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<https://doi.org/10.22394/2410-132X-2024-10-2-60-78>EQUITY FINANCING POTENTIAL
FOR LEADING R&D OF SMALL AND
MEDIUM-SIZED BIOMEDICAL CORPORATIONSY. SUN^{1,2}¹ Institute of Economics, Mathematics and Information Technology, Russian Presidential Academy of National Economy and Public Administration, Moscow, Russian Federation² Pfiker Biopharma (Hong Kong) Group Co., Ltd, Hong Kong, People's Republic of China;
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Abstract. From the perspective of small and medium-sized innovative biomedical enterprises, this study conducts a comprehensive analysis of the corporate financing capacity during the equity financing process, aiming to provide valuable insights for the successful implementation of equity financing. The study involved the distribution of a total of 400 questionnaires to Chinese venture capital institutions and SMEs of innovative drug R&D, followed by statistical analysis of the questionnaire data results. In light of the challenges faced by these enterprises during the equity financing process, such as inadequate attention to financing business plans, neglect of financing roadshows, insufficient financing expertise, reliance on single financing approaches or channels, lack of meticulous capital partner selection and enterprises raise capital prematurely, this study proposes several countermeasures. These include prioritizing the financing business plan, emphasizing the importance of the financing roadshows, adopting a diversified financing approach, and objectively determining the optimal entry point for the financing stage. Venture capital can effectively address the financing bottleneck faced by small and medium-sized innovative biomedical enterprises, thereby serving as the optimal financing channel. Not only that, but also can effectively address the bottleneck issues associated with equity financing for small and medium-sized innovative biomedical enterprises and play a pivotal role in the field of innovative drug research and development (R&D). By fostering the development of more efficient novel drugs, it can significantly contribute to the robust growth of China's biomedical industry.

Keywords: small and medium-sized enterprises, SME, biomedical enterprise, venture capital, VC, equity financing, financing capacity

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ФИНАНСИРОВАНИЕ, ФОНДЫ И КАДРЫ НАУКИ

ОРИГИНАЛЬНАЯ ИССЛЕДОВАТЕЛЬСКАЯ СТАТЬЯ

УДК: 334.722.8

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<https://doi.org/10.22394/2410-132X-2024-10-2-60-78>ПОТЕНЦИАЛ АКЦИОНЕРНОГО ФИНАНСИРОВАНИЯ ДЛЯ
МАЛЫХ И СРЕДНИХ БИОМЕДИЦИНСКИХ КОМПАНИЙ,
ВЕДУЩИХ ИССЛЕДОВАНИЯ И РАЗРАБОТКИЯ. СУНЬ^{1,2}¹ Институт экономики, математики и информационных технологий, Российская академия народного хозяйства и государственной службы при Президенте Российской Федерации (РАНХиГС), Российская Федерация, Москва; e-mail: syhmba@foxmail.com² Pfiker Biopharma (Hong Kong) Group Co., Ltd, Гонконг, Китайская Народная Республика;
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Equity Financing Potential for Leading R&D of Small
and Medium-Sized Biomedical Corporations

Аннотация. Это исследование представляет собой комплексный анализ корпоративных возможностей в области финансирования при привлечении акционерного капитала с точки зрения малых и средних инновационных биомедицинских предприятий с целью формирования базы знаний для успешного осуществления акционерного финансирования. Исследование включало анкетирование сотрудников 400 китайских венчурных компаний и МСП, занимающихся исследованиями и разработками инновационных лекарств, с последующим статистическим анализом результатов данных анкет. С учетом проблем, с которыми сталкиваются подобные предприятия в процессе привлечения акционерного капитала, такими как недостаточное внимание к бизнес-планам финансирования, пренебрежение презентацией эмиссии, недостаточный опыт в сфере финансирования, чрезмерная зависимость от одного подхода или канала финансирования, не совсем тщательный выбор финансовых партнеров и преждевременное привлечение капитала, это исследование предлагает ряд мер противодействия. Они включают в себя первоочередное внимание к бизнес-планам финансирования, подчеркивание значимости презентации эмиссии ценных бумаг, принятие разнообразных подходов к финансированию и объективную оценку оптимального момента для начала финансирования. Венчурный капитал способен эффективно решать проблемы, связанные с привлечением акционерного капитала для малых и средних инновационных биомедицинских предприятий, играя ключевую роль в сфере инновационных исследований и разработке лекарственных препаратов. Венчурный капитал может эффективно решить проблему финансирования, с которой сталкиваются малые и средние инновационные биомедицинские предприятия, выступая в качестве оптимального канала финансирования. Венчурный капитал также может решить проблемы, связанные с долевым финансированием малых и средних инновационных биомедицинских предприятий, тем самым играя ключевую роль в области исследований и разработок инновационных лекарств (НИОКР) и содействуя устойчивому росту биомедицинского сектора Китая в целом.

Ключевые слова: малые и средние предприятия, МСП, биомедицинское предприятие, венчурный капитал, акционерное финансирование, потенциал финансирования

Информация о финансировании: Исследование выполнено без внешнего финансирования.

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INTRODUCTION

The biomedical industry is a strategic emerging sector that significantly impacts a nation's economy, public health and national security. Biomedicine, as a high-tech industry characterized by its knowledge-intensive nature and high R&D density, is globally acclaimed as the emerging sector with the highest growth potential and international competitiveness in the 21st century. It also represents the most dynamic and rapidly advancing domain of biotechnology applications (Zhang et al, 2020; Negahdary, Heli, 2018). With continuous breakthroughs in biomedical technology, China's biomedicine industry has experienced rapid development, witnessing an expanding scale and an increasing proportion within the overall pharmaceutical sector. Encompassing chemical drugs, biological agents, Chinese herbal medicine, and other facets, biomedicine epitomizes the integration of multidisciplinary theories and advanced technologies (Singh, Rajoria, 2020; Cheng, Yoon, Tian, 2018; Sakr, Korany, Katti, 2018).

In recent years, China's biomedical sector has been accelerating into a "high-speed lane" of development, with domestic innovative drugs representing a continuous stream of groundbreaking achievements. To further promote the growth of the biomedical industry and expedite the development of the biomedical industry chain, the State Council, the National Medical Products Administration (NMPA), and the National Development and Reform Commission have successively rolled out and implemented numerous policies that endorse the biomedical sector, offering full support for the R&D, achievement transformation, and public service platform construction in the specialized fields of biotechnology or biological drugs, chemical drugs and the traditional Chinese medicines. Amidst the policy incentives, the review and approval process for new drugs in China has significantly expedited, leading to a surge in the introduction of innovative drugs. In 2021, the comprehensive acceleration of the review and approval policies for various new drugs in China resulted in

Equity Financing Potential for Leading R&D of Small
and Medium-Sized Biomedical Corporations

a record high number of approved new drugs. According to China Life Science and Biotechnology Development Report (CBDC, 2023) and National Medical Products Administration in China (NMPA), the NMPA approved 45 innovative drugs, among which 18 were launched in the market in 2022, including 7 chemical drugs, 7 biological drugs, and 4 traditional Chinese medicines (Figure № 1). A multitude of novel mechanisms and drugs have recently gained marketing approval, indicating not only the fruition of local pharmaceutical enterprises' R&D efforts but also the progressive approximation of China's innovative drug development system to the international forefront.

The term *innovation* originates from Latin and connotes the notions of transformation, rejuvenation, and creation of novel entities. Innovation exhibits several key characteristics: high levels of uncertainty and risk, substantial investment requirements, lengthy development cycles, knowledge spillover effects, and significant returns (Hou, 2023). In terms of the content of innovation, it can be categorized into technological and non-technological

forms. Non-technological innovation encompasses market and management innovations. Technological innovation revolves around products or services (Sun, Peng, Sun, 2020; Chen, 2021), while management innovation centers around business models (Yu et al, 2021). The cutting-edge drug R&D capabilities of the biomedical industry serve as a crucial indicator of a nation's pharmaceutical sector's advancement (Ding, Ma, 2012). The process of innovative drug R&D is characterized by "high investment, high risk, and long cycle," and yet, small and medium-sized innovative biomedical enterprises in China have long been grappling with the issue of financing challenges. Currently, the primary financing channels for China's technology-oriented SMEs, including biomedical innovative R&D enterprises, encompass internal funding by enterprises themselves, government research grants, loans from financial institutions, and IPO capitalization (Zhu, Xu, Hu, 2019). The financing of small and medium-sized biomedical enterprises presents a long-term, specific financial challenge, and it remains difficult to cater to the actual equity financing needs of these enterprises through

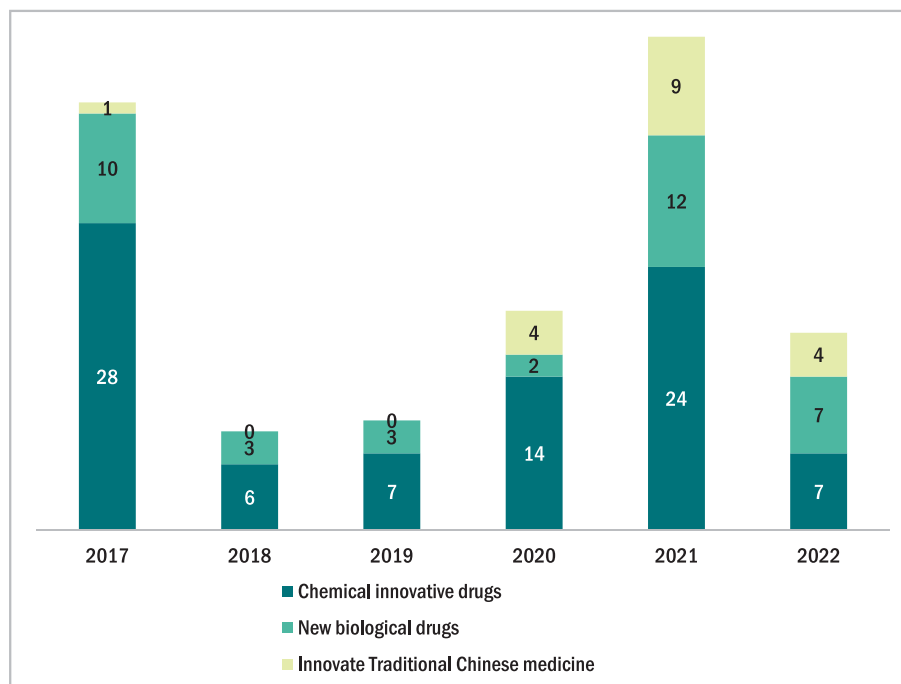


Figure 1. The number of innovative drugs approved for marketing in China from 2017 to 2022

Рисунок 1. Количество инновационных лекарств, одобренных для продажи в Китае с 2017 по 2022 год
Source: Data are extracted from National Medical Products Administration in China (NMPA, <https://www.nmpa.gov.cn>)

Equity Financing Potential for Leading R&D of Small and Medium-Sized Biomedical Corporations

traditional approaches. Typically, venture capital exhibits three key features: “high risk, long cycle, and involvement in project management” which aligns closely with the characteristics of “high investment, high risk, and long cycle” associated with innovative drug R&D. Undoubtedly, venture capital represents a vital financing channel and a mutual-win strategy for small and medium-sized innovative biomedical R&D enterprises.

The study provides a comprehensive analysis of the corporate financing capacity during the equity financing process from the perspective of small and medium-sized innovative biomedical enterprises, aiming to offer valuable insights for the successful implementation of equity financing. To identify the financing bottlenecks and key challenges faced by these enterprises in their equity financing practices, this study involved the distribution of a total of 400 questionnaires to venture capital institutions and SMEs of innovative drug R&D, followed by statistical analysis of the questionnaire data results.

WILLINGNESS OF VENTURE CAPITAL FUNDS TO INVEST IN THE DEVELOPMENT OF SMALL AND MEDIUM-SIZED INNOVATIVE BIOMEDICAL ENTERPRISES

The findings from the 2017 China Pharmaceutical Industry Investment Research Report, released by the Zero2IPO Research Center, indicate that the pharmaceutical sector in China’s venture capital market (VC/PE) experienced a general upward trend from 2010 to 2016, with an average annual growth rate of 89.0% in investment volume (Zero2IPO R C, 2017). Notably, venture capital investment in the pharmaceutical industry underwent a significant acceleration in 2015 and 2016. In 2016, the number of institutions participating in pharmaceutical venture capital reached 226, amounting to a total investment of 23.2 billion yuan.

In recent years, the healthcare industry has progressively emerged as a focal point of global competition. In 2021, the global healthcare sector attracted \$127 billion in investments, reaching an all-time high, and encompassing the highest

number of financing events. Nonetheless, influenced by the macroeconomic environment, the financing events and investment volume in the global healthcare industry are anticipated to decrease in 2022. A total of 3,057 financing events took place that year, amounting to a total of \$72.9 billion. This phenomenon suggests that the global capital market’s investment in the healthcare industry is likely to become more rational in 2022, with a deceleration in the growth rate of investment and financing (*Figure № 2*). Similarly, China’s medical and health investment and financing market will also be affected by the macro environment in 2022, experiencing a slight decline in enthusiasm. In 2022, a total of 1,218 investment incidents occurred in China, amounting to \$15.6 billion in investments, less than half of the amount invested in 2021 (*Figure № 3*).

The willingness of venture capital to support the biomedical industry/enterprises and novel drug R&D can be observed. Utilizing venture capital as a strategic channel to facilitate the growth of innovative pharmaceutical R&D enterprises is advantageous. However, challenges arise in the equity financing capacity of small and medium-sized innovative biomedical enterprises during the process.

QUESTIONNAIRE AND RESULTS

Drawing upon our previous literature review on innovative biomedical R&D, as well as equity financing within this field, the questionnaire was designed to incorporate candidate questions. Subsequently, a survey of venture capital institutions and small and medium-sized innovative biomedical enterprises was conducted to facilitate our research and analysis.

The primary methodologies of this study encompassed various approaches, such as email distributions, WeChat group distributions, telephone interviews, and on-site visits. A total of 400 questionnaires were disseminated among venture capital institutions (Paper A) and small- to medium-sized innovative biomedical enterprises (Paper B) participating in the project. A total of 187 valid questionnaires were retrieved from Paper A, yielding a calculated response rate of 93.5%. Similarly, 196 valid questionnaires were collected

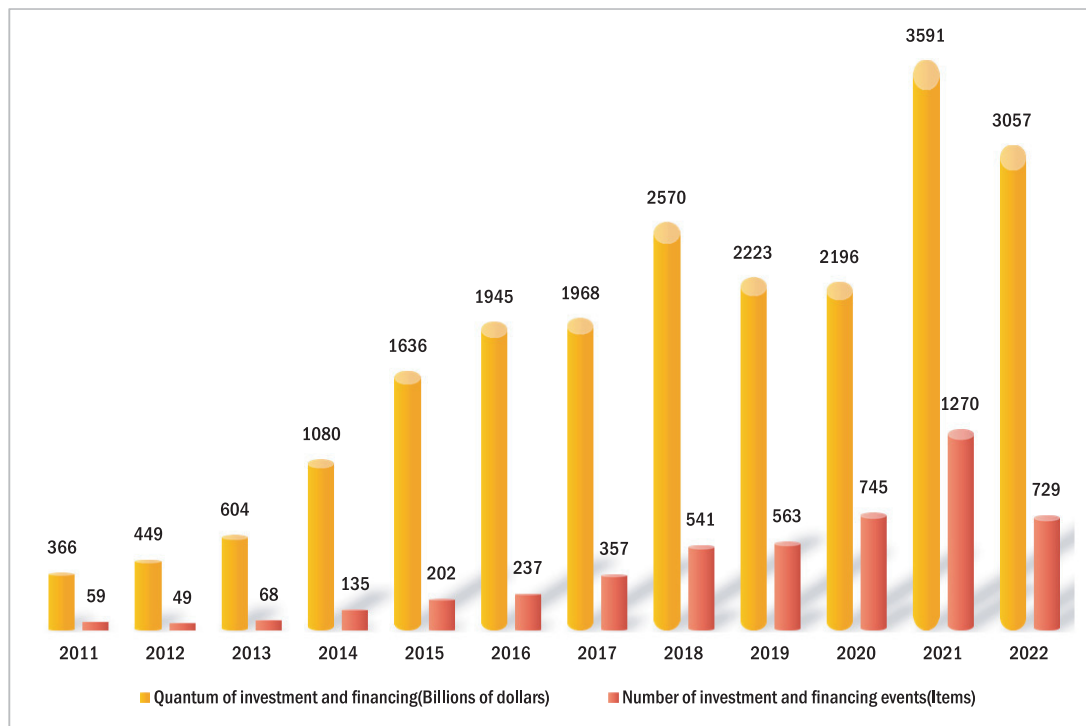
Equity Financing Potential for Leading R&D of Small
and Medium-Sized Biomedical Corporations

Figure 2. Trends of investment and financing in global biomedical health industry from 2011 to 2022

Рисунок 2. Тренды инвестиций в глобальной биомедицинской индустрии с 2011 по 2022 год

Source: Data are extracted from Artery Orange Industry Think Tank (<https://www.vbdata.cn>)

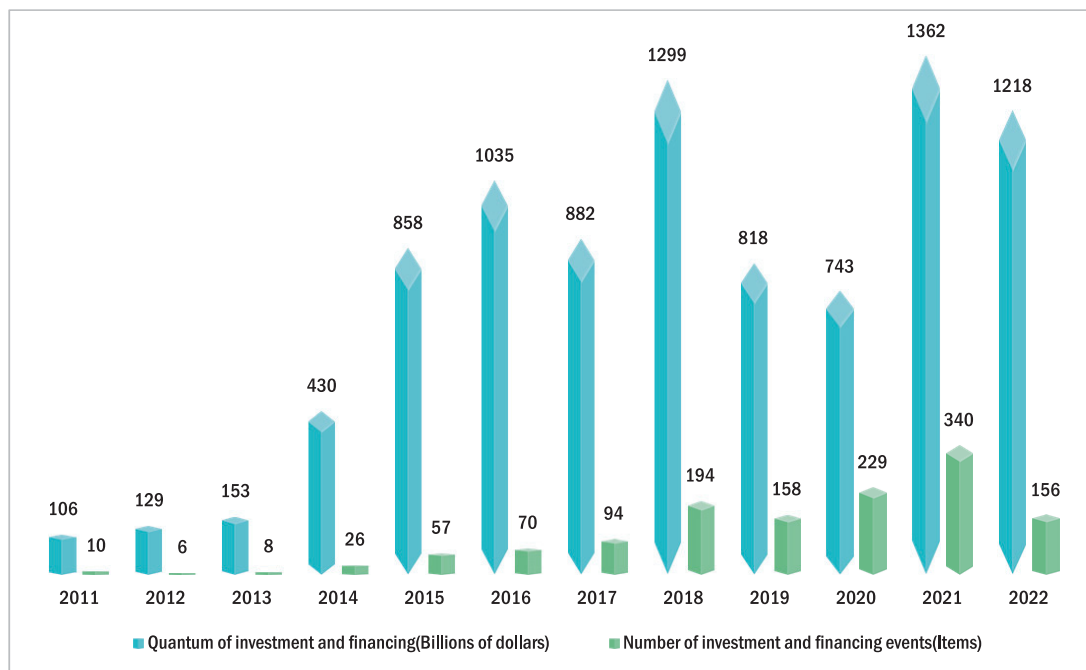


Figure 3. Trends of investment and financing in Chinese biomedical health industry from 2011 to 2022

Рисунок 3. Тренды инвестиций в китайской биомедицинской индустрии с 2011 по 2022 год

Source: Data are extracted from Artery Orange Industry Think Tank (<https://www.vbdata.cn>)

Equity Financing Potential for Leading R&D of Small and Medium-Sized Biomedical Corporations

from Paper B, boasting a calculated response rate of 98%. The data derived from the questionnaires were primarily analyzed utilizing Microsoft Excel, an application software in the world.

The objectives of the Paper A questionnaire survey are venture capital institutions, primarily targeting investment professionals in the life science, pharmaceutical chemical, biomedical and innovative medicine fields. This is to comparatively examine the current status and practices of pharmaceutical investment and financing. The focus of the Paper B questionnaire survey is on small and medium-sized innovative biomedical enterprises, namely, those engaged in innovative biomedicine and innovative medical care, including innovative medicine, innovative biotechnology, etc. The survey is aimed at the founders and senior management of these enterprises to more accurately delineate the current corporate financing process.

The findings from the questionnaire survey reveal that the statistical analysis indicates that the primary factors influencing the equity financing of small and medium-sized innovative biomedical enterprises are related to their financing capacity (Figure № 4). These aspects include: (1) Inadequate focus on the financing business

plan. (2) Neglect of financing roadshows. (3) Insufficient presence of a dedicated financing team or professionals/experts. (4) Relatively limited financing approaches or channels. (5) Inadequate consideration in selecting capital partners. (6) Early-stage financing for the project.

ANALYSIS OF FINANCING CAPACITY AND CHALLENGES FACED BY FINANCING ENTERPRISES

For small and medium-sized innovative biomedical enterprises, the development of a comprehensive financing strategy is not only essential for ensuring the healthy growth of the company, but also serves as a guarantee for its stable progression. Furthermore, it provides a foundation for mitigating the relative risks faced by these enterprises. The underlying financing capacity of these companies is, undoubtedly, the linchpin of their respective financing strategies.

Inadequate focus on the financing business plan

The business plan represents the initial stage of project evaluation conducted by venture capital institutions, serving as a crucial method

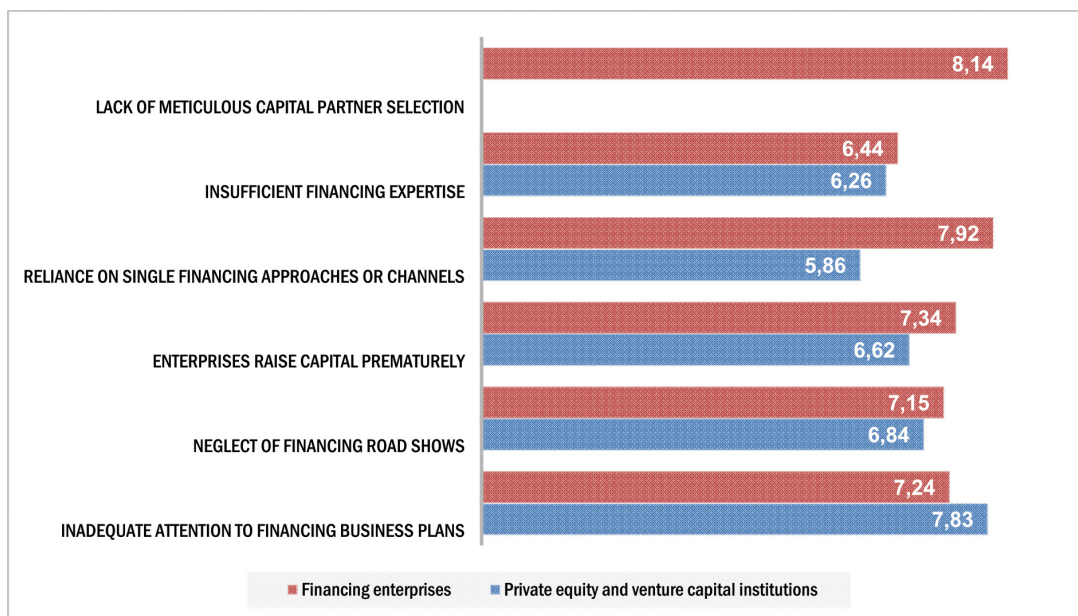


Figure 4. Results of investigation and research on corporate equity financing capacity

Рисунок 4. Результаты исследования корпоративного акционерного финансирования

Source: Data are derived from the results of this questionnaire

Equity Financing Potential for Leading R&D of Small
and Medium-Sized Biomedical Corporations

for entrepreneurial companies to secure funding from venture capitalists. This strategic document conveys the intentions of financing enterprises to capital investment institutions and forms one of the vital links in the equity financing process for these enterprises. Regrettably, the business plan has not garnered adequate attention from small and medium-sized innovative biomedical enterprises during equity financing.

The data presented in *Figure № 4* reveal a discrepancy between the perceived importance of the financing business plan for small and medium-sized innovative biomedical enterprises, as perceived by venture capital institutions (rating it at **7.83** out of high importance) and those enterprises themselves (rating it at **7.24** in a questionnaire survey). This variance suggests that there may be differences in the significance attributed to the “financing business plan” between capital investors and the enterprises seeking financing. The primary reasons for this discrepancy are likely due to a lack of emphasis placed on the “financing business plan” by small and medium-sized innovative biomedical enterprises or the failure to develop a business plan that aligns with the overall status of the financing enterprise.

Insufficient emphasis on financing roadshows

“Financing roadshows” typically denote a crucial approach or channel for companies to present speeches, showcase their corporate image, and promote their entity, team, products and ideas to investors during exchange meetings organized and conducted by industry or third-party institutions. Currently, financing roadshows have emerged as a novel financing channel for financing enterprises to secure funds (Li, 2013).

Although venture capital institutions assessed the “financing roadshows” of small and medium-sized innovative biomedical enterprises as being of general importance (**6.84** points), these enterprises themselves perceived them as posing significant challenges (**7.15** points) in the questionnaire survey (*Figure № 4*). The data indicate that financing enterprises have identified critical issues requiring urgent resolution in their “financing roadshows”.

The primary factors contributing to this crucial problem are as follows: Firstly, innovative drug

R&D enterprises tend to focus excessively on the technical aspects of their business plan, neglecting or overlooking the financing roadshows recommendation process. This is primarily due to the background of the core team, which is primarily technical and scientific, resulting in a lack of proactive engagement in face-to-face communication with venture capital institutions using the roadshows format. Consequently, this leads to increased time and opportunity costs associated with fundraising. Secondly, given the voluminous business plans and projects received by venture capital institutions, reliance on conventional hard indicators such as market share and profitability during the project screening process may not fully comprehend the core advantages and unique selling points of the financing enterprises. Consequently, this could lead to a missed opportunity for both high-quality financing enterprises and venture capital institutions. Thus, financing roadshows can significantly leverage their potential by enabling financing enterprises to communicate and interact with multiple venture capital institutions simultaneously.

Lack of financing business team or professionals/experts

As illustrated in *Figure № 4*, small and medium-sized innovative biomedical enterprises scored **6.44** in the questionnaire survey, marginally surpassing the score of investment institutions. The data indicate that venture capital institutions and financing enterprises essentially assign equal importance to “financing business team or professionals/experts” underscoring the significance of this problem in the investment and financing collaboration process between both parties.

The financing negotiations between biomedical innovative enterprises and investment institutions are frequently intricate, encompassing a multitude of knowledge-related aspects such as products, technology, market, finance and law. Should these enterprises engage in overseas financing negotiations with foreign venture capital institutions, they would also need to consider relevant national laws, international trade regulations, foreign languages and other specialized skills or knowledge, which are beyond the

Equity Financing Potential for Leading R&D of Small and Medium-Sized Biomedical Corporations

capabilities of individual negotiators. As such, a “financing negotiation team” is essential for conducting these negotiations, as illustrated in Figure № 5 and Figure № 6.

The primary explanation for this situation is the absence of equity financing experience and specialized financial investment knowledge among small and medium-sized innovative biomedical enterprises. Consequently, during the negotiation process between the financing enterprise’s investment team and venture capital institutions, technical factors can easily result in stagnation. Drawing from practical investment and financing experiences, it has been observed that the relevant personnel involved in equity financing of innovative drug R&D enterprises often lack financial and investment expertise, effective business communication skills and negotiation strategies at the bargaining table. Consequently, the inherent value of the innovative drug project is not adequately conveyed. Simultaneously, even high-quality projects may miss out on crucial financing opportunities, underscoring the significance of assembling a negotiation team.

The singularity of financing approaches or channels

As depicted in Figure № 4, although venture capital institutions assigned a relatively low importance of **5.86** points to the “financing approach or channel” of small and medium-sized innovative biomedical enterprises, these enterprises themselves rated the aspect significantly higher at **7.92** points in the questionnaire survey. The data indicate that financing enterprises confront significant challenges in the realm of “financing approach or channel” which are pressing problems that necessitate immediate resolution.

The primary explanation for this phenomenon is that venture capital institutions typically acquire superior project information not through a singular, one-on-one delivery from financing project parties, but by procuring project resources through various channels. From the perspective of small and medium-sized innovative biomedical enterprises, although they possess an informational advantage in the development of projects or businesses, they lack the specialized knowledge of financial investment during

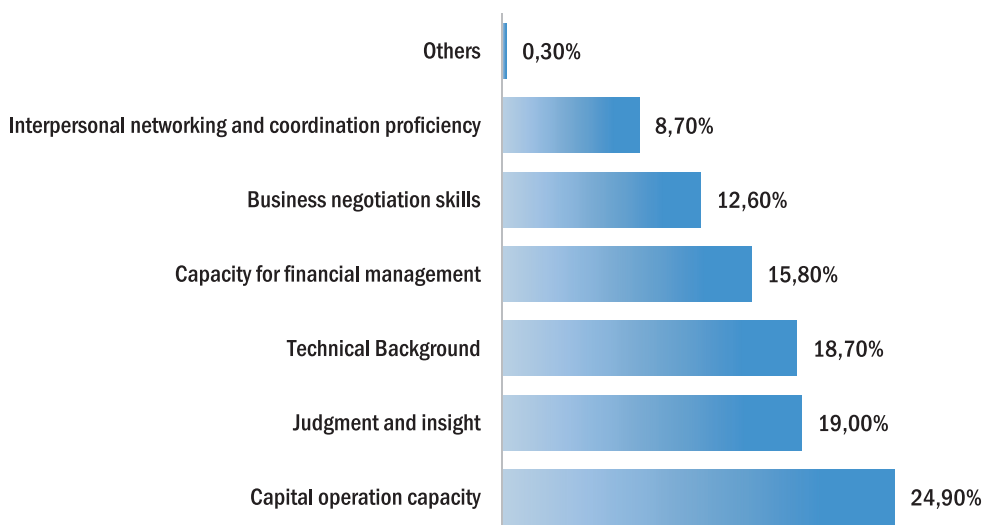


Figure 5. Competencies and expertise required for investment and financing professionals (2021)

Рисунок 5. Компетенции и опыт, необходимые для специалистов по инвестициям и финансированию (2021)

Source: Data are derived from the report of China venture capital survey group (2022) of the Institute of Science and Technology Governance and Talent Research, China Academy of Science and Technology Development Strategy (the number of valid samples is 2405)

Equity Financing Potential for Leading R&D of Small and Medium-Sized Biomedical Corporations

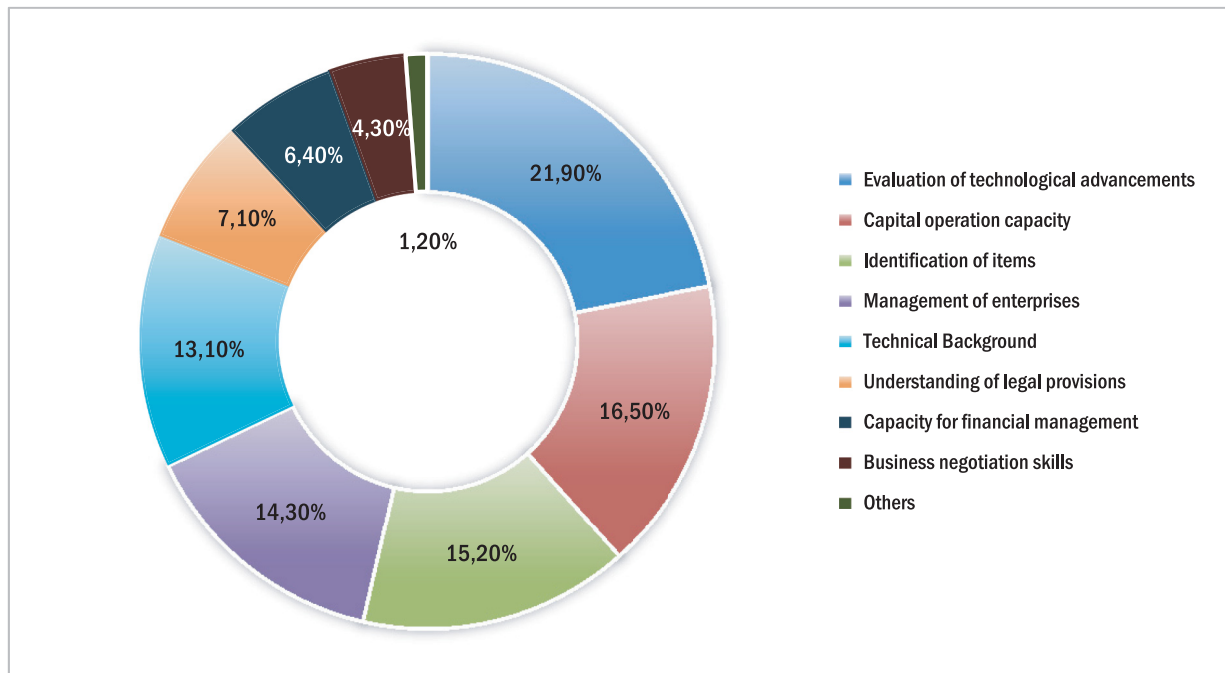


Figure 6. Limited expertise and capabilities of Chinese venture capital personnel (2021)

Рисунок 6. Ограниченный опыт и возможности китайского венчурного капитала (2021)

Source: Data are derived from the report of China venture capital survey group (2022) of the Institute of Science and Technology Governance and Talent Research, China Academy of Science and Technology Development Strategy (the number of valid samples is 2388)

the equity financing process, particularly the professional expertise of investment institutions. Consequently, a single approach to equity financing is no longer adequate for today's digital economy and electronic information age. As illustrated in *Figure № 7*, this study classifies the channels used by venture capital institutions to acquire project information from 2017 to 2021.

Insufficient prudent selection of investment institutions

To facilitate the seamless implementation of innovative drugs and the growth of R&D enterprises, it is both necessary and responsible for financing enterprises to select investment institutions that possess a genuine understanding of innovative drugs, the pharmaceutical industry and management capabilities, as well as operational strength and effective collaboration. This ensures a solid foundation for the success of innovative drug R&D, as illustrated in *Figure № 4*. A questionnaire survey conducted on small and medium-sized

innovative biomedical enterprises regarding the "insufficient research on investment institutions" revealed the following primary reasons:

Lack of assessment of potential risks associated with investment institutions. In the course of investment and financing activities, small and medium-sized innovative biomedical enterprises, being equity financing entities, frequently experience "financial famine" due to insufficient funds, which curtails the proactive and cautious selection of investment entities and impedes a comprehensive understanding of capital partners. Consequently, this leads to frictions during the subsequent collaboration process and foregone opportunities for efficient growth. On the other hand, financing entities lack adequate comprehension and knowledge concerning the non-standard operations (such as disarrayed organizational structures and equity corruption) and the lack of internal ethics within the investment institutions they collaborate with, thereby exposing themselves to risks during the cooperation

Equity Financing Potential for Leading R&D of Small and Medium-Sized Biomedical Corporations

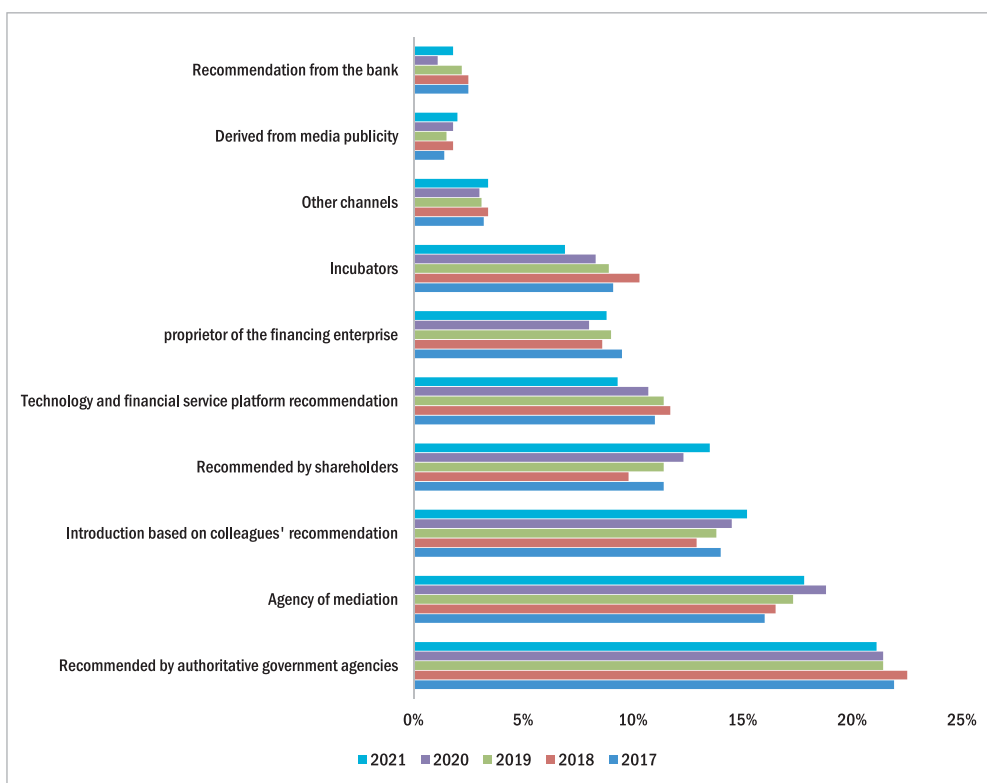


Figure 7. Investigation into the information sources and channels utilized by Chinese venture capital institutions for financing enterprise (2017–2021)

Рисунок 7. Исследование источников информации и каналов, используемых китайскими венчурными учреждениями для финансирования предприятий (2017–2021)
 Source: Data are derived from the China Academy of Science and Technology Development Strategy

process. The disclosure system of investment institutions exhibits certain shortcomings. According to the preliminary data from the Venture Capital Survey Report, issued by the Chinese Academy of Science and Technology Development Strategy, investment institutions generally possess a positive self-assessment of their own development, as illustrated in *Figure № 8*. Although China mandates that venture capital funds compulsorily register with institutions and regularly provide fund reports, along with disclosing investment and financing information, a survey indicates that only 38.5% of these funds in China adhere to the corresponding disclosure requirements set by relevant management departments (Sun, 2009). Among venture capital funds, 26.9% choose not to disclose information until a specific stage of operation, while 35% altogether neglect to do so. In an attempt

to secure greater operational flexibility during collaboration, investors and fund managers of investment institutions often withhold pertinent information, such as the details of invested projects and the amount raised by innovative biomedical and novel drug funds, etc. Consequently, financing enterprises are deprived of comprehensive information about investment institutions. This imbalance of information seriously infringes upon the rights and interests of financing enterprises, hindering the oversight and management of both the state and the industry.

Early stage of corporate financing

In 2021, the investment of Chinese venture capital institutions remains primarily focused on the initial and growth stages, accounting for 32.54% and 37.74% of the total number of investment projects, respectively, as illustrated in

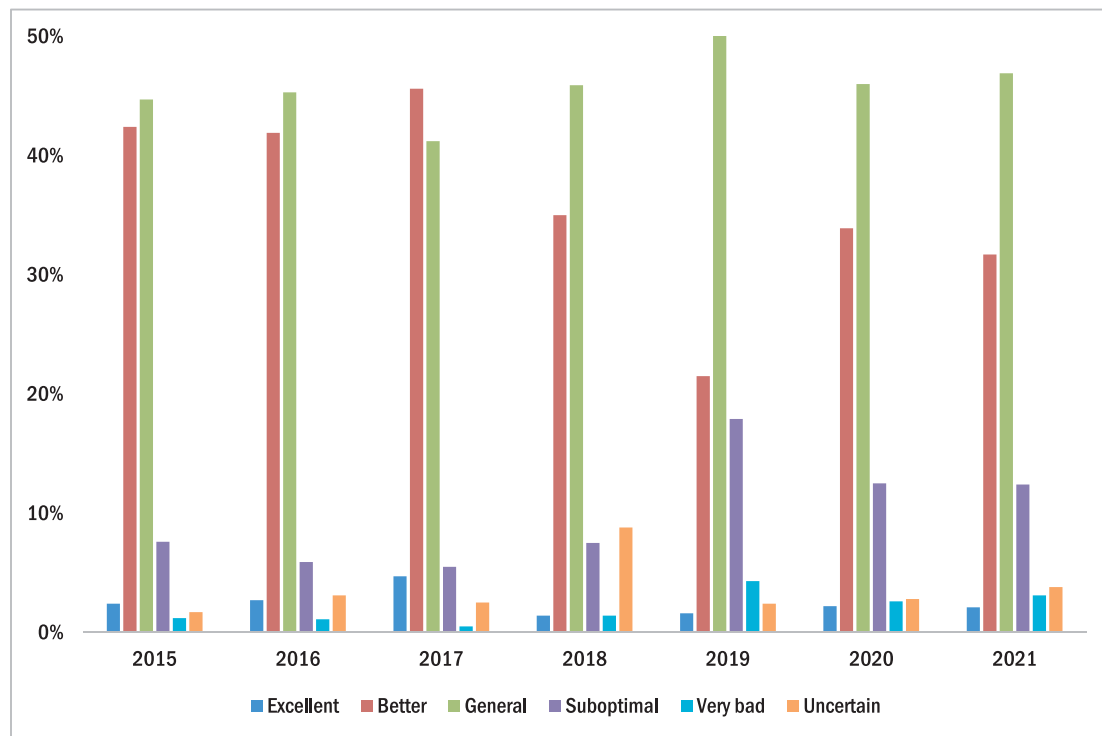
Equity Financing Potential for Leading R&D of Small
and Medium-Sized Biomedical Corporations

Figure 8. An overview of the investment industry assessment by Chinese venture capital institutions (2015–2021)

Рисунок 8. Обзор инвестиционной оценки индустрии китайскими венчурными учреждениями (2015–2021)

Source: Data are derived from the investigation report of China Academy of Science and Technology Development Strategy

Figure № 9. A significant increase in the proportion of projects invested in the seed and initial stages was also observed in 2021 compared to 2020, rising from 18.42% and 31.93% to 23.63% and 32.54%, respectively. The seed stage experienced a notable increase of 5.21 percentage points. Early-stage financing for small and medium-sized innovative biomedical enterprises may not be advantageous for securing support from innovative drug venture capital funds. Instead, venture capital institutions tend to identify and invest in innovative drug R&D projects during the late stage of clinical trials or those that are soon to be listed for IPO.

As depicted in Figure № 4, although venture capital institutions allocated **6.62** points to the “financing stage” of small and medium-sized innovative biomedical enterprises, small and medium-sized innovative biomedical enterprises assigned **7.34** points in the questionnaire survey.

The data indicate that there are discrepancies in the emphasis placed by investment institutions and financing enterprises on the “financing stage.” However, small and medium-sized innovative biomedical enterprises generally believe that it is particularly crucial to select the optimal stage or time node for equity financing.

The primary motivations are as follows: venture capital institutions and investors with fund management responsibilities and pressures uniformly express their aspirations to recover their investments within a six-year period. Assuming the innovative drug financing entity party exits the stock market of the innovation board through the innovative drug financing enterprise, the timeline of the project party is reversed; it takes approximately three years for the financing enterprise to become eligible for listing/IPO after receiving listing guidance and fulfilling listing conditions, and an additional two years to

Equity Financing Potential for Leading R&D of Small and Medium-Sized Biomedical Corporations

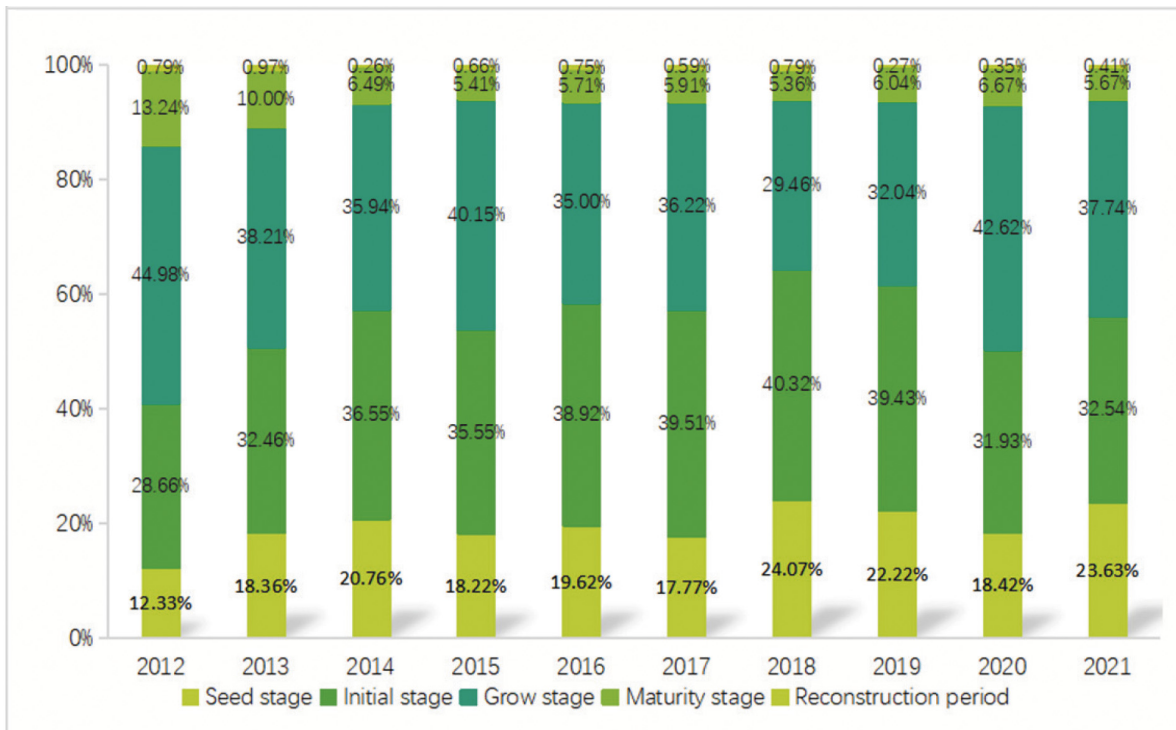


Figure 9. Venture capital distribution across project stages in China (2012–2021)

Рисунок 9. Распределение венчурного капитала по этапам проектов в Китае (2012–2021)

Source: Data are derived from the investigation report of China Academy of Science and Technology Development Strategy

secure approval for the innovative drug and its production. Consequently, to meet the six-year investment recovery deadline, venture capital institutions can only consider innovative drug projects that can complete clinical trials within a two-year timeframe.

COUNTERMEASURES AND SUGGESTIONS ARE PROPOSED CONSIDERING THE EQUITY FINANCING CAPABILITIES OF FINANCING ENTERPRISES

The alteration of the policy environment emerged as the overriding factor influencing the subpar investment performance of venture capital institutions in 2021, accounting for a significant 20.7%. This was followed by market competition, which saw its impact share escalate from 19.1% in 2020 to 20.2% in 2021, as depicted in *Figure № 10* and *Figure № 11*. Clearly, financing enterprises are also susceptible to the aforementioned factors; thus, the financing

capacity of small and medium-sized innovative biomedical enterprises largely dictates the crux of their development.

Emphasize the importance of financing business planning

Small and medium-sized innovative biomedical enterprises are overly reliant on venture capital funds for initial financing. Consequently, the number and strength of these enterprises are uneven, resulting in a substantial number of “hungry” project resources within the segmented industry. In practice, venture capital institutions pay greater attention to the information provided by the business plan of an enterprise during the screening process for projects. This leads to the implementation of a two-stage process, including “audition projects” and “selected projects”.

For financing enterprises, the business plan serves as a crucial instrument to attract investment from venture capital institutions during the

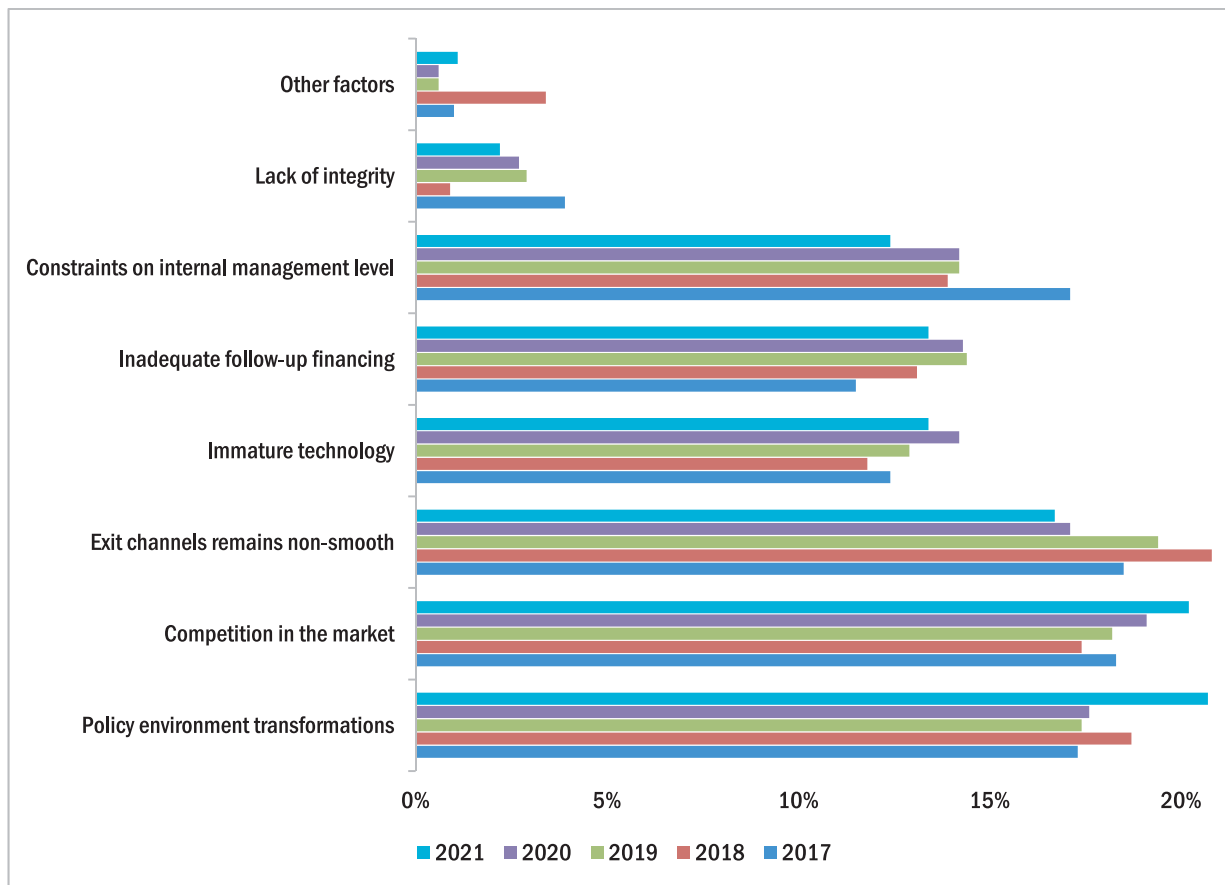
Equity Financing Potential for Leading R&D of Small
and Medium-Sized Biomedical Corporations

Figure 10. The principal causes of the inadequate investment outcomes of venture capital institutions in China (2017–2021)

Рисунок 10. Основные причины неадекватных инвестиционных результатов организаций венчурного финансирования в Китае (2017–2021)

Source: Data are derived from the report of China venture capital survey group (2022) of the Institute of Science and Technology Governance and Talent Research, China Academy of Science and Technology Development Strategy

initial stage of development. The contents of the business plan emphasize the operability of the implementation plan for the innovative drug project, the empirical demonstration of the commercial value of the innovative drug project, and the action plan and execution strategy for the future objectives of the biomedical R&D enterprises. Furthermore, it serves as a vital guiding document for small and medium-sized innovative biomedical drug R&D enterprises to secure subsequent investment and persuade potential investors to inject additional funds into the innovative drug project.

(1) It is proposed that small and medium-sized innovative biomedical enterprises should

prioritize the development of comprehensive and meticulous business plans. These plans serve as crucial reference materials for capital investment decisions. Companies seeking financing should produce rigorous and thorough business plans, an exercise that not only reflects the caliber of their management team but also demonstrates the authenticity of their financing intentions.

(2) It is suggested that financing enterprises should pay attention to the perspective of investors when making business plans, otherwise they are likely to fall into some misunderstandings. To avoid the misappropriation of funds, lack of clarity in financial utilization and overzealous pursuit of financing quantities, it is crucial

Equity Financing Potential for Leading R&D of Small and Medium-Sized Biomedical Corporations

to eschew the pitfalls of hollow rhetoric, blind confidence and underestimation.

Emphasize the significance of project financing roadshows

In addition to presenting the business plan, the financing enterprise can also persistently communicate the emotional display of the biomedical R&D enterprise to the funding agency in a tranquil environment. Given the highly specialized nature of innovative drug R&D, some investors may harbor doubts or lack comprehension of the project due to a lack of background in this field. Consequently, through perceptive explanation and interaction with the investment institution’s personnel during the financing roadshows, both parties can establish a rapid connection, enabling the investment institution to gain a true understanding of the innovative drug project within a short period. This minimizes unnecessary detours in the equity financing process of the biomedical enterprises and facilitates more accurate judgments.

It is proposed that small and medium-sized innovative biomedical companies should opt for more specialized financing roadshows and presentation platforms. These events should clearly articulate the business model (or “profit model”), innovative pharmaceutical products, and the developmental stage of their innovative projects. Furthermore, it is essential to showcase the investment value and realization approaches or channels of innovative pharmaceutical projects, thereby attracting the attention of investment institutions and facilitating investment and financing collaborations.

Various approaches or channels of equity financing

The unidirectional financing approach employed by enterprises has proven challenging in addressing financing activities characterized by asymmetric information. To safeguard their rights and interests, it is proposed that small and medium-sized innovative biomedical enterprises engage and leverage the expertise of

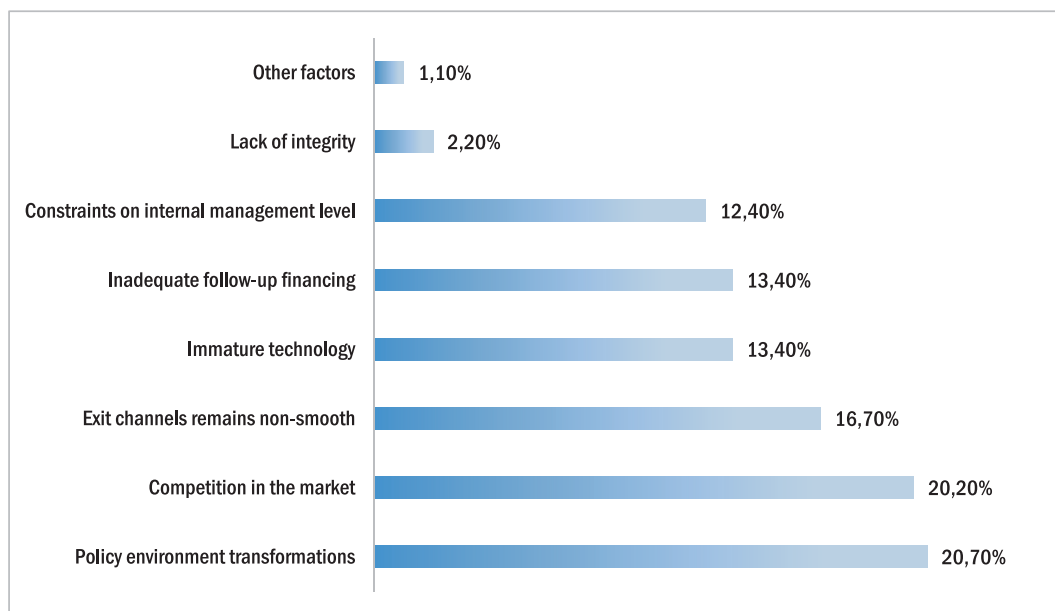


Figure 11. The principal causes of the inadequate investment outcomes of venture capital institutions in China (2021)

Рисунок 11. Основные причины неадекватных инвестиционных результатов организаций венчурного финансирования в Китае (2021 г.)

Source: Data are derived from the report of China venture capital survey group (2022) of the Institute of Science and Technology Governance and Talent Research, China Academy of Science and Technology Development Strategy

Equity Financing Potential for Leading R&D of Small
and Medium-Sized Biomedical Corporations

professionals for professional operations. In terms of professional selection, financing enterprises are advised to procure comprehensive financing service providers via recommendations from trusted sources, or to consult financial auditors and practicing attorneys for professional mediation services. As illustrated in *Figure № 12*, a multitude of avenues are available for Chinese venture capital institutions to acquire project information in 2021, which can serve as a vital reference for academic purposes.

In the event that a confidentiality agreement is signed or other suitable project confidentiality measures are taken, the financing intermediary consultant should, to the greatest extent possible, provide relevant professionals with a comprehensive overview of the project or enterprise's fundamental information, the selection criteria for the capital party, and the fundamental financing terms. The consultant is responsible for identifying the investment institution with the intention to invest, composing the initial investment-related documents or long-term financial

statements and preparing various equity financing materials. This not only demonstrates professionalism in investment and financing but also effectively mitigates the risks associated with inappropriate operations.

Objectively and rationally selecting the optimal entry point for equity financing stage

The venture capital institutions' focus is primarily on project stages, which are categorised as "seed stage, growth stage, and maturity stage". These precisely align with the biomedical enterprises' innovative biomedical drug project R&D phases and milestones.

As depicted in *Figure № 13*, the allocation of global venture capital funds in 2016 skewed towards later-stage investments, with seed and early-stage funds accounting for a relatively modest share. In contrast, the investment funds allocated by Chinese venture capital institutions in 2021 demonstrate an increasing trend in seed and initial-stage funding, climbing from 9.09% and 23.85% in 2020 to 13.22% and 27.99%

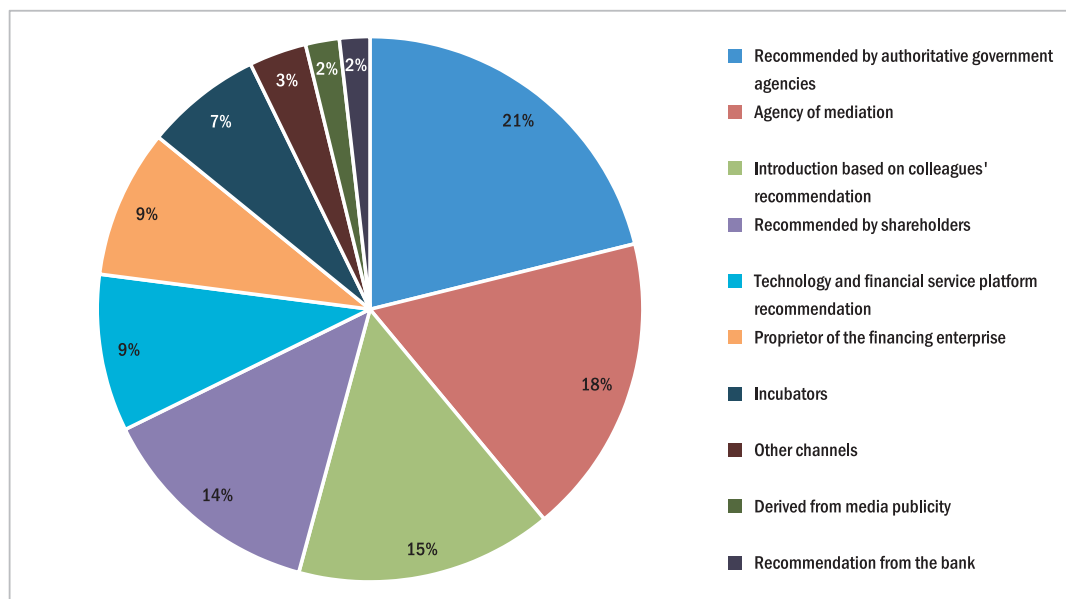


Figure 12. Investigation into the information sources and channels utilized by Chinese venture capital institutions for financing enterprises (2021)

Рисунок 12. Исследование источников информации и каналов, используемых китайскими венчурными учреждениями для финансирования предприятий (2021)

Source: Data are quoted from the 2021 survey results of the national science and technology special statistics of the Ministry of Science and Technology of China on the operation and management of Chinese venture capital (the number of valid samples is 2422)

Equity Financing Potential for Leading R&D of Small and Medium-Sized Biomedical Corporations

respectively. Specifically, the proportion of seed-stage investment funds surged by 4.13 percentage points, as illustrated in *Figure № 14*.

For small and medium-sized innovative biomedical enterprises, which are typically at the seed stage, it is crucial for financing entities to objectively and rationally select the appropriate equity financing stage. It is suggested that financing entities initiate project equity financing at the “seed stage” building upon the early-stage accomplishments of small to medium-sized innovative biomedical enterprises. By introducing biomedical venture funds and accelerating the commercialization of high-quality innovative biomedical drug projects, the treatment of patients can be significantly improved.

CONCLUSION

Although the research sample size in this paper is limited, it partially reflects the challenges encountered during the process of equity financing for small and medium-sized innovative biomedical enterprises. Given its status as the world’s second largest unilateral drug consumption market, the biomedical industry is poised to capitalize on significant development opportunities (Ge,

2012). The biomedical industry is a technology-driven and knowledge-intensive sector. Enhancing the development of talent teams remains pivotal for our nation’s pursuit of medical excellence and power. Through international collaboration, biomedical or pharmaceutical enterprises should be guided to actively engage in global competition, assimilate cutting-edge technology and management expertise from overseas sources, and continuously enhance the capacity and proficiency of domestic enterprises in new drug R&D. Venture capital investments will play a crucial role in supporting innovative drug R&D within the biomedical industry or pharmaceutical industry, enabling enterprises to create more efficient novel therapeutics. This, in turn, will facilitate the rapid growth of innovative biomedical drugs in China and further propel the advancement of the entire pharmaceutical sector. Venture capital can effectively address the financing bottleneck faced by small and medium-sized innovative biomedical enterprises, thereby serving as the optimal financing channel. As one of small and medium-sized innovative biomedical enterprises, understanding the intricacies of project technical and economic evaluation, intellectual property

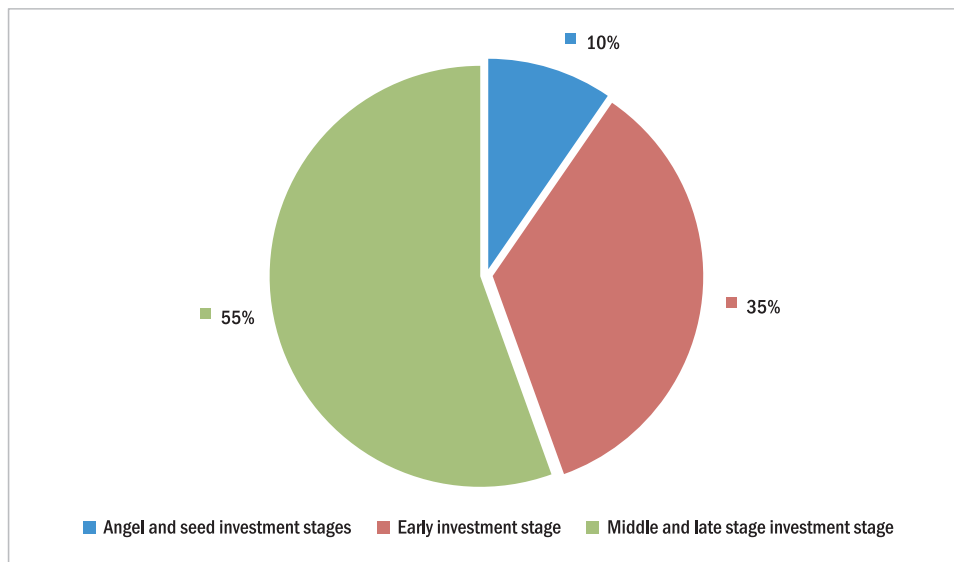


Figure 13. Investment stage distribution of venture capital funds in 2016 (Based on fund proportions)

Рисунок 13. Распределение венчурного финансирования по инвестиционным этапам в 2016 году (на основе пропорций финансирования)

Source: Data cited from NVCA 2017 yearbook, data provided by PitchBook

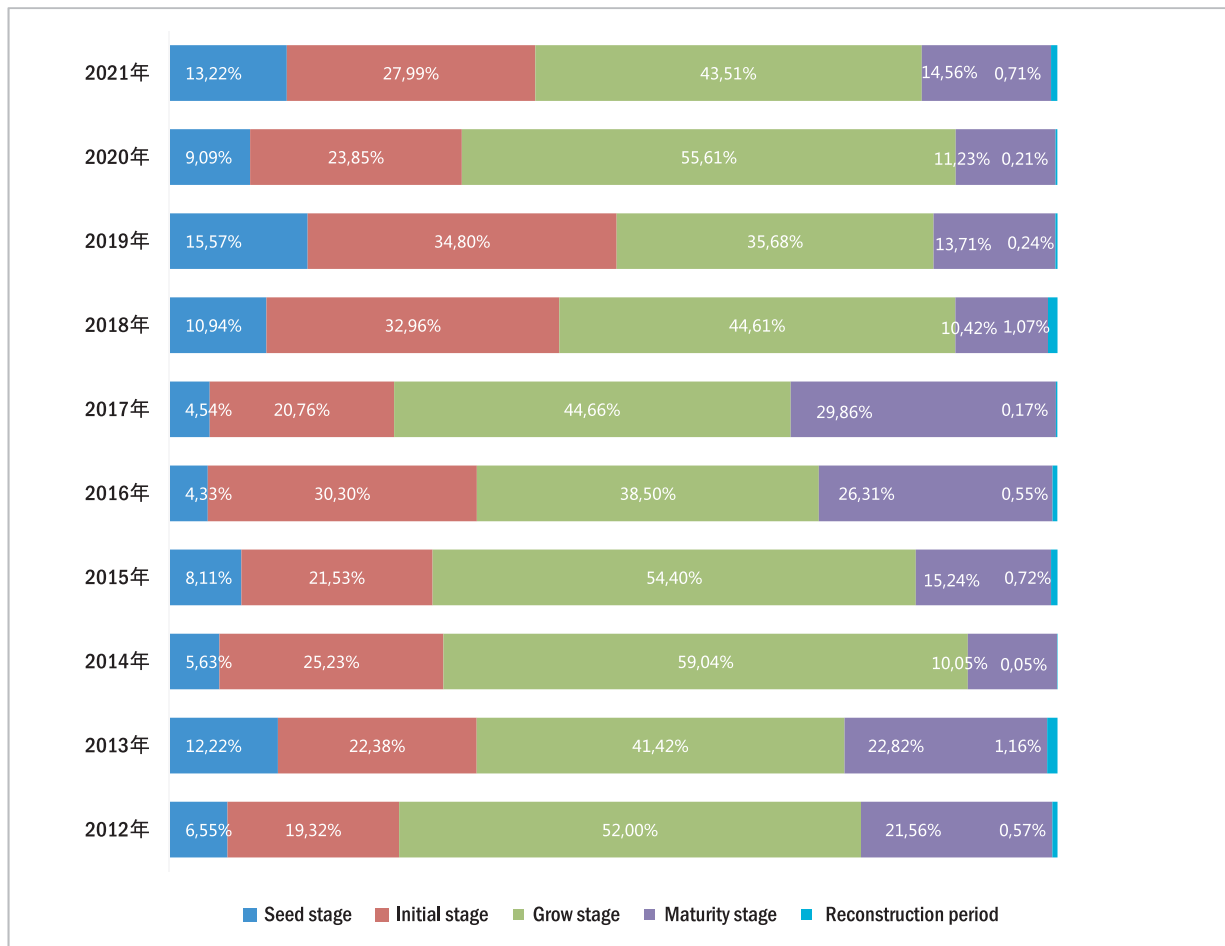
Equity Financing Potential for Leading R&D of Small
and Medium-Sized Biomedical Corporations

Figure 14. Venture capital distribution in China by project stage (based on invested funds) from 2012 to 2021
Рисунок 14. Распределение венчурного капитала в Китае по проектным этапам (на основе инвестированных средств) с 2012 по 2021 год

Source: Data are quoted from the 2021 survey results of the national science and technology special statistics of the Ministry of Science and Technology of China on the operation and management of Chinese venture capital (the number of valid samples is 3402)

protection, interest allocation, post-investment management and valuation in the financing process represents a persistent research topic for the pharmaceutical science and technology industry, financial sector, pharmaceutical industry and government departments (Jin, 2007). To enhance

the influence and competitiveness of China in the field of new drugs, it is imperative to support small and medium-sized innovative biomedical enterprises in their pursuit of developing cost-effective, high-quality products with both clinical and commercial value.

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