

Research on the Impact of ESG and Business Model Innovation on Financing Ability of Technology-based Enterprises based on the Moderating Role of Financial Technology

Haokai Zhao

University of Nottingham Ningbo China, Ningbo 315000, China.

Abstract: The financing ability of enterprises has always been an important proposition in the development process of technology-based enterprises. According to the current difficulties faced by China's science and technology-based enterprises in the financing process, this paper finds a feasible solution to enhance the financing ability of China's science and technology-based enterprises by studying the relationship between enterprise ESG, business model innovation, financial technology and enterprise financing ability, which is of great guiding significance to the benign development of China's science and technology-based enterprises.

Keywords: ESG; Business Model Innovation; Financial Technology

1. Introduction

At present, innovation drive is one of the main driving forces for the high-quality development of China's economy and society. Historical experience shows that enterprises' scientific and technological innovation cannot be separated from financial support, while the current financing situation of science and technology-based small and medium-sized enterprises (SMEs) is seriously mismatched with their important position in China's innovation-driven strategy, and the persistent problems of difficult financing and high financing costs have not yet been solved. In this case, how the government can guarantee the survival and future development of science and technology-based enterprises, and how science and technology-based enterprises can improve their financing ability from their own perspective, so as to promote the benign operation of China's scientific and technological innovation system, are important issues that both enterprises and the government need to think about at present.

1.1 Difficulties in corporate finance for science and technology-based SMEs

The growth potential of science and technology-based SMEs is huge, but it is often accompanied by high experience risk and investment risk, and is limited by factors such as the size of the company, the enterprise's collateralized assets are less, coupled with China's financing system for science and technology-based enterprises has not yet been perfected, so the financing of science and technology-based enterprises is usually very difficult, and the cost of financing is also very high, and many enterprises have advanced technology but because of the problem of capital can not be put into industrialization. Many enterprises have advanced technologies but are unable to industrialize them because of financial problems. How to improve the financing ability of technology-based enterprises? Whether an enterprise can obtain financing depends on the enterprise's own conditions on the one hand, and is also affected by the overall market conditions on the other. The internal factors of the enterprise and the external market environment are the two main research dimensions of this paper.

1.2 Average performance in ESG rating of listed companies

As green sustainability has become an important goal of corporate development, corporate ESG has gradually received attention from governments, enterprises and scholars, and is considered an important hand in promoting a green economy and realizing sustainable development in China. In November 2018, the China Association of Funds launched the core indicator system for measuring corporate ESG for the first time, which greatly accelerated the development process of corporate ESG in China. ESG is an acronym for Environment, Society and Governance, and corporate ESG has a far-reaching impact on the performance, financial status and even development potential of enterprises, and has become an important criterion for investors and stakeholders to measure the value of enterprises. The data of ESG rating performance of A-share enterprises show that most listed companies have average ESG performance, and the ESG development of Chinese enterprises is

still in an immature stage, as shown in Figure 1.

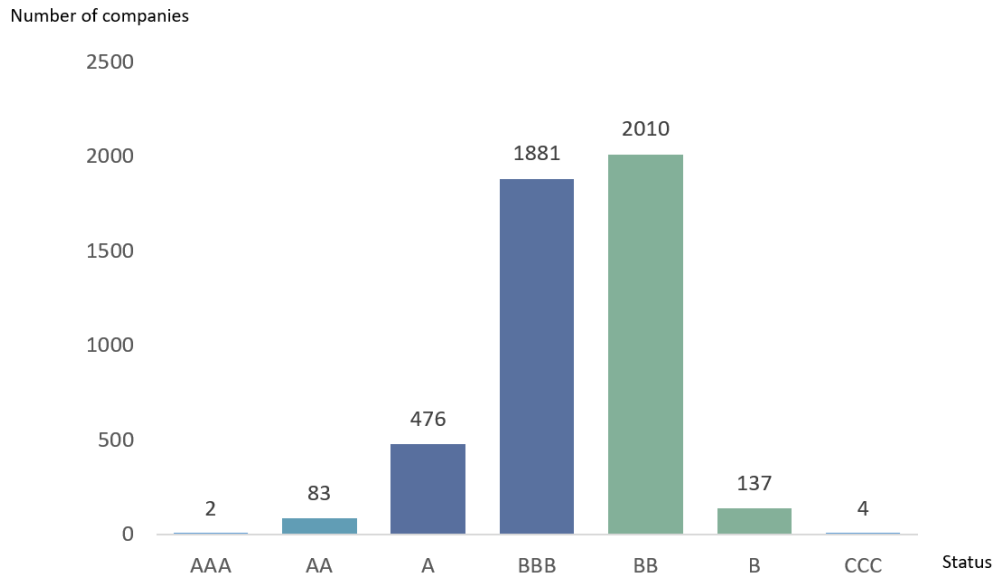


Figure 1 Distribution of A-share ESG ratings in 2022

Note: Information from the National Statistical Office

This essay centers on the theme of financing ability of science and technology-based enterprises, starting from the development status quo and real problems of financing of science and technology-based enterprises in China, exploring the impact and mechanism of business model innovation of science and technology-based enterprises, ESG rating of enterprises and financial science and technology on enterprise financing, which is conducive to the improvement of the level of financing of science and technology-based enterprises in China, and it has certain value for the development of science and technology-based enterprises in China.

2. Literature review and outlook

This study mainly examines the impact of business model innovation of science and technology-based enterprises, enterprise ESG on financing ability under the moderating effect of financial institution digitization, which involves the related literature on financial institution digitization, business model innovation of science and technology-based enterprises, the impact and role of enterprise ESG, and the influencing factors of enterprise financing ability. Therefore, we first review the relevant literature on the digitization of financial institutions, and on this basis, we then explore the intrinsic connection between the business model innovation of science and technology-based enterprises, enterprise ESG and financing ability, distill the research path, discover the role mechanism of business model innovation, ESG affecting financing ability, and put forward the relevant research hypotheses.

2.1 Enterprise financing capacity

According to Yandan (2012), financing capability in a broad sense refers to the maximum amount of financing under the financing constraints faced by the enterprise. For science and technology-based enterprises, financing capability is related to whether the enterprise can create more value and make more technological innovations, and it also has an impact on managers' decision-making (Huang Ze Ye, 2023). The evaluation of the financing ability of science and technology-based enterprises and the identification of financing risks are the key to their provision of capital financing services to science and technology-based SMEs (Yuan Jien, 2022). Li (2023) pointed out that financing cost is an important dimension in evaluating the financing ability of enterprises. Financing cost is actually the cost of using funds for enterprises, and with higher financing cost, the exogenous financing of enterprises will be limited, which in turn will affect the financing activities of enterprises (Guo Tianyong & Sun Guangyu, 2021).

2.2 Corporate ESG

2.2.1 Corporate ESG and Business Model Innovation

Corporate ESG can be used for business model innovation in three dimensions: environmental protection, social responsibility and corporate governance. Under the requirements of environmental protection of corporate ESG, technology-based enterprises need to change the traditional strategic positioning and integrate the concept of environmental protection into their business model, which will be regarded as their core competitiveness (Shao Yumeng, 2022). Bocken et al. (2020) pointed out that through the innovation of the business model, technology-based enterprises are able to achieve environmental protection and sustainable development, reduce the negative impact of enterprises on the environment, and complete the transformation of the strategic positioning of enterprises. The social responsibility part of corporate ESG requires technology-based enterprises to actively and continuously comply with industry integrity and corporate ethics, and actively fulfill their social responsibilities (Meng Jiajia et al., 2023). In this process, enterprises have the opportunity to shift more focus to solving social problems in the design of new business models, giving business models more social connotations (Kluza, 2021). Meanwhile, corporate ESG can influence the business model of enterprises through the internal governance of the company. The requirements of corporate ESG on corporate governance help science and technology-based enterprises to build a sound internal control mechanism, which helps enterprises to identify, analyze and control risks, so as to improve the robustness of the business model (Qin Xian et al., 2020). Song Jing et al. (2015) pointed out that in the case of a relatively concentrated shareholding in the enterprise, the major shareholders of the enterprise are more inclined to adopt the business model of pursuing the enterprise's long-term returns, rather than pursuing their own interests.

2.2.2 Corporate ESG and Financing Capacity

Viewing the ESG of science and technology-based enterprises as an overall result, there is also a direct impact of corporate ESG on corporate financing ability. Based on the information asymmetry theory, enterprises can solve the information asymmetry problem between enterprises and investors by disclosing more ESG information, and can satisfy the value pursuit of investors, thus obtaining more financing (C. Ballesteros et al., 2016) (Li Jinglin & Yang Hongjie, 2023). Based on the signaling theory, a good ESG rating situation of an enterprise can convey the positive signals of good business operation so as to obtain the trust and help of stakeholders, and the market value of the enterprise will be improved (Meiali and Zhang Qian, 2023; Wang Huaiming and Zhou Xinyu, 2023) (Xie Xiaoyan and Xie Yuan, 2023).

2.3 Business model innovation

2.3.1 Business model innovation and financing capacity

Strategic positioning innovation of technology-based enterprises can improve their financing ability by increasing their market value. Investors usually consider the investment value of enterprises with innovative business models to be higher because they believe that these enterprises are better able to adapt to market changes, have a unique strategic positioning in the market, and are able to stand out from the competition in the market (Qi Yudong and Cai Chengwei, 2020). These strategic partners can provide support in terms of capital, resources, and market channels to further enhance the financing ability of the enterprises (Yildiz & Aykanat, 2019).

The value creation of business model innovation of science and technology-based enterprises can improve the financing ability of enterprises by improving their profitability. By enriching the social connotation of products and services, science and technology-based enterprises are able to satisfy a larger range of consumer groups, realize a wider space for value transfer, cover more stakeholders, and expand the market of the enterprise (Yu Dengke and Chen Shuting, 2023). Meng Jiajia et al. (2023) pointed out that the value creation of business model innovation in science and technology-based enterprises can create new value growth points for the enterprise, increase the market share of the enterprise, and complete the enterprise's value capture, which improves the profitability of the enterprise.

The business model innovation of science and technology-based enterprises can also improve the financing ability of enterprises by optimizing their business conditions. Yu Dengke and Chen Shuting (2023) believe that business model innovation can bring more revenue and profit for technology-based enterprises, thus increasing the cash flow of the enterprise and optimizing the enterprise's financial condition.

2.4 Financial Technology

2.4.1 Definition of Fintech

Fintech refers to a new financial industry formed after the deep integration of modern science and technology with the financial industry in the informationization era (Xu Guwen, 2023). With the support of modern science and technology, financial science and technology can use comprehensive science and technology as a tool for the innovation and development of the financial industry, which effectively improves the depth of the integration of finance and science and technology, and improves the innovative vitality of the development of the financial industry (Li Liping, 2022).

2.4.2 Financial Technology and Corporate Finance

First of all, the emergence of fintech provides new financing channels and solutions for technology-based enterprises. Through the use of the Internet, big data, artificial intelligence and other technical means, fintech has changed the operation of the traditional financial industry, provided more convenient and efficient financing services, and reduced the financing cost of enterprises from the source (Liu Ming & Wang Yanfang, 2022). Secondly, the development of financial technology promotes the effective docking between enterprises and investors, and solves the problem of information asymmetry in the financing process (Zhang Wei, 2022).

2.5 Review of the study

After combing the literature, it is found that the ESG practices, business model innovation and fintech of technology-based firms are closely related to their financing ability, and ESG promotes the innovation of firms' strategies and business models from the dimensions of the environment and corporate governance, which in turn enhances market value and indirectly strengthens their financing ability. Meanwhile, fulfillment of social responsibility also directly enhances market value, which in turn affects financing. Fintech plays a moderating role in this, reinforcing the enhancement of market value by strategic innovation and social responsibility. However, much of the current research focuses on business model innovation and ESG per se, and there are few results that directly explore their relationship with financing capacity. Therefore, this paper will start from the perspective of financing ability of tech enterprises, and explore the influence and mechanism of enterprise ESG, business model innovation, and financial technology on them, as shown in Figure 2.

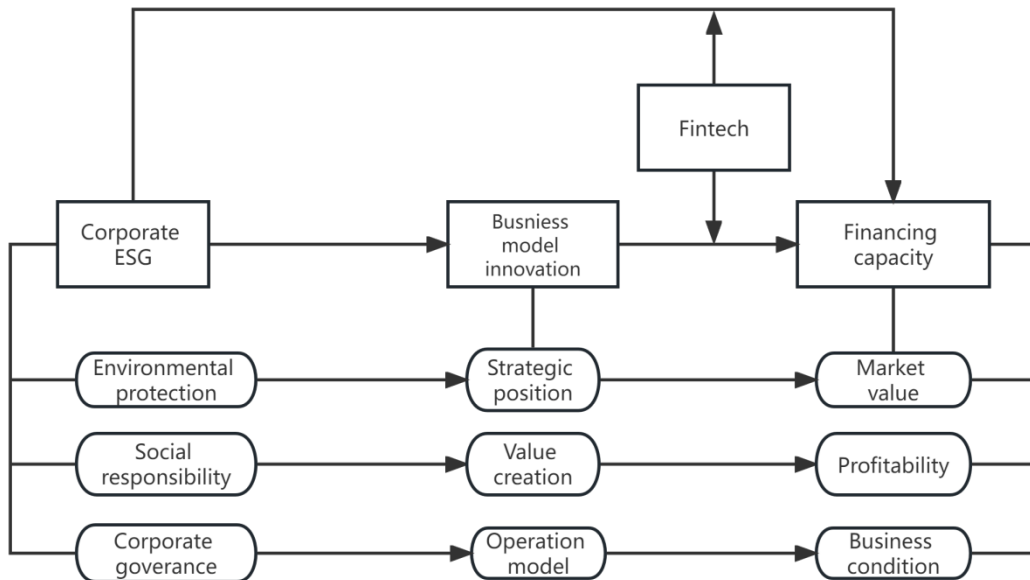


Figure 2 Relationship between variables

3. Status of development

3.1 Current status of business model innovation in technology-based enterprises

China's tech enterprises are experiencing a significant uptrend in business model innovation, with a notable 42% engaging in such practices by 2022, marking a 19% increase from the previous year, as per the National Bureau of Statistics. This shift underscores a growing acknowledgment of the critical role business models play, prompting a surge in innovation and R&D investments among tech firms. Amidst the digital age's challenges and market shifts, traditional models falter, pressing companies to seek novel growth avenues and adapt to evolving investment landscapes influenced by fintech advancements. The impact is profound; numerous firms have revamped their business models, embracing digitalization, service-oriented strategies, and platform-based operations, thereby enhancing their financial performance. Furthermore, collaborative innovation models, especially those partnering with academic entities, are fast-tracking tech advancements, showcasing the synergistic potential of industry-academia alliances.

3.2 Status of ESG Development in Technology-based Enterprises

With the society's increasing demand for corporate social responsibility and sustainable development, more and more technology-based companies are focusing on ESG, emphasizing the impact of corporate ESG factors on business and long-term development, and incorporating them into their business operations and strategic planning. From the data point of view, in 2022, the number of ESG companies disclosed in China was 1,741, an increase of 18% year-on-year, which has maintained a high growth trend for three consecutive years. In 2022, there were only 210 and 55 listed companies in the A-share market that actively disclosed their ESG reports and sustainability reports, which accounted for 25% and 3.6% of the listed companies in the A-share market, which was much lower than that of Hong Kong, as shown in Figure 3, which shows that the number of listed companies in the A-share market that actively disclosed their ESG reports and sustainability reports was only 210 and 55, respectively.

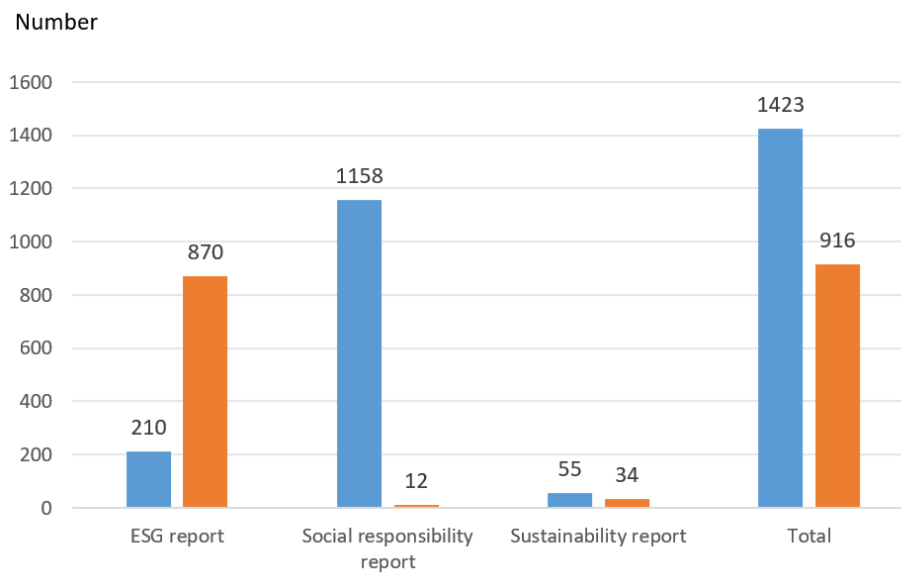


Figure 3 Report disclosure of A-share and Hong Kong-listed companies in 2022

Although the number of companies actively disclosing ESG data and information is increasing, the overall level of disclosure remains low. At the same time, the quality of corporate ESG disclosure varies due to the lack of harmonized standards, widely varying ESG rating frameworks across companies, and the lack of credible underlying data.

3.3 Status of financing for technology-based enterprises

China's push to bolster its tech sector with financial aids, tax breaks, and loan assurances has indeed eased funding access, yet the financing hurdle persists for many startups and growing tech firms. Direct financing channels for enterprises are still very limited. Despite their

innovative edge and market promise, a mere 30% have secured funds, hindered by their modest assets, inherent risks, and financial instability. Bank loans dominate the funding scene, with direct financing playing a minor role. In 2022, only about a quarter of tech SMEs managed to tap into direct financing, and even fewer ventured into public markets. This skewed financing landscape amplifies financial strains and risks for these enterprises, as direct funding avenues remain scarce. Moreover, tech firms face financing costs exceeding 10%, notably steeper than in other sectors, underscoring the challenges of high funding expenses and limited financial support in China’s tech ecosystem.

4. Pathways and modalities

4.1 Operational modalities

In the current business environment, technology-based enterprises not only need to fully understand their own business conditions, but also need to be sensitive to macro policies. In this context, by constructing the Boston Matrix we can more intuitively analyze what strategies are the most effective for technology-based enterprises to enhance their financing capabilities under different circumstances (four quadrants), as shown in Figure 4.

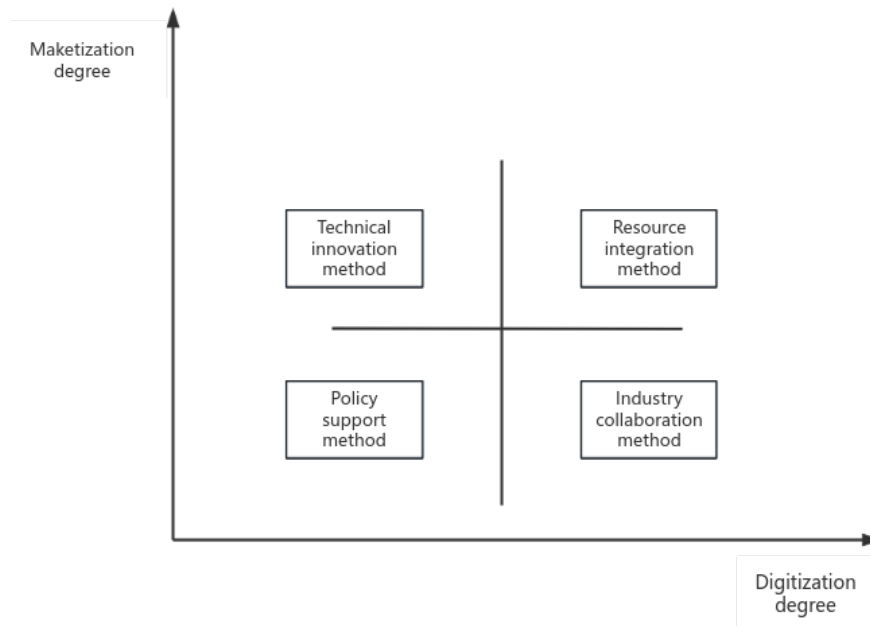


Figure 4 Mode of operation

Using the degree of digitization as the horizontal axis and the degree of marketability as the vertical axis, companies can be classified into four quadrants, which are:

Enterprises with high degree of digitalization and marketization (Quadrant 1): These enterprises usually have high market position and brand influence, as well as advanced digital technology and application capabilities. In this case, ESG enterprises can integrate resources according to their own characteristics and adopt a variety of financing modes suitable for the enterprises, such as green finance, sustainable development bonds, and social impact investment, in order to attract more investors’ attention and support.

Enterprises with low digitization and high marketability (Quadrant 2): These enterprises may lack advanced digitization technology, but have high market position and brand influence. In this case, ESG enterprises can improve their digitalization level by cooperating with digitalization technology providers, actively engaging in technological innovation, and adopting financing models such as green finance and sustainability bonds to obtain financial support.

Highly digitized, low marketability firms (Quadrant 3): These firms typically have more advanced digital technologies but lack sufficient market position and brand influence. In this case, ESG companies can improve their market position and brand influence by participating in industry associations and strengthening cooperation with business partners. This type of enterprise can mainly obtain financial support

through industry investment funds.

Enterprises with low digitization and low marketability (Quadrant 4): These enterprises lack both advanced digitization technology and sufficient market position and brand influence. In this case, ESG enterprises need to strengthen their own technological innovation and market development capabilities, while seeking policy support and investor attention. These enterprises have a better chance of obtaining financing through traditional commercial loans and government subsidies.

4.2 Path to realization

As shown in Figure 5, with the support of macro policies, technology-based enterprises can significantly improve their environmental ESG performance with the help of business model innovation and green sustainability as their core strategy. By publicizing ESG-related information, the market value of enterprises will be enhanced, which in turn will strengthen their financing ability. The new business model incorporates the concept of green sustainability, which not only meets the environmental protection needs of the government and customers, but also shapes a positive image of the company and enhances its brand influence. This positive image will help the enterprise to enhance its market value in the market competition.

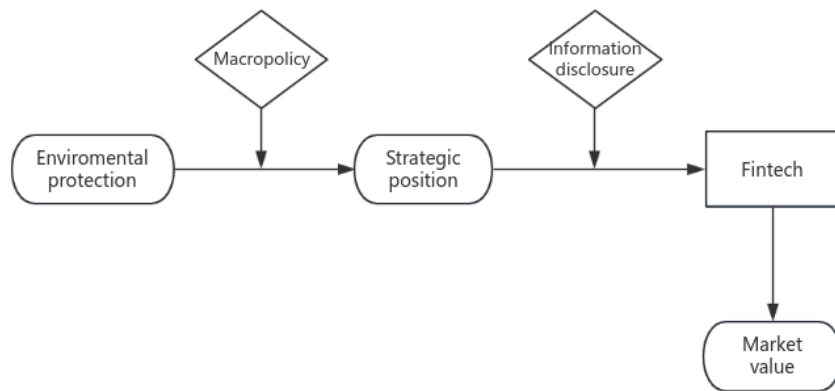


Figure 5 Realization path 1

Business model innovation aimed at green sustainability can bring new business opportunities and market demand for technology companies. Green technology has become a new market hot spot. By investing and innovating in the field of green development, technology-based enterprises can open up new markets and improve their competitiveness and market value. With the help of financial technology, the government and financial institutions can better grasp the situation of green and sustainable development of enterprises, and then be able to quickly bring policy and financial support to enterprises that meet the conditions, which strengthens the role of enterprises to carry out green and sustainable business model innovation to enhance the ability of financing.

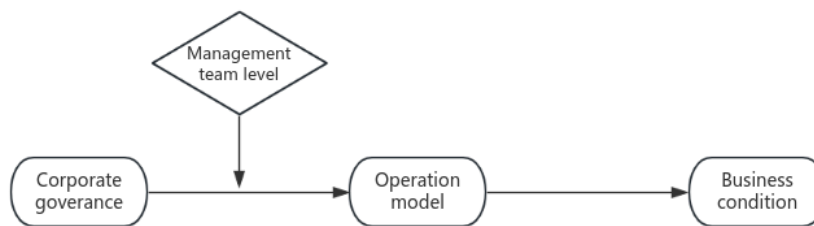


Figure 6 Realization path 2

Corporate governance is an important element in the development of science and technology-based enterprises, and has an important impact on the financing ability of enterprises. As shown in Figure 6, when implementing corporate governance, science and technology-based enterprises can improve their operating conditions by optimizing their business model. Good corporate governance helps to establish a scientific and standardized decision-making mechanism and improve operational efficiency and decision-making quality. Firstly, governance

helps to clarify the relationship between rights and responsibilities of enterprises, reduce internal power abuse and corruption through perfect power and supervision mechanism, and enhance the transparency and fairness of operation. Secondly, scientific corporate governance can strengthen the monitoring and management of internal risks of enterprises, improve the ability to resist risks, and provide strong support for the business model. Finally, corporate governance can provide a good innovation environment and incentive mechanism, promote enterprise innovation ability, and promote the optimization and transformation of the business model.

5. Conclusion

This essay mainly takes the financing difficulty and expensive financing situation of China's science and technology-based enterprises as the background, and takes the improvement of the financing ability of science and technology-based enterprises as the main content, analyzes the financing status quo and problems of China's science and technology-based enterprises at present, and explores the mechanism of the role of enterprise ESG, business model innovation and financial science and technology on the financing ability of science and technology-based enterprises. This essay finds that due to the existence of the backward business model of science and technology-based enterprises, the information asymmetry between enterprises and financing institutions and the imperfection of the financial system of the three major problems, resulting in the current high cost of financing for China's science and technology-based enterprises, financial institutions have a low willingness to raise funds for the two major status quo, and the business model innovation, ESG ratings and financial institutions digital transformation can be an effective solution to the three problems mentioned above, so as to change the unfavorable status quo of difficult and expensive financing for science and technology-based enterprises in China.

References

- [1] Bocken, Nancy, M.P. & Geradts, T. H. J. (2020). Barriers and drivers to sustainable business model innovation: Organization design and dynamic capabilities. *Long Range Planning*, 53(4), 1019-50.
- [2] Garcia-Sanchez, S. Cuadrado-Ballesteros, B., & Frias-Aceituno, J.-V. (2016). Impact of the Institutional Macro Context on the Voluntary Disclosure of CSR Information. *Long Range Planning*, 49(1), 15–35. <https://doi.org/10.1016/j.lrp.2015.02.004>
- [3] Guo, T.Y. & Sun, G.Y. (2021). Economic policy uncertainty, financing cost and enterprise innovation. *Research in international finance*(10),78-87.
- [4] Huang, Z.Y. (2023). Analysis of influencing factors of financing ability of small and medium-sized enterprises in science and technology. *Commercial economy*(03), 82-84.
- [5] Kluza, Ziolo, M., & Spoz, A. (2021). Innovation and environmental, social, and governance factors influencing sustainable business models - Meta-analysis. *Journal of Cleaner Production*, 303, 127015.
- [6] Li, L. P. (2022). The impact of green finance development on green technology innovation efficiency. *Gansu Finance* (11),52-56.
- [7] Li, J.L. & Yang, H.J. (2023). ESG and Corporate Finance: Research review and Prospects. *Friends of Accounting* (15),69-74.
- [8] Li, J.J. (2023). Can ESG Performance Affect the financing ability of enterprises? . *Accounting communication* (17), 70-75.
- [9] Liu, M. & Wang, Y.F. (2022). High-quality coupling and collaborative development of financial industry and manufacturing industry: Mechanism, measurement and influencing factors. *Shanghai Economic Research Institute* (12),93-112.
- [10] Mei, Y.L. & Zhang, Q. (2023). The impact of ESG performance on corporate debt financing costs. *Finance and Economics* (02),51-63.