

# Analysis of Management Model and Financing Demand of Shanghai Technology-based SMEs

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**Abstract**—At present, the development of Shanghai's Technology-based small and middle enterprises (SMEs) is severely constrained by financing difficulties. Due to the management model and its high-risk and high-input characteristics, it has hindered its financing, which greatly reduces the survival rate of SMEs. Therefore, such enterprises urgently need effective government support. Based on the principle of product life cycle, this paper analyzes the law of the management and development of SMEs, and points out the characteristics, development stages and faults of SMEs, and then analyze the difference between the management mode of SMEs and the staged differences in financing needs. Therefore, this paper proposes that the Shanghai government should start to solve the financing difficulties of SMEs from the following three aspects : direct investment, fiscal and taxation policies and financial support policies. The Shanghai government should provide targeted financial assistance for different stages of growth of the company, thereby greatly improving the development level of Shanghai's technology-based SMEs.

**Keywords**—*Technology-based SMEs, Life cycle, Financing requirement, Management model.*

## I. CHARACTERISTICS OF TECHNOLOGY-BASED ENTERPRISES

### A. Limited Asset Size and Poor Mortgage Guarantee

In the early stage of entrepreneurial development, technology-based enterprises often have problems of small economies and low total assets. Therefore, fixed assets or corporate movable assets that can be used for mortgages are very limited, especially those with high technology and new technologies[1]. It has less investment in property, due to the lack of fixed assets and collateral assets, and the extremely low credit level in the early stage of the venture. The lack of guarantees from credit guarantee companies narrows its financing channels, which makes the SMEs very difficult to obtain the funds needed through a large amount of mortgage.

In addition, technology-based SMEs can choose mortgage guarantees or pledge guarantees, but both types of guarantees have complicated procedures and expensive expenses. The costs of various intermediate which links in the guarantee and mortgage process are not standardized. Wherever, it will increase the financing cost of the company.

### B. High Risk

For technology-based companies that rely on new technologies and new products to establish themselves in the market, they often face a variety of risks during the initial stage. In the process of development, enterprises need to spend a lot of energy on personnel investment and technology research and development, accompanied by technical risks, financial risks and market risks. The operational risks of SMEs may also originate from faults in the growth phase.

Among the consumer groups of technology-based products: Innovators and early-stage users are individuals with technical skills who are willing to endure product defects and are less sensitive to price; early adopters value ease of use, reliability and cost performance. Therefore, the growth period is an important demarcation point in the development process of SMEs. If enterprises can not find new profit growth points through technological innovation in the growth period, or fail to find market positioning through product innovation, then enterprises will face great risk. Therefore, the uncertainty of the success rate of technical achievements, product yield, market acceptance and future yields all determine that one of the important characteristics of SMEs is high risk.

On the other hand, due to the small-scale characteristics of SMEs, financing mainly comes from commercial credit and short-term bank loans, which will lead to irrational capital structure. The capital structure of enterprises has great impact on the solvency and refinancing level. The decisive role is a key indicator for measuring the financial status of a company, and is closely related to the future profitability of the company. The irrational phenomenon of capital structure will also bring high financial risks and operational risks to SMEs.[2] In recent years, the two levels of government in Shanghai have tried to build a service platform to connect the bridge between banks and enterprises. However, due to the insufficient disclosure of business risk information and the unstable risk of reviewing loans, most of the technology finance business continues, based on risk considerations, choosing the traditional modes like "collateral + guarantee + insurance + personal joint responsibility guarantee".

### C. High Investment

Technology-based SMEs focus on technology research and innovation, and require high investment in the process of enterprise growth and development, including capital, manpower and material resources. Among them, the investment in

technology development accounts for a large proportion. Traditional enterprises can take advantage of existing production technologies, while technology companies are different from traditional enterprises. Technology companies need to develop and test production,

In addition, the technology opening of small and middle enterprises of science and technology often involves multiple fields, requiring higher quality and higher requirements of equipment and raw materials. Moreover, technology research and development is the leading force for the success of technology-based small and middle enterprises. It also requires a high investment in human capital. Technology-based SMEs require a large number of highly educated and highly skilled researchers, which increases the cost of the business. All of the above have caused the high-investment nature of SMEs.

#### *D. The Management Level is Limited and the Internal System is not Perfect*

In the early stage of the development of science and technology enterprises, their management level is low, and they lack standardization. For example, the centralized management method of “one person is the master” and the lack of specialized management personnel; on the other hand, the management concept is relatively backward, such as financial awareness. The lack of financial awareness has led to a relatively backward financing concept, which has narrowed the financing channels artificially and weakened the ability of enterprises to resist risks and the ability to attract financing. In addition, because managers focus on technology research and development, they may relatively ignore the content of financial knowledge, that is, technology-based small and medium-sized enterprises take technical research as their expertise, and technicians are dominant in the human resources of enterprises, which means that they are proficient in professional finance. The people of financial knowledge are quite scarce. In this context, the SMEs generally have unrealistic and incomplete financial statements. The weakness of internal control and the confusion of the financial system coexist at the same time, which is far from the provisions of the General Rules of Loans of Commercial Banks.

According to the survey data of SMEs in some economically developed regions, more than half of the SMEs have not established a sound financial management system, and they cannot provide financial data recognized by the bank credit department when financing funds. Even if it meets the requirements, it takes a long time to prepare, so that the company's statements can not better reflect the true profitability and development prospects of the enterprise. The financial statements of the business records, lack of professional audit department evaluation and good continuity, are also likely to cause information asymmetry, increasing investment risks and inconvenience to financing activities[3].

## II. CHARACTERISTICS OF DEMAND FOR TECHNOLOGY FINANCIAL SERVICES BY TECHNOLOGY-BASED ENTERPRISES

### *A. The Demand for Loans is Characterized by “Urgent, Frequent, Small and Many”*

SMEs are urgently required to meet the financing speed of banks, mainly used to meet short-term liquidity shortage revolving funds; SMEs have high frequency financing requirements for banks, which runs through all five stages of business growth; The amount of SMEs financing for banks is small, the value of collateral is limited; Technology-based SMEs have more financing for banks. In fact, banks have strict procedures for issuing loans, including three stages: pre-lending investigation, loan review and post-lending inspection. They are divided into eight steps: loan investigation, approval and issuance and so on, regardless of the amount of each loan. Therefore, banks prefer to handle large-scale credit business rather than SME retail business, because the former's loan cost is relatively lower.

### *B. Characteristics of Capital Demand in Each Stage of the Life Cycle*

The growth of technology-based SMEs usually goes through five stages, namely seed stage, start-up stage, growth stage, maturity stage and recession stage. According to the characteristics of different stages, its financing needs have different characteristics. With the changes in constraints such as information and asset size, the financing structure of enterprises will also change. The basic law of change is that the more early stage of growth, the tighter the constraints of external financing, the narrower the financing channels.

The financing needs of technology-based SMEs include the amount of financing and financing methods. The company determines the amount of financing required based on the cost budget and determines the possible financing method based on the relationship between investment and income. For SMEs, the main financing methods are self-owned funds, retained earnings, direct government investment, venture capital, equity investment and loans.

In the seed stage, the products are mainly in the stage of technology research and development, and the funds are in the stage of pure investment, and there is no income. Therefore, the seed period is the investment stage of the enterprise, and there is a great financial risk during the period. At this stage of technology-based SMEs, companies need a lot of money to support their own technology and product development, especially in certain industries, such as bio-pharmaceuticals, telecommunications and so on. The investment in this stage is very huge. And at this stage, the products and technologies studied cannot be converted into income. Therefore, technology-based SMEs can adopt less financing methods, generally relying on their own funds and direct investment by the government.

When the enterprise enters the start-up stage, the technology and products developed in the previous stage enter the experimental stage, which can generate certain income and have a certain commercial basis. But at this stage, the enterprise still needs a lot of funds for product improvement and expansion of production and scale of market. So at this stage, companies often lose money. However, technology and products have begun to take shape, and their market benefits can be initially assessed. At the same time, the technical risks are not very large, mainly including market risks, management risks and

financial risks. At this stage, bank loans and venture capital began to intervene and became an important financing method for technology-based SMEs. Of course, for most high-tech industries, they still rely on their own funds and direct government investment.

In the growth period, after the initial market trials, according to the "fault" theory, the company enters a critical moment. If the product is positioned correctly and can be gradually accepted by the market, the company's income will increase substantially, and the financial situation will be improved. However, enterprises still need to continue to invest more, expand production and organization scale, carry out effective marketing, and improve the management level of enterprises. Therefore, this stage still needs a lot of financial support.

On the other hand, market demand has gradually opened up and the range of options for financing has expanded. First, venture capital can evaluate projects more reasonably, so that venture capital can invest more in technology-based SMEs. Second, enterprises tend to have high expectations in the growth period, and banks' willingness to lend is also improved. Finally, a certain surplus can be obtained, so that its own funds and retained earnings are also one of the important financing methods for growth enterprises.

