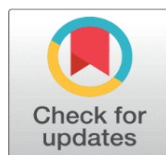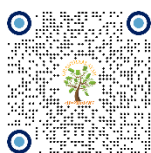# NURTURING DOMESTIC OPEN-SOURCE TALENTS TO EMPOWER NEW-QUALITY PRODUCTIVITY: CONNOTATIVE CHARACTERISTICS AND DIRECTION OF PROMOTION

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ABSTRACT

The domestic open source industry is showing a vigorous development trend, with many industrial-level open source projects springing up, injecting new vitality into China's independent innovation and industrial development. However, in the face of global competition, we must face up to the challenges we are currently facing. China's open source community is still in a disadvantageous position on the international stage. There is a significant gap between the performance of enterprises in the open source field and that of foreign countries, and there is also a serious shortage of open source talent reserves in domestic universities. In view of this, this article deeply analyzes the shortcomings in the development of open source industry talents, focuses on how to inject strong impetus into new productivity, and deeply explores the connotation characteristics and promotion path of open source talent cultivation, emphasizing the key role of open source talents in the formation of new productivity. Based on these analyses, this article proposes a series of countermeasures and suggestions, including supporting the development of open source communities, strengthening the construction of open source talent teams in enterprises, strengthening the cultivation and echelon construction of open source talents in universities, integrating talent elements and scientific and educational resources, and exerting the siphon effect of talents, aiming to help China achieve a leading position in the open source industry and promote the sustainable development of new productivity.

Keywords: New Quality Productivity, Open Source Industry, Open Source Talent Cultivation, Open Source Community, Domestic Open Source

1. INTRODUCTION

Promoting domestic open source is conducive to accelerating the formation of new productive forces

New quality productivity is the concrete manifestation of the modernization of productivity, and it is an advanced quality state of productivity in which innovation plays a leading role. It breaks away from traditional economic growth methods and productivity development paths, and is characterized by high technology, high

efficiency, and high quality, in line with the new development concept. The new quality productivity emphasizes the core role of technological innovation in promoting economic and social development, and is a Chinese innovation and practice of Marxist productivity theory. The improvement and development of such productivity often requires advanced technology and innovative models, of which open source industry is an important component. The open source industry is an emerging industry based on open source code and open innovation concepts, which covers open source hardware, open source technology, open source software, open source culture and other aspects. The essence of open source is openness, sharing, and collaboration, which enables continuous innovation through the joint participation and collaboration of large-scale collective wisdom. The development of open source industry not only promotes the deep innovation of information technology, but also provides important technical support and innovation impetus for the improvement of new productivity.

Open source technology and open source software in the open source industry can provide advanced and efficient tools and platforms for the development of new productivity. For example, open source software can help enterprises quickly build and deploy applications, reduce development costs, and improve production efficiency; Open source technology can promote the deep transformation and upgrading of the industry, and improve the technical level and quality of the industry. At the same time, the open innovation concept and collaborative model in the open source industry also help to stimulate the innovative vitality of new productivity and promote the sustainable and healthy development of the economy and society.

Secondly, domestic open-source talents are an important driving force for new productivity

Open source talents are those who participate in open source projects, contribute to open source technologies, or have professional skills and enthusiasm related to open source. These talents play an important role in the open source community, contributing to the continuous development and innovation of open source projects through coding, testing, documentation, project management, community maintenance, and other methods. By cultivating domestic open source talents, we can effectively promote the development of new productivity and provide strong support for China's technological innovation and industrial upgrading.

Domestic open source talents are an important driving force for new productivity. New productivity is dominated by technological innovation, achieving key disruptive technological breakthroughs. As an important area of technological innovation, open source industry has a direct impact on the development of new productivity through its talent pool and innovation capabilities. Therefore, cultivating domestic talents with open source skills and innovative spirit is of great significance for promoting the development of new productivity. The connotative characteristics of domestic open source talent cultivation and empowerment of new productivity mainly include cross-border integration, continuous innovation, practicality, and applicability.

First, domestic open source talents have the characteristics of cross-border integration. The development of new productivity requires interdisciplinary and cross-domain cooperation and exchanges, while open source culture emphasizes openness, sharing, and collaboration, which helps to break down disciplinary barriers and promote integration and innovation between different fields. The open source community is characterized by its cross-regional, interdisciplinary, and

cross-industry nature. Therefore, domestic open source talents often have interdisciplinary knowledge backgrounds and innovative capabilities, and can play an important role in the development of new productivity.

Secondly, domestic open-source talents also have the ability to continue to innovate. The rapid development and changes in the open source industry require practitioners to have the ability to constantly learn and adapt to new technologies. Domestic open source talents constantly improve their skills through participating in open source projects and sharing experience and technology, providing a continuous source of innovation for the development of new productivity.

Third, domestic open source talent cultivation also emphasizes practicality and applicability. The development of new productivity needs to be combined with the actual industrial needs. Domestic open source talents not only need to master theoretical knowledge, but also need to have the ability to solve practical problems. Therefore, during the training process, we should focus on the setting of practical links and cooperation with enterprises, so that talents can better adapt to market demands and provide strong support for the development of new productivity.

2. RESEARCH STATUS OF OPEN SOURCE TALENT CULTIVATION

2.1. RESEARCH STATUS OF THE RELATIONSHIP BETWEEN NEW PRODUCTIVITY AND INNOVATIVE INDUSTRIAL TALENTS

As a concrete manifestation of the modernization of productive forces, new quality productivity emphasizes the central role of technological innovation in promoting economic and social development. As an emerging industry based on open source code and open innovation concepts, the open source industry provides important technical support and innovation impetus for the improvement of new productivity. By participating in open source projects, enterprises and individuals can share knowledge, technology and experience, promote the optimal allocation and efficient utilization of innovative resources, and thus promote the rapid development of new productivity. Ma Xueguang and other scholars analyzed the era connotation, evolution logic and practice approach of new quality productivity Haiyuan (2023)Fu Lianying and other scholars proposed the time series evolution, group characteristics, and development strategies of new productivity in China's urban areas Lianying, & Yu (2024). Peng Mengyuan and other scholars have explored the digital economy, new productivity in the service industry, and common prosperity Lin (2024).Yin Ximing and other scholars have constructed an enterprise-led industrial technology innovation system for the development of new productivity Mengyuan & Cheng (2024)

Talent is the key to the common development of new productivity and open source industry. The open source industry needs developers with professional skills and innovative spirit to promote the progress of projects and technological innovation. At the same time, the development of new quality productivity also needs high-level talents to lead and promote. Therefore, cultivating domestic talents with open source skills and innovative spirit is of great significance for promoting the coordinated development of new productivity and open source industries. Wang Qingwang and other scholars proposed to empower the development of new quality productivity in the capital with talent innovation Qingqiao et. al (2024). Scholars such as Li Xujia proposed to inject talent momentum into the development of new productivity Qingwang (2024). Scholars such as Shen Cai Xuan proposed that

Shenzhen Guangming Science City should build a talent foundation for the development of new quality productivity Tao (2023). Yuan Chuan and other scholars have studied the influencing mechanism of the willingness of high-level talents to flow in universities from the perspective of new quality productivity Wenbao et. al (2022).

2.2. RESEARCH STATUS OF DOMESTIC OPEN SOURCE TALENT CULTIVATION

The research status of domestic open source talent cultivation shows a positive development trend. With the increasing attention and investment in open source technology in China, more and more scholars and institutions are beginning to focus on the cultivation of open source industry and open source talents. Wang Lin and other scholars have studied the development of open source ecosystems abroad and their implications for China Ximing et. al (2024). Li Haiyuan and other scholars have explored the changes brought by open source to the digital economy Xuan & Guangming (2024) Scholars such as Ding Yibin and Yang Yibin have explored the opportunities of seizing the new round of technological development and building an open source industry innovation ecosystem in Shanghai Xueguang & Zhihan (2023) Huang Qingqiao and other scholars have proposed the problems and countermeasures faced by China's digital technology open source ecosystem Xujia (2024).

In terms of setting training objectives, it is emphasized to closely align with the needs of industrial development and formulate training objectives that meet the demands of society. This includes emphasizing the cultivation of students' practical and innovative abilities, as well as setting lifelong learning as the goal to improve their self-learning ability. At the same time, diversified training objectives and achieving personalized development are also one of the key research areas, aiming to guide students to choose their own areas of interest, stimulate their potential and strengths, and cultivate comprehensive qualities and a sense of social responsibility. In terms of teaching methods and means, we will explore the introduction of Internet plus to carry out new teaching methods such as distance education, in order to enrich teaching resources and improve teaching effectiveness. This online teaching method helps to break geographical restrictions and allows more people to access open source knowledge and technology. In addition, China has carried out a series of practical activities and cooperation projects for the cultivation of open source talents. For example, by building open source communities and holding open source competitions, we can gather outstanding open source talents and promote the innovation and application of open source technology. At the same time, some universities and research institutions are also actively cooperating with enterprises to jointly carry out open source talent training projects, providing students with practical opportunities and employment channels. Qiao Wenbao and other scholars have explored the development and thinking of open source education in universities Yiyi (2023). Lin Tao and other scholars have explored the cultivation of information professional talents based on the concept of open source Zhuo et. al (2023) Tao Zhuo and other scholars have studied the cultivation of innovative software talents under the open source ecosystem.

Although domestic open source talent cultivation has made some progress, it still faces some challenges and problems. For example, the system of open source talent cultivation is not yet perfect, lacking unified standards and norms; At the same time, the popularity of open source culture needs to be improved, and some people still have misunderstandings about open source technology. In general, the

research status of domestic open source talent cultivation shows a positive development trend, but further research and practical exploration are still needed to improve the cultivation system and enhance the quality of cultivation, providing strong talent support for promoting the healthy development of China's open source industry.

2.3. MAIN CONTRIBUTIONS OF THIS PAPER

The development of China's open source industry is in good momentum, and industrial-level open source projects are constantly emerging. However, at the same time, there are still problems such as the weak position of China's open source community in competition with foreign countries, the significant gap between enterprises' participation in open source and foreign countries, and the serious shortage of open source talent reserves in domestic universities. This article focuses on cultivating and developing new quality productivity, analyzes the shortcomings of open source industry talent development, studies the connotation characteristics and promotion direction of open source talent cultivation to empower new quality productivity, and proposes countermeasures and suggestions to vigorously support the development of open source communities, promote the construction of open source talent teams in enterprises, cultivate open source talent echelons in universities, gather all talent elements and scientific and educational resources, and amplify the talent siphon effect, to help the country seize the initiative in the open source industry.

3. CHINA'S OPEN SOURCE INDUSTRY ECOSYSTEM IS BEGINNING TO TAKE SHAPE, AND THE SHORTAGE OF DOMESTIC OPEN SOURCE TALENTS IS INTENSIFYING

In the era of fostering new productivity, China's open-source industry ecosystem is gradually being established and showing a robust momentum of development. As an open, collaborative, and shared innovation model, open source has become an important force in promoting technological progress and industrial upgrading. However, with the continuous expansion and deepening of the open source industry ecosystem, the demand for domestic open source talents is also increasing. At present, although China has made a series of important achievements in the field of open source, high-level and professional open source talents are still in short supply, which not only limits the continuous innovation and development of open source projects, but also affects China's competitiveness and influence in the global open source ecosystem. Therefore, strengthening the cultivation and introduction of domestic open source talents and building a healthy and active open source industry ecosystem have become important tasks for China's current and future scientific and technological innovation and industrial development.

3.1. A NUMBER OF SOFTWARE COMPANIES HAVE ENTERED THE OPEN SOURCE INDUSTRY, ACCELERATING THE INTERNATIONAL OPEN SOURCE INDUSTRIALIZATION PROCESS

In terms of mergers and acquisitions, AMD acquired the open source AI software Nod.ai to deploy optimized artificial intelligence solutions on AMD's high-performance platforms; Cisco announced its plan to acquire cloud-native cybersecurity startup Isovalent, which is committed to applying two key open

source technologies, eBPF and Cilium. In terms of financing, Mistral AI, founded by scientists from Meta and Google, recently released the open source Moe large model Mixtral 8X7B, which received 415 million in the latest Around off in ancingand currently has a valuation fover2 billion; Positioned for the DB For AI scenario, MindDB has received multiple rounds of financing in 2023, with a total amount of nearly50million;Theopen−sourcelargemodelstartupTogetherhasreceiveda20 million seed round of financing and has already open sourced a 1.2 trillion token training dataset.

3.2. THE TWO COUNTRIES CONTINUE TO RESTRICT AND SUPPRESS EACH OTHER, AND OPEN SOURCE SOFTWARE HAS BECOME AN IMPORTANT PART OF THE TRADE WAR

In 2019, then-US President Trump blacklisted Huawei, restricting its use of Android Google services and app stores. Huawei phones have historically built their own programs and services based on the Android open-source operating system. To deal with the technology blockade, Huawei has developed its own operating system OpenHarmony through open source and continues to promote the international development of OpenHarmony. In 2023, under the banner of "protecting national security", US senators requested the US government to restrict US technology companies' contact with Chinese entities involving RISC-V related chip technology, and proposed to restrict China's development in the RISC-V field. The United States restricts the openness of open source software related companies to China, in order to cut off some open source software supply and use open source software as a weapon in the trade war.

3.3. THE GROWTH OF INDUSTRIAL-LEVEL OPEN SOURCE PROJECTS IN CHINA IS OBVIOUS, AND ENTERPRISE R&D PERSONNEL HAVE BECOME THE MAIN FORCE

Open source is an important counterattack force to deal with technology blockade, and it is also an important way for China's scientific and technological strength to go global. Huawei, Baidu, WeBank, Alibaba, ZTE, Tencent, Ant Financial, Didi, Xiaomi, ByteDance and other Chinese enterprises have established open source committees or open source management offices. Huawei's OpenHarmony operating system has more than 4,000 applications, Baidu's PaddlePaddle deep learning open source framework has attracted 10.7 million developers, and WeBank's FISCO BCOS blockchain has been applied to cross-border data verification more than 200 million times. With the increasing number of industrial-level open source projects in China, the gap in domestic open source talent is also growing. More than 55% of open source developers are enterprise R&D personnel, and the contribution of universities to domestic open source communities needs to be strengthened.

4. THERE ARE SHORTCOMINGS IN THE DEVELOPMENT OF TALENTS IN CHINA'S OPEN SOURCE INDUSTRY, WHICH RESTRICTS THE FORMATION OF NEW PRODUCTIVITY

The shortcomings in the development of talents in the open source industry in China have become an important factor restricting the formation of new

productivity. At present, although there are many open source software developers in China, there is a lack of high-level talents who can deeply participate in open source projects and master key core technologies. This talent gap has led to limited influence in the open source community in China, making it difficult for China to take a leading position in the global open source ecosystem. At the same time, the lack of a professional and systematic open source education system has resulted in a large gap between talent supply and industry demand, which cannot meet the demand for talents in new productivity. Therefore, