

Research on the Role Mechanism and Optimisation Strategies of Science and Technology Intermediaries in Enabling the High Quality Development of New Productive Force

Bowen Xu*

School of Management, Wuhan University of Technology, Wuhan, China

*Corresponding author: bowen090228@163.com

Abstract

Science and technology intermediary institutions, as a bridge connecting science and technology innovation and industrial application, play an important role in promoting the development of new productive force. Based on the theoretical framework of S&T intermediary service model innovation and effectiveness enhancement, we analyse the operation mode and practical effectiveness of Internet+ agency K and state-owned enterprise agency Z. The results show that S&T intermediaries can effectively promote the breeding and expansion of new productivity by building an open and collaborative innovation ecosystem, implementing service model innovation, promoting close synergy between policy and market, deepening international cooperation. Science and technology intermediaries need to continue to explore service innovation and strengthen cross-border cooperation to contribute to the high-quality development of new productive force.

Keywords

Science and technology intermediary institutions; new productive force; role mechanism; strategy suggestion.

1. Introduction

Science and technology intermediaries, as a bridge connecting science and technology innovation resources and market demand, play multiple roles in promoting technology transfer, results transformation, information services and innovation support, and are an indispensable part of a modern innovation system. These institutions cover a wide range of forms such as technology trading markets, intellectual property service agencies, business incubators, science and technology consulting companies, etc. Through professional services, they effectively reduce information asymmetry in the process of science and technology innovation, accelerate the flow of knowledge and diffusion of technology, and provide an important platform for the transformation of scientific research results into real productivity[1]. The service has provided an important platform for the transformation of scientific research results into real productivity.

Science and technology intermediaries play a particularly crucial bridging role in the interaction between universities and enterprises. They effectively promote the transformation of basic research results into applied technologies, enhance the match between university research and enterprise needs by organising technology exchange meetings and project matching activities, shorten the innovation cycle and improve the efficiency of research and development. In addition, science and technology intermediaries also provide professional technology assessment, legal consultation and financing consultancy services for enterprises, which effectively reduces the risks and costs of enterprise innovation, strengthens the

independent innovation capability of enterprises, and promotes the formation of a new pattern of in-depth integration of industry, academia and research.

The strategic significance of science and technology intermediaries has become even more prominent in the context of the high-quality development of new productive force. Science and technology intermediaries can not only directly promote technological innovation and industrial upgrading by optimising resource allocation, accelerating knowledge dissemination and promoting cross-border cooperation, but also indirectly stimulate the innovation vitality of the whole society by building an open and synergistic innovation ecosystem, thus providing fertile soil for the cultivation and development of new productive force. In this process, science and technology intermediaries promote the commercial application of scientific and technological achievements by accurately connecting the innovation chain with the industrial chain, accelerating the breeding of new industries, new industries and new modes, and contributing to the optimisation and upgrading of the economic structure and high-quality development[2].

2. Mechanisms of Science and Technology Intermediaries to Empower New Productive Force

2.1. Information transfer and knowledge diffusion

At the initial stage of promoting the development of new productivity, the primary and fundamental function of science and technology intermediaries is to build an efficient information transfer and knowledge diffusion mechanism, which is the cornerstone of knowledge flow and technological progress in the innovation ecosystem. Through the use of advanced information processing technology and professional analysis methods, the intermediary organisation carries out fine screening and scientific evaluation of complicated scientific research results, which not only ensures the accuracy, timeliness and relevance of the information, but also effectively alleviates the information asymmetry that exists in science and technology innovation activities through in-depth excavation of the market demand and precise matching of the two sides of the supply and demand. This process integrates advanced technologies such as big data analysis and artificial intelligence, realising the intelligent docking between scientific research resources and market demand, and laying a solid foundation for subsequent innovation activities[3].

On this basis, the promotion of knowledge transfer and technological innovation has become the core driving force for science and technology intermediaries to catalyse the development of new productive force. Intermediaries build a bridge from theory to practice and from the laboratory to the market through well-planned seminars, targeted technical training courses, and collaborative R&D projects involving multiple parties. These activities not only accelerate the spillover effect of advanced knowledge and key technologies, but also promote cross-fertilisation and co-innovation among different knowledge systems, providing rich and diversified knowledge nutrients and a steady stream of innovative inspiration for the nurturing of new productive force. Especially in the field of emerging technologies, such as artificial intelligence, biotechnology, new materials, etc., the services provided by science and technology intermediaries have paved the way for the rapid commercialisation and social application of cutting-edge science and technology, and directly contributed to the optimisation and upgrading of the structure of new productivity[4]. The services of science and technology intermediary organisations have paved the way for the rapid commercialisation and social application of cutting-edge technologies, directly promoting the optimisation and upgrading of new productivity structures.

2.2. Integration and optimisation of resources

In the process of promoting the development of new productive force, the resource integration and allocation optimisation mechanism of science and technology intermediaries is another important fulcrum, which provides a solid guarantee for the smooth promotion of scientific and technological innovation activities and the cultivation of new productive force by strengthening the effective integration of two key elements, namely, financial capital and human resources. At the level of matching and allocation of financial capital, intermediaries make full use of their market sensitivity and network advantages to build a diversified and multi-level financing ecosystem. This not only includes traditional channels such as traditional bank loans, venture capital and angel investment, but also actively explores emerging financing methods such as crowdfunding, science and technology credit, and innovation funds, which broaden the access to funds for science and technology innovation projects[5].

In terms of the mechanism of talent flow and capacity building, science and technology intermediaries play the role of "catalysts" for talent strategy, and through systematic headhunting services, customized career development training programmes, and extensive international academic and industrial exchange platforms, they have strongly promoted the interaction of talents and knowledge-sharing between scientific research fields and the industrial sector.

2.3. Market cultivation and environment creation

By carefully planning various cooperation platforms and innovation networks, such as innovation incubators, accelerators, industry alliances, etc., intermediaries build bridges of close cooperation for participants in different fields - including research institutions, enterprises, governments and NGOs, etc., and promote the barrier-free circulation and optimal allocation of knowledge, technology, capital, information and other factors of innovation. This environment of cross-border collaboration has not only accelerated the development of innovation, but has also facilitated the development of the innovation industry. This cross-border collaborative environment not only accelerates the collision of creativity and the fusion of technology, but also promotes the efficient reorganisation and utilisation of innovation resources, paving the way for the incubation and expansion of new productive force[6].

At the same time, science and technology intermediaries also actively fulfil their roles as policy transmitters and market rule shapers. They closely follow the government's policy guidance and industry development, convey the policy intent to innovation subjects in a timely and accurate manner, and collect feedback from the industry so as to provide empirical evidence for the continuous optimisation of the policy and its precise implementation. By participating in the formulation of industry standards and the improvement of intellectual property protection mechanisms, intermediaries help build a transparent, fair and stable market order, reduce the uncertainty and potential risks of innovative activities, and create a predictable external environment conducive to long-term planning for the development of new productive force[7].

2.4. Risk management and sustainable development

Through the introduction of advanced risk assessment models and methodologies, the intermediary conducts a comprehensive and in-depth review of technology innovation projects, identifies the technological, market and financial risks that may be encountered at each stage from technology R&D, productisation to marketisation, and provides tailor-made risk control strategies and consulting services. This forward-looking risk management system not only helps enterprises and R&D organisations avoid potential pitfalls and reduce resource wastage, but also improves the overall success rate of innovation activities and ensures the return and sustainability of innovation investments[8].

In promoting sustainable innovation, intermediaries are committed to building a set of multi-dimensional incentive mechanisms, aiming to fully activate the intrinsic motivation and innovation potential of innovation subjects through positive guidance and reward mechanisms. This includes, but is not limited to, assisting innovation subjects to realise the commercialisation value of their intellectual property rights through patent operation services and transforming them into actual income; setting up a mechanism for rewarding scientific and technological achievements, giving material and spiritual recognition to innovation achievements and enhancing the innovators' sense of honour and achievement; and promoting the establishment of a social recognition system to enhance the social visibility and influence of the innovation subjects through media publicity, industry conferences and awards, etc. and attract more resources and influence. The establishment of a social recognition system, through media publicity, industry conferences, awards and other means, will enhance the social visibility and influence of innovation subjects and attract more resources and cooperation opportunities[9].

3. Empirical Analysis of Science and Technology Intermediaries Empowering New Productive Force

3.1. Internet + science and technology intermediaries: Agency K

As a leader in the field of science and technology intermediary services, Agency K's operation model and practice results vividly illustrate how science and technology intermediaries can effectively empower new productivity and provide valuable practical experience for exploring facilitation strategies. In conjunction with the mechanism of S&T intermediaries' enabling new productivity, the practice of Agency K demonstrates the practical application and effectiveness of the mechanisms of information transfer and knowledge diffusion, resource integration and allocation optimisation, market cultivation and environment creation, as well as risk management and sustainable development.

Institution K has constructed an efficient information screening and matching system, using advanced information technology means, such as big data analysis and artificial intelligence algorithms, to effectively solve the problem of information asymmetry between scientific research results and market demand. This process not only accelerates the identification and promotion of high-quality scientific research results, but also realises the seamless matching of technology supply and demand based on accurate insights into market demand, providing a rich source of knowledge and technology for the breeding of new productive force. This practice is closely linked to the mechanism of information transfer and knowledge diffusion, demonstrating how science and technology intermediaries can optimise the allocation of innovation resources and promote the effective diffusion of knowledge through technological means.

In terms of resource integration and allocation optimisation, Institution K has effectively promoted the optimal allocation of financial capital and human resources through the construction of a diversified service matrix, such as a platform for the transformation of achievements and the introduction of high-end talents. It not only helps innovation projects obtain the necessary financial support, but also promotes the reasonable flow of talents and capacity building, and builds a stable supply chain of talents, which provides a solid guarantee for the continuous growth of new productive force. Through its platform function and service innovation, Institution K directly echoes the core path of resource integration and allocation optimisation, and demonstrates the positive role of science and technology intermediaries in promoting the efficient use of resources.

The mechanism of market cultivation and environment creation has also been fully reflected in the practice of institution K. Through the establishment of an innovation ecosystem, Institution

K promotes cross-border cooperation and resource sharing, accelerates the flow and optimal combination of innovation factors, and creates a favourable environment for the healthy growth of new productivity. At the same time, as a bridge between policy and market, Institution K actively participates in the improvement of policy recommendations and market rules, providing stable external conditions for innovation activities, further proving its key role in creating a favourable innovation environment.

3.2. Science and technology intermediaries of a State-owned enterprise nature: Institution Z

As a science and technology intermediary service platform in the state-owned context, the operation mode and practice strategy of Z Agency show unique value and demonstrative significance in the process of empowering the new quality of productivity, which is closely related to the mechanism of the role of science and technology intermediary institutions, and at the same time provides an empirical basis for the development of strategic recommendations. Based on the joint support of the Ministry of Science and Technology and the local government, Z Agency has made full use of the scientific and educational resources and innovation and entrepreneurship ecology of the central region to build a comprehensive service platform integrating technology transfer, intellectual property operation and transformation of achievements. The core of the platform lies in the strategy of "layout first, operation later", taking intellectual property rights as the axis to drive the convergence and transformation of innovation resources, which embodies the innovative practice of scientific and technological intermediaries in the mechanism of information transfer and knowledge diffusion. By establishing a physical space for displaying and trading scientific and technological achievements, Z Institution not only shortens the distance from knowledge creation to market application, but also promotes the transparency and efficient circulation of technological information, accelerates the process of capitalisation of knowledge, and provides direct kinetic energy for the formation and expansion of new productivity.

Institution Z's "IPR+" operation model is a deepening application of the mechanism of resource integration and allocation optimisation. By embedding intellectual property services into every aspect of scientific and technological innovation, Institution Z not only strengthens the protection of scientific and technological achievements, but also promotes the commercial development and value realisation of intellectual property rights, and creates a complete chain from intellectual property rights to industrialisation for the cultivation of new productive force. The innovation of this model is that it not only optimises the allocation of a single resource, but also promotes the systematic value-adding of intellectual property rights, and builds a diversified service ecosystem that includes scientific and technological innovation, results transformation, industrial incubation, etc., and provides three-dimensional support for the development of new productive force.

In terms of the mechanism of market cultivation and environment creation, the Z Institution has effectively expanded the scope and efficiency of technology transfer and created an open and inclusive innovation ecosystem by building an extensive domestic and international cooperation network, including in-depth collaboration with universities, cities and service organisations. This cross-regional and cross-field cooperation model not only promotes the precise docking between technology and market, but also accelerates the flow and optimal allocation of innovation resources, creating a favourable external environment for the sustained development of new productive force. At the same time, through active participation in international scientific and technological cooperation and exchanges, Z Institutions have enhanced the international competitiveness of their services, paving the way for the global expansion of new productive force.

4. Strategic Recommendations to Promote The Development of Science and Technology Intermediaries to Serve The New Productive Force

4.1. Building an open and collaborative innovation ecosystem

Building an open and collaborative innovation ecosystem, as a cornerstone for science and technology intermediaries to empower new productive force, requires that they commit themselves to designing and implementing a highly integrated interdisciplinary and cross-border cooperation framework. Such a framework should promote the deep connection of multi-dimensional stakeholders, such as universities, research institutions, industries and governments, to facilitate the free flow of resources, knowledge and information as well as collaborative innovation, and to build a multi-dimensional and interactive innovation network[10]. The network will be constructed through the use of advanced information management and communication. Through the use of advanced information management and exchange platforms, intermediaries can significantly improve the efficiency and quality of technology and knowledge flows, providing a fertile ground for the nurturing of new productive forces that are rich in innovation, containing diverse ideas, technologies and solutions, and facilitating the cross-fertilisation and upgrading of innovation.

In this process, intermediaries should play the role of catalyst for the evolution of the ecosystem and promote the transformation of the innovation ecosystem from simple connection at the primary stage to deep integration and self-adaptation at the advanced stage. This means continuously optimising the network structure so that information, resources and innovation elements can circulate smoothly within the system, forming a self-reinforcing positive feedback mechanism, which can quickly respond to technological iterations and market changes and ensure the vitality and resilience of the innovation ecosystem. To this end, intermediaries should continue to explore and adopt emerging technologies, such as artificial intelligence and blockchain, to enhance the transparency, credibility and operational efficiency of the platform, so as to make the innovation ecosystem more flexible and adapt to rapid technological updates and dynamic adjustments in market demand. and thus maintain a leading position in the fiercely competitive global environment, providing a lasting impetus for the continued development of new productive force.

4.2. Innovation in service models

As a key lever to enhance the effectiveness of science and technology intermediaries, the innovation of service model needs to follow the pulse of scientific and technological evolution, and deeply integrate cloud computing, big data, artificial intelligence and other cutting-edge technologies, so as to build an intelligent service structure, aiming at realising the accurate matching and optimal allocation of innovation resources. This not only requires science and technology intermediaries to keep up with the technological frontier, but also to take the initiative to lead the intelligent transformation of the service mode, reshape the service form by using the concept of "Internet+", enhance the convenience and personalised customisation of the service, and ensure that it can flexibly satisfy the unique needs of various types of innovation subjects, so as to promote the double enhancement of the service experience and efficiency. The service experience and efficiency will be improved.

On this basis, the exploration of a composite service model is particularly important. This includes, but is not limited to, the in-depth integration of intellectual property services and results transformation, and the synergistic innovation of technology transfer and financial services, aiming to build a whole chain integrated service ecology covering from intellectual property protection to technology marketisation and financial support. This mode of innovation not only simplifies the path of innovation transformation and reduces the friction of intermediate links, but also enhances the systematic and continuous nature of innovation

activities through one-stop services, and provides full-cycle and all-round support for the breeding and development of new productive force. The service chain has also enhanced the system and continuity of innovation activities through one-stop services, providing full-cycle and all-round support for the breeding and development of new productive force.

4.3. Promoting close synergies between policies and markets

Promoting effective synergy between policy and market, as a solid cornerstone to ensure that science and technology intermediaries empower the development of new productive force, requires intermediaries to proactively embed themselves in the interactive process of policy formulation and optimisation of market rules. Intermediaries should become a living link between policy and practice, actively participate in policy dialogues and agenda setting, and accurately feedback the practical demands and challenges of industry and innovation to the policy level to ensure the scientific, forward-looking and adaptive nature of policy making. This ensures scientific, forward-looking and adaptive policy formulation. Through this two-way communication mechanism, we can not only respond to market changes in a timely manner, but also provide evidence-based basis for the dynamic adjustment of policies and create a more favourable policy environment for innovation activities.

At the same time, intermediaries should be committed to optimising the rules of market operation, reducing transaction costs and information asymmetry and enhancing the certainty of the innovation process by promoting fair and transparent market principles. This includes advocating the strengthening of intellectual property protection, the regulation of market competition, and the promotion of sound innovation cooperation mechanisms, with the aim of building a stable and predictable innovation ecosystem. In such an environment, innovators can reduce their worries about external risks and focus on technological breakthroughs and value creation, thus laying solid external conditions for the cultivation of new productive force. Through this benign interaction between policy and market, the intermediary not only promotes the precise implementation of policy, but also ensures the fairness and efficiency of the market, providing a strong guarantee framework for the sustainable development of new productivity.

5. Conclusion

Through an in-depth exploration of the role and mechanism of S&T intermediaries in the process of empowering new productive force, combined with empirical analyses of three types of representative S&T intermediaries in the market, this study reveals the unique value of S&T intermediaries in the promotion of information transfer and knowledge diffusion, resource integration, market environment creation, risk management and sustainable development, and so on. Based on this, the study proposes a series of strategic recommendations to deepen the construction of innovation ecosystem, service model innovation, policy and market synergy.

As a key node of the innovation ecosystem, science and technology intermediaries, through their unique service model and mechanism innovation, not only promote the effective flow of knowledge and technology, but also accelerate the optimal allocation of resources, providing rich soil for the breeding of new productivity. In the future, science and technology intermediaries need to continue to deepen digital transformation, strengthen cross-border cooperation, promote innovation and integration of service models, and at the same time, focus on the practical training of talents and cultural shaping, in order to adapt to the fast-changing science and technology trends and market demand.

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