When the enterprise enters the mature stage, the income and investment status of the enterprise will stabilize and its profit will be in a stable state. At the same time, the strength of the enterprise is further strengthened, and the overall assessment can be carried out more objectively and accurately. At this time, the enterprise has sufficient capital and credit capacity, and the financing environment will be greatly improved. At this stage, venture capital exits and the company's loan financing capacity increases, but companies must invest in finding new profit growth points and improving internal management capabilities. At this time, the introduction of new strategic investors through equity financing will become a key financing. In this way, capital operation becomes the core of financing strategies.

When the maturity period is over, the financial situation of the company will be polarized: companies looking for new profit growth points and effectively improving internal management capabilities will achieve new developments, such companies will widely adopt mergers and acquisitions, lending and listed equity financing. They use these ways to obtain funds, so as to cross the product life cycle, into the transition period; Conversely, the unprepared enterprises have to shrink the business after the product enters a recession period, mainly using their own funds and retained earnings to tide over the difficulties or implement the exit strategy.

TABLE I. CHARACTERISTICS OF CAPITAL DEMAND IN EACH STAGE OF THE LIFE CYCLE

| Table Head       | Each Stage of the Life Cycle                             |  |   |   |  |
|------------------|--|--|---|---|--|
|                  | <i>Seed stage</i>  | <i>Start-up stage</i>  | <i>Growth stage</i>   | <i>Maturity stage</i>                                   | <i>Recession stage</i>   |
| Financial status | A lot of investment, no income, loss                     | A lot of investment, a small amount of income, loss-based                                      | A lot of income, a lot of income, start to make a profit        | Stable investment, stable income, stable profit         | Polarization: companies in good development find new profit points or save costs; companies with poor development shrink their investment and their income declines.                                       |
| Financial needs  | Based on self-owned funds and national direct investment | With its own funds and direct investment from the state, venture capital begins to participate | Focus on venture capital, with both loans and retained earnings | Focus on equity investment, loans and retained earnings | Polarization: well-developed enterprises are mainly based on equity investment, loans and retained earnings; enterprises with poor development are mainly based on retained earnings and self-owned funds. |

### III. THE "PAIN POINT" OF THE DEMAND SIDE OF TECHNOLOGY FINANCIAL SERVICES

#### A. *The Problem of "First Mile"*

In the early stages of innovation and entrepreneurship, companies face the highest uncertainty and the highest mortality rate. Some people call it the "Valley of Death". This makes a large amount of social capital unwilling to invest and become a market failure period for investment. However, the early stage of conception, development, and start-up of these enterprises and individuals became an indispensable foundation and condition for future emerging industries or business models.

At present, Shanghai SMEs are all light-asset enterprises in the early stage of development, showing the distinctive characteristics of high-risk and high-input. However, in the long-term economic development process, Shanghai has paid attention to tangible assets and been contemptuous of intangible assets; appreciated resource exploitation and ignored the development of technology; attached importance to the real economy and ignored the characteristics of the virtual economy. The policies and measures introduced for the development of small and medium-sized enterprises and innovation and entrepreneurship are less comprehensive, systematic and synergistic than the management of mature industrial economic activities. So most technology-based SMEs have the "first mile" problem in terms of funding sources in the early stages of development.

The most ideal targets for the “first-mile” financing of small and medium-sized enterprises in science and technology are angel investment and venture capital. However, most of the technology start-ups in Shanghai are in the stage of high risk and no income, and external investors are not enough to understand the enterprise. For reasons of caution, it is difficult for companies to obtain financial support from outside investors. They can only hope to find “angel investment”, but the chances of success are very limited. On the other hand, there is no cash flow inflow due to lack of sales operations. There are also operational risks and market risks in the operation. Therefore, most of the commercial banks in Shanghai are not willing to lend to the technology-based SMEs at this stage because of their own financial security considerations. Enterprises cannot obtain bank loans and cannot undertake more business contracts. For the so-called “Internet +”, banks often do not lend to them, because there are no fixed assets and no credit records. Therefore, the “first mile” problem encountered by Shanghai's SMEs in the early stage of development is one of the “pain points” that Shanghai's technology financial services need to solve urgently.

#### *B. The Problem of "Last Mile"*

At present, Shanghai has a relatively sound project support system for basic research. However, for a long time, it lacks the “last mile” mechanism for the productization and industrialization of scientific research results. When Shanghai's technology-based SMEs transform their scientific and technological achievements, there will be a lack of financial support, resulting in inefficient conversion of scientific and technological achievements.

The transformation of scientific and technological achievements is a key step in the scientific and technological achievements from the laboratory to the market, and is often described as the “last mile” of the transformation of results. After the science and technology enterprise enters the initial stage from the seed stage, the technology research and development results of the previous stage have achieved certain gains. However, there are still a series of unknown risks. After the completion of technical research, the relevant technology-based SMEs in Shanghai have market risks and financial risks. As well as the existence of factors such as management risk, the financing ability of the subsequent development is still very limited, with lacking effective financial support.

Although bank loans and venture capital have begun to intervene at this stage, they are still at a low level of support. The limited amount of financing cannot meet the industrialization transfer of the results of Shanghai's technology-based SMEs, which greatly limits the connection between its related results and the market. This may further increase the market risk faced by enterprises, and at the same time, reduce the credit level and development prospects of enterprises in the eyes of banks and venture capitalists. Finally it will form a vicious circle that hinders enterprise technology transfer and market development. Therefore, the “last mile” problem encountered by Shanghai SMEs during their development is also one of the “pain points” that Shanghai Science and Technology Financial Services needs to solve urgently.

### IV. POLICY SUPPORT

Generally speaking, the survival rate of high-tech industries is only 20% to 30%, but once successful, it will generate several times or even dozens of times. For such a high-risk and high-yield industry, the government policy promotion is crucial. Specific to the financing needs of high-tech industries, the Shanghai government can apply the following three policy instruments: direct investment, fiscal and taxation policies and financial support policies. Three different policy instruments are aimed at different financing needs. The government can only produce the greatest effect if the policy supply matches the financing needs of the enterprise.

#### *A. Direct investment*

The government's direct investment mainly comes in the following forms: direct investment support, loan interest subsidies and fund support. Direct government investment has been an important source of funding for R&D for technology-based SMEs. Before 2005, the direct investment of the Chinese government was mainly achieved through direct financial support and loan interest subsidies. However, in recent years, the fund support methods of developed countries are gradually introduced. The emergence of a number of funds, such as state-level SME innovation funds, SMEs international market development funds, and electronic information industry development funds, has played an important role in easing the funding bottlenecks of SMEs in the seed and start-up periods.

#### *B. Fiscal and tax policy*

Fiscal and taxation policy is one of the most commonly used means. At present, the tax incentives for high-tech enterprises in the world mainly include: tax reduction and tax exemption, VAT preferential treatment, accelerated depreciation, fee deduction, loss carryover, etc. China's fiscal and taxation policies for small and medium-sized enterprises in science and technology are generally formulated in conjunction with high-tech development zones. Generally, they can be divided into the following categories: reduction of income tax rates of enterprises in high-tech zones; and tax-deductible policies for newly-established technology-based SMEs; the fiscal and taxation subsidy policy in special development zones. Compared with the diversified financial and taxation support methods in the world, China's fiscal and taxation policies still appear to be relatively simple. From the perspective of the growth stage of the enterprise, due to the low income of the enterprises in the seed period and the initial stage, the tax reduction and exemption will not help the enterprise. However, in the growth and maturity period, the retained earnings of enterprises are an important financing channel for enterprises. In these two stages, the role of fiscal and taxation policies in promoting enterprises will be very obvious.

### C. Financial support policy

The financial support policy is mainly to improve the credit service system, credit work methods, the credit management system, and diversified financing channels to provide a good financing environment for enterprises. For example, some important documents promulgated in recent years have provided policy support for the diversified financing of SMEs. According to the life cycle, after the company enters the growth stage, the company mainly depends on venture capital and bank loans; At the maturity stage, venture capital exits, the company begins to introduce new investors, equity financing and bank loans become the main Financing method; In the recession period, enterprises seek listing financing. At this stage, equity financing and bank loans are still the main financing methods of enterprises. Therefore, financial support policies will have an important impact on enterprises in the growth, maturity and recession stage. For these companies, a good credit environment and a sound equity financing environment are essential.

### V. CONCLUSION

The development of technology-based SMEs cannot be separated from the support of government policies. The government's policy design should conform to the objective laws of SMEs, and be designed and configured according to the financing needs of enterprises in different stages of growth. The specific conclusions are: adopting the direct investment policy to meet the financing needs of the technology-based enterprises in the seeding stage and the initial stage; providing preferential fiscal and taxation policies to meet the financing needs of the growing and mature enterprises; and formulating financial support policies to meet the financing needs of companies in growth, maturity and recession period. Using the above policy support model, we can optimize the government's technology and financial services for Shanghai's technology-based SMEs, and better promote the development of Shanghai's SMEs.

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