value can be co-created need to be further researched. The enterprise resource planning (ERP) systems is to support a decrease in the consumption of raw materials, energy and other limited resources, which in turn increases the company's performance (Jacova and Horak, 2015). Whether or not a company adopts ERP systems depends on the entrepreneurs, i.e., entrepreneurial decision plays an important role in enterprise performance. There are also other factors that affect the enterprise performance. When R&D is the dominant strategy, firms realise greater growth in sales (Boles and Link, 2017). However, the constructs are based on the availability of data rather than on theoretical foundations. The entrepreneurial culture is important for family firms to yield innovation processes and performance (Antonio et al., 2017). If the private enterprises exceed a certain scale, family involvement has a negative impact on enterprise performance (Li and Zhu, 2015). It is due to the low strength of their businesses, they are vulnerable in competition with large enterprises in the market and situate in a relatively unstable state under market changes and competition. Market should be incorporated in the study. The dynamic recruitment problem with enterprise performance in the uncertain environment is studied (Zhou et al., 2017). The results demonstrate that the threshold of recruitment increases with the enterprise performance level. Talent is important in enterprise performance, so the threshold of recruitment should be increased in order to recruit more talented staffs. All the factors should be compared with each other.

3   Research methodology

As we know, manufacturing industry is still facing a lot of challenges and problems. Equipment manufacturing industry is the development foundation of the manufacturing industry. So equipment manufacturing industry is the research model, and the research objects are basically the enterprises of numerical control machine industry, intelligent manufacturing industry, large-scale equipment manufacturing industry, engineering machine manufacturing industry, national defence industry. The products include general equipment, mine equipment, numerical control machines, heavy-duty equipment, transportation equipment, communication equipment and so on.

This paper chooses 29 typical large equipment manufacturing enterprises to investigate. We design the questionnaires specially, then adopt the methods of on-the-spot investigation and e-mail investigation to distribute the questionnaires. The respondents are mainly executives or department directors of the enterprises. They are engaged in management work and know more situations about the enterprises. In order to ensure the recovery rate of the questionnaire, we communicate with the personnel manager in advance and take advantage of their meeting time to distribute the questionnaires. Most of the questionnaires are recovered on the spot, the rest of the questionnaires are recovered by e-mail or WeChat. Nine hundred copies of questionnaires are sent. Six hundred seventy-seven copies of questionnaires are taken back, among which there are 614 copies of valid questionnaires and 63 copies of invalid questionnaires.

3.1 Data analysis based on grounded theory

Grounded theory is a kind of qualitative research method. It explores the key concepts of the research through deep analysis and then establishes some kind of logical relation between different concepts. The main idea of grounded theory is comparison. In this study, we use grounded theory to explore the key influencing factors of enterprise performance through the perspective of S&T innovation. Grounded theory includes three levels of coding steps: open coding, axial coding and selective coding.

The open coding is to encode and label the original questionnaires, so as to generate the original concept from the original data and discover the conceptual category. In open coding step, we abstract initial concept with qualitative analysis software NVivo10.0. After many times of decomposing and recombining of the data, 27 initial categories are formed finally. Category and related initial concept are showed in Table 1.

Table 1 Open coding categorisation

Initial concept	Initial category
People trust the state-owned enterprises or large enterprises.	Customer preference
Some enterprises can obtain monetary assets or non-monetary assets from the government for free.	Funds of the grant
There are fewer R&D personnel in some enterprises.	Proportion of R&D personnel
The proportion of various types of personnel needs to be suitable.	Staff composition
Old products must be replaced by mew product in some certain time, which can enhance the vitality of the enterprise.	Product renewal
Track the usage of the products and solve the problems promptly can make customer feel valued.	Post-sale service
Brand effect is based on the products quality of the enterprises, which is also the life of enterprise.	Product quality
Raw material and labour costs increase rapidly in recent years, so the product cost is increasing.	Product cost
Vigilance and a proportionate response are required of leaders.	Risk awareness
State-owned enterprises pay more tax to local government, small and medium-sized enterprises pay a little tax.	Taxes
Functions are the main character of the products.	Product function
Our experience is limited in overseas projects, so we need professional person to handle with some particular problems.	Technical consulting and service
Importing technology can obtain advanced technology quickly.	Technology introduction
Leaders must have policy sensitivity and know what to do.	Identification and development
Individual learning capability and creative thinking are important to an enterprise leader.	Innovation ability

Table 1   Open coding categorisation (continued)

| Initial concept	Initial category
Research and development need more tests.	Number of trials
Good communication with the workers can get twice the result with half the effort.	Cooperation ability
Reward can improve the initiative in production	Reward and punishment system
Continuously train employees to improve their skills.	Training mechanism
Most people with high level of education quit their jobs every year.	Talent flow rate
Leaders of the enterprises make people in every position work coordinately.	Organisation and management ability
Enterprises' development trend in the next few years needs to be cleared.	Strategic planning
Pay more wage to R&D personnel, and they can be more creativity.	R&D personnel salary
The vast of domestic market makes foreign companies invest on domestic projects.	Foreign investment
Patent technology can be directly translated into productivity, domestic noticed and pay attention to it recently.	Number of patents
Effort should be proportional to the return.	Achievements-related wages
The project of energy-saving, safety and environmental protection are strongly supported by the government.	Government support

The aim of axial coding is to find the connection of the initial category and to establish connections among the different concept categories through clustering analysis of the data which is divided by open coding. It integrates effect factors in common into an independent effect factor. According to the qualitative analysis software NVivo10.0, we get nine independent sub-categories. As shown in Table 2.

Table 2   Result of axial coding

Initial category	Sub-category
Customer preference, product function, product renewal	Market demand
post-sale service, product quality, product cost	Market competition
Government support, taxes, funds of the grant	Government policy
Technical consulting and service, technology introduction, number of patents	Technology market
Innovation ability, risk awareness, cooperation ability	Entrepreneurial spirit
Proportion of R&D personnel, training mechanism, talent flow rate	Talent advantage
Organisation and management ability, strategic planning, identification and development	Innovation and entrepreneurship idea
R&D personnel salary, number of trials, foreign investment	R&D funds
Staff composition, achievements-related wages, reward and punishment system	Incentive and distribution mechanisms

Selective coding focuses on the core categories. It connects with other categories systematically and verifies the relationship among them. And it also completes the conceptual categories which it is not well developed. The final theoretical framework is shown in Figure 1.

Figure 1 Theoretical framework
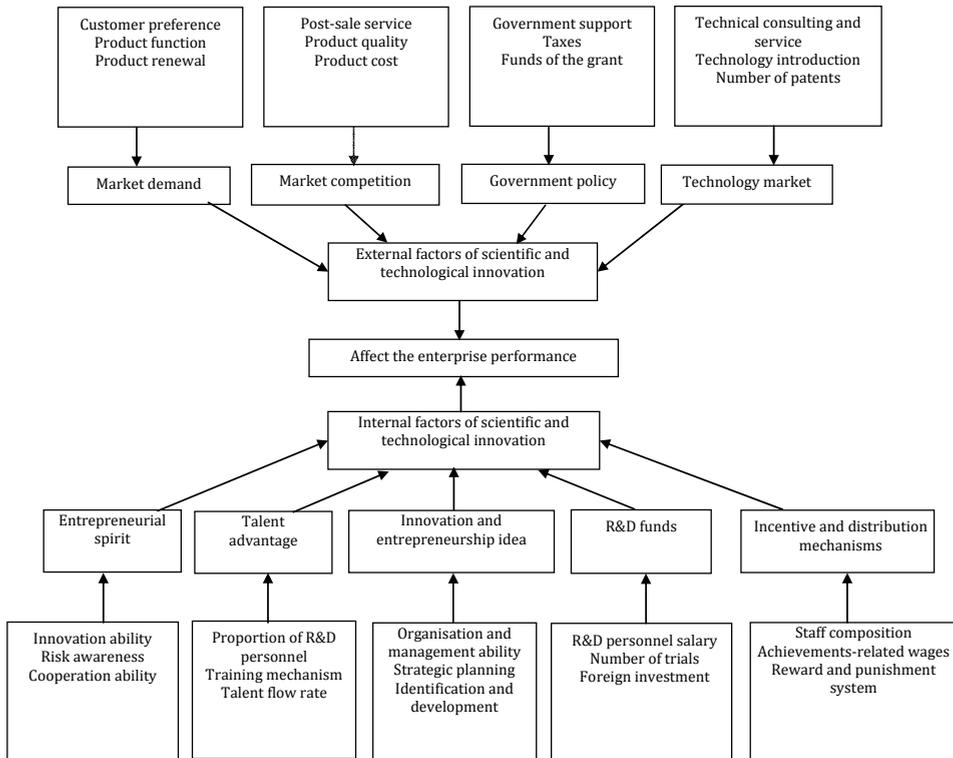
Based on data analysis of grounded theory, we can get the factors that affect the enterprise performance include two facets. They are internal factors of S&T innovation and external factors of S&T innovation. External factors of S&T innovation are market demand, market competition, government policy, technology market. Internal factors of S&T innovation are entrepreneurial spirit, talent advantage, innovation and entrepreneurship idea, R&D funds, incentive and distribution mechanisms.

3.1.1 External factors

1 Market demand

Market demand is defined as the total amount of purchases of a product or family of products within a specified demographic. Market demand can change over time, enterprises invest resources in constantly checking the current status of consumer wants and needs. This ongoing process often allows companies to remain competitive with other enterprises who also target the same markets, as well as keep the interest of current customers by making improvements to existing products and

possibly introducing new products that are also of interest to those same customers. So the hypothesis is that market demand has a positive effect on enterprise performance.

2   Market competition

Market competition is a condition where "buyers tend to compete with other buyers, and sellers tend to compete with other sellers." Market competition causes enterprises to develop new products, services and technologies, which would give consumers greater selection and better products (Xu et al., 2017). It is generally accepted as a necessary condition for the coordination of disparate individual interests. Market competition mainly includes product quality and product price. Enterprises advertise that their machine's price is lower, and that their machine's quality and efficiency is higher. Recently, service is becoming more and more important in market competition. Good service makes consumers feel comfortable and would like to buy products even at a higher price. So the hypothesis is that market competition has a positive effect on enterprise performance.

3   Government policy

Government tracks and analyses the business development, tendencies and existing issues of the equipment manufacturing industry and formulate relevant regulatory policies and rules. It encourages State and private investment in business start-ups, especially those in the high-tech sector, to help finance new business and innovation. Preferential tax policies, given to start-ups and individual angel investors, it stipulates that 70% of total investment can be deducted from taxation two years after the investment for high-tech start-ups. In the meantime, government encourages the commercial banks to establish inclusive financing branches to help small and medium-sized enterprises. In addition, government establish subsidiary funds to invest in start-ups, according to guideline on promoting the innovation-driven strategy and mass entrepreneurship. The funding consists of the national venture capital fund for emerging industries, the national development fund for small and medium-sized enterprises, the national fund for transforming technological achievements. So the hypothesis is that government policy has a positive effect on enterprise performance.

4   Technology market

Technology market is the important component of the socialist market system. It mainly has the following forms: intermediary agencies for technology transfer, agencies for technological consultation and development, 'Scientific shop' and technology market (Xu et al., 2016). These technology market forms refer to visible market that centres around the buyer and have the fixed venue. There are also the markets held irregularly. It may be a membership organisation made up of many sellers and buyers, or the individual market that includes only one seller such as professional enterprises for scientific research running according to market system. Technology market delivers actionable, high-impact intelligence, insights and solutions to enable enterprises to more accurately and quickly make informed decisions. It optimises return on investment and strengthens enterprises' competitive advantage. So the hypothesis is that technology market has a positive effect on enterprise performance.

3.1.2　Internal factors

1　Entrepreneurial spirit

Entrepreneurship is the process of designing, launching and running a business. Entrepreneurs possess an interior fuel and stamina that drive their actions. Successful entrepreneurs are typically confident and self-motivated (Chang et al., 2013). Instead of following the status quo, entrepreneurs have a healthy disrespect for established rules and often set out to do things that others may not have the courage to pursue. They have the ability to lead a business in a positive direction by proper planning, to adapt to changing environments and understand their own strengths and weakness. Entrepreneurial spirit is a key driver of economic growth, job creation and innovation. So the hypothesis is that entrepreneurial spirit has a positive effect on enterprise performance.

2　Talent advantage

Talent is defined as: "In the most general sense, talent is the sum of a person's abilities – his or her intrinsic gift, skills, knowledge, experience, intelligence, judgement, attitude, character and drive. It also includes his or her ability to learn and grow" (Heim, 2012). Talent is the key ingredient for entrepreneurial success. If a talented employee leaves the enterprise, the enterprise thus loses not only valuable work force but also competition-relevant knowledge and experience. In addition, financial costs of recruitment, induction, training, remuneration to the talented employee is high. So the hypothesis is that talent advantage has a positive effect on enterprise performance.

3　Innovation and entrepreneurship idea

Innovation is intimately linked with entrepreneurship. Ideas, innovation, entrepreneurship are considered the keys to a wealthy and sustainable economy. Entrepreneurship refers to an individual's ability to turn ideas into action. It includes creativity, innovation and risk taking, as well as the ability to plan and manage projects in order to achieve objectives. Innovation and entrepreneurship are complementary because innovation is the source of entrepreneurship and entrepreneurship allows innovation to flourish and helps to realise its economic value. Entrepreneurship and innovation are continuous processes in organisations and that both are complementary in enhancing enterprises performance. So the hypothesis is that innovation and entrepreneurship idea has a positive effect on enterprise performance.

4　R&D funds

R&D investment reflects an organisation's willingness to invest in discovery and commercialisation of new technologies in the form of products and processes as well as refinement of existing technologies. Enterprise-level R&D expenditures are typically composed of labour, capital and material costs. Enterprises' high levels of R&D funds reveal their efforts in technological research. R&D funds are necessary for developing new products and production methods and processes of efficient use and adaptation of current and imported technologies. Economic growth is in parallel with technological developments and that technological developments can be

realised through investments in R&D. So the hypothesis is that R&D funds have a positive effect on enterprise performance.

5   Incentive and distribution mechanisms

Incentive and distribution mechanisms is based on the principle of benefit sharing and used to encourage the staffs to achieve desired goals. It is important for enterprises to improve the incentive and distribution mechanism constantly, to distribute the benefit salary reasonably. Incentive mechanism is key supervise, control and core of distribution system of the enterprise. The key of the incentive mechanisms is the distribution system of the enterprise. Fair distribution will improve the enthusiasm of the staff, to make them improve their work efficiency and thus increase the enterprise performance.

3.2   *Model specification and variable definitions*

The relationship between influencing factors of S&T innovation and enterprise performance is also a process of input and output. So according to traditional Cobb-Douglas production function, we construct the development Cobb-Douglas production function. In order to construct linear regression equation and test the relationship between influencing factors of S&T innovation and enterprise performance, the production function model is taken on both sides of the logarithm, and gets a logarithmic form linear model:

$$LnEP_t = c_0 + c_1 LnIM_t + c_2 LnIF_t + c_3 LnIA_t + u_t \tag{1}$$

t represents time, c_0 is constant term, u_t is random error. The enterprise performance ($LnEP_t$) is the dependent variable and innovation manpower ($LnIM_t$), innovation funds ($LnIF_t$), activities of innovation ($LnIA_t$) are the independent variable.

In addition, we can also decompose more independent variables in the above regression equation. Thus, the relationship among the enterprise performance and influencing factors of S&T innovation can be clearly identified. So the regression equation to be tested is:

$$\begin{aligned} LnEP_t = {} & \alpha_0 + \alpha_1 LnDe_t + \alpha_2 LnCo_t + \alpha_3 LnPo_t + \alpha_4 LnTe_t + \alpha_5 LnEn_t + \alpha_6 LnTa_t \\ & + \alpha_7 LnId_t + \alpha_8 LnFu_t + \alpha_9 LnMe_t + \varepsilon_t \end{aligned} \tag{2}$$

In formula (2), there are nine independent variables. $LnDe_t$ represents market demand, sales revenue of Shenyang equipment manufacturing enterprises (X_1) is the measure index. $LnCo_t$ represents market competition, products' service life of Shenyang equipment manufacturing enterprises (X_2) is the measure index. $LnPo_t$ represents government policy, proportion of government innovation funds of Shenyang equipment manufacturing enterprises (X_3) is the measure index. $LnTe_t$ represents technology market, number of patents of Shenyang equipment manufacturing enterprises (X_4) is the measure index. $LnEn_t$ represents entrepreneurial spirit, number of innovation projects of Shenyang equipment manufacturing enterprises (X_5) is the measure index. $LnTa_t$ represents talent advantage, number of the persons with senior professional title of Shenyang equipment manufacturing enterprises (X_6) is the measure index. $LnId_t$ represents innovation and entrepreneurship idea, the transformation rate of technological achievements of Shenyang equipment manufacturing enterprises (X_7) is the measure index. $LnFu_t$ represents R&D

funds, the ratio of R&D funds to total investment of Shenyang equipment manufacturing enterprises (X_8) is the measure index. $LnMe_t$ represents incentive and distribution mechanisms, the ratio of bonus to wages of Shenyang equipment manufacturing enterprises (X_9) is the measure index. α_0 is constant term, ε_t is the random error term, α_1, α_2, …, α_9 are the coefficient of each factors.

Shenyang equipment manufacturing industry is conducted to empirical analysis in this paper. The data are from Shenyang Statistics Bureau, Liaoning Intellectual Property Office. SPSS software is used to analyse various factors that affect the enterprise performance of equipment manufacturing industry.

3.3   Results analysis

The fitting situation of the model is shown in Table 3. We can see from the table that adjusted R square is 0.841. It indicates that the nine independent variables together can explain the change of 84.1% of dependent variable. It proves that the fitting degree of the multiple linear regression equation is better.

Table 3   Model summary

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.942	.887	.841	.0209431

Table 4   ANOVA

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	0.031	9	0.003	12.042	0.000
	Residual	0.004	14	0.000		
	Total	0.035	23			

Results of analysis of variance (ANOVA) are shown in Table 4. We can see from the table that the F statistic of the model is 12.042. Its corresponding significance level is 0.000, less than 0.05. It indicates that the regression equation is significant. There is a linear relationship between the enterprise performance and influencing factors of S&T innovation.

Table 5   Coefficients

Model		Unstandardised coefficients		Standardised coefficients	T	Sig.
		B	Std. error	Beta		
1	(Constant)	0.482	0.063		7.264	0.000
	X_1	0.436	0.291	0.630	5.571	0.000
	X_2	0.088	0.036	0.151	1.162	0.063
	X_3	0.079	0.024	0.103	1.002	0.075
	X_4	0.018	0.006	0.397	3.519	0.019
	X_5	0.211	0.097	0.242	1.213	0.041
	X_6	0.152	0.064	0.305	2.307	0.021
	X_7	0.205	0.116	0.405	4.303	0.014
	X_8	0.087	0.012	0.286	2.016	0.037
	X_9	0.106	0.081	0.123	1.072	0.071

Multiple linear regression coefficients are shown in Table 5. From Table 5, we can see the significance levels of the independent variables X_1, X_4, X_5, X_6, X_7, X_8 are less than 0.05, they are significant to dependent variable. Although the significance levels of the independent variables X_2, X_3, X_9 are greater than 0.05, they are less than 0.1. So the independent variables X_2, X_3, X_9 are also significant to dependent variable.

Effect of the independent variables on dependent variable in descending order is: market demand, innovation and entrepreneurship idea, technology market, talent advantage, R&D funds, entrepreneurial spirit, market competition, incentive and distribution mechanisms, government policy.

4   Discussions and analysis

1   Market demand: market demand and enterprise performance of equipment manufacturing industry are positive correlation. The hypothesis is tested. It is the most important factor to enterprise performance of equipment manufacturing industry. The standardised regression coefficient of market demand is 0.630. Assessing market demand is one of the most important ways that businesses decide what to sell and how to go about selling the products they produce. Failure to accurately project the demand for an equipment or service can lead to production levels that are in excess of the number of units that will actually be sold. As a result, the company is left with a huge inventory of finished goods that generate no profit at all. On the contrary, the consumption of consumers is greater than or equal to the production volume, and the sales revenue of enterprises keeps increasing. In some cases, failing to project market demand properly is enough to force an enterprise to go out of business. So market demand has the greatest impact on enterprise performance of equipment manufacturing industry.

2   Innovation and entrepreneurship idea: innovation and entrepreneurship idea have positive correlation with enterprise performance of equipment manufacturing industry. The hypothesis is tested. The standardised regression coefficient of innovation and entrepreneurship idea is 0.405. The effect of innovation and entrepreneurship idea on enterprise performance is right after market demand. The transformation rate of technological achievements of Shenyang equipment manufacturing enterprises is the measure index. Transformation of technological achievements is the transformation of the application of the technological achievements to the realisation of reality productivity that can realise economic benefits. The higher transformation rate of technological achievements, the greater enterprise performance of equipment manufacturing industry.

3   Technology market: technology market and enterprise performance of equipment manufacturing industry are positive correlation. The hypothesis is tested. The standardised regression coefficient of technology market is 0.379. Technology market generates and develops along with the development of economy and the division of labour. Division of labour society leads to separation between the owner and the user of technology. Along with development in commercial trade, patents become more and more important. Patents are a form of intellectual property. People

who utilised patented technology owned by others must pay costs. For enterprises, it increases the product costs and reduces the profits. In recent years, patents are paid more attention by enterprises. In 2016, the state intellectual property office accepted 1339,000 patent applications for inventions. It increases 21.5% from the last year and continues to lead the world in the past six years. The proportion of enterprises invention patents has reached more than 60%. So technology market is important to enterprise performance of equipment manufacturing industry.

4   Talent advantage, R&D funds and entrepreneurial spirit: talent advantage, R&D funds, entrepreneurial spirit has positive correlation with the enterprise performance of equipment manufacturing industry. The hypotheses are tested. The standardised regression coefficients are respectively 0.305, 0.286, 0.242. With the advent of the knowledge economy era, high-level talents in companies become the main driving force to promote enterprise development and innovation. Talent has been observed to be an important contributor to both innovation and entrepreneurship. The enterprises with more senior professional titles person possess stronger ability of innovation. So talent advantage can increase the enterprise performance of equipment manufacturing industry. R&D funds have a positive impact on enterprise innovation. However, the R&D funds have an intermediate level of effect on enterprise performance. It is mainly due to the high degree of uncertainty inherent in the process of engaging in research and innovation. Entrepreneurial spirit is the act of being an entrepreneur. Entrepreneurs are leaders willing to take risk and exercise initiative, taking advantage of market opportunities by planning, organising, and deploying resources, often by innovating to create new or improving existing products or services. An entrepreneur is able to convert a new idea or invention into a successful innovation. The more innovation projects, the stronger innovation ability, so the market competitiveness of enterprises is increased and enterprise performance is improved.

5   Market competition: market competition and enterprise performance of equipment manufacturing industry are positive correlation. The hypothesis is tested. The standardised regression coefficient of market competition is 0.151. We all know that market competition has both positive side and negative side. On the one hand, competition forces enterprises to innovate continuously and avoid being eliminated. On the other hand, some enterprises are opportunistic. They achieve short-term benefits by reducing product quality. It is very unfavourable for the long-term development of the enterprises. But if the products' service life is too long, consumers don't need to replace the equipment, which is also unfavourable for the sales of the products and enterprise performance is low. It should also be noted that market competition in most situations is often limited or restricted. Market competition may be legally prohibited as in the case with a government monopoly or a government-granted monopoly. Tariffs or other protectionist measures may also be instituted by government in order to prevent or reduce market competition. Market competition may also lead to wasted effort and to increased costs in some circumstances. So market competition has little effect on enterprise performance of equipment manufacturing industry.

6   Incentive and distribution mechanisms: incentive and distribution mechanisms have positive correlation with enterprise performance of equipment manufacturing industry. The hypothesis is tested. The standardised regression coefficient of market competition is 0.123. For some enterprises, benefit salary is too little to mobilise the staffs' work motivation. It is unattractive. In addition, incentive and distribution mechanisms are not only bonus motivation, there are also objective motivation and contingency motivation. So incentive and distribution mechanisms have a little effect on improving the enterprise performance of equipment manufacturing industry.

7   Government policy: government policy and enterprise performance of equipment manufacturing industry are positive correlation. The hypothesis is tested. The standardised regression coefficient of government policy is 0.103. It shows that government policy has the minimum effect on enterprise performance of equipment manufacturing industry. It is because that we set government funds as the measure index. On one hand, the proportions of government innovation funds in the total S&T innovation funds are small. At present, the source of most of the innovation funding is enterprise self-financing. So government innovation funds are not significant in promoting the enterprise performance. On the other hand, the effects of government policy on enterprise performance are not only government innovation funds, the guiding role of the policy is also important. That effect is not reflected by the measure index.

5   Conclusions

The results presented in this paper shed light on an important aspect of the relationship between influencing factors of S&T innovation and enterprise performance. According to the grounded theory, we summarise the crucial factors that affect the enterprise performance of equipment manufacturing industry. Through the empirical analysis of multiple linear regression, we verify the hypotheses which the influencing factors affect the enterprise performance. It comes to the following conclusions:

1   Influencing factors of S&T innovation and enterprise performance can be described by modified Cobb-Douglas production function. Influencing factors of S&T innovation are input, enterprise performance is the output. The fitting degree of the multiple linear regression equation is better. So the relationships between influencing factors of S&T innovation and enterprise performance of equipment manufacturing industry can be analysed through multiple linear regression analysis.

2   The relationships between influencing factors of S&T innovation and enterprise performance of equipment manufacturing industry are all clear. Influencing factors of S&T innovation and enterprise performance of equipment manufacturing industry are positive correlation. They are coincident with the hypotheses. Enterprise performance of equipment manufacturing industry may be improved by expanding the market demand, accelerating the transformation rate of technological achievements, increasing the number of patents and R&D investment, attracting and training more senior professional technical talents, etc.

3   All the factors may improve the enterprise performance of equipment manufacturing industry, but there are significant differences in the degree of influence among the factors. Factor's degree of influence in descending order is market demand, innovation and entrepreneurship idea, technology market, talent advantage, R&D funds, entrepreneurial spirit, market competition, incentive and distribution mechanisms, government policy. Market demand takes the lead in proving enterprise performance. Enterprises should do more investigation on market demand to expand the product sales and thus increase the enterprise performance.

There are still many fields worth studying on equipment manufacturing industry. Such as upgrade path, upgrade mode of equipment manufacturing industry under innovation-driven condition. These are the main research direction in the future.

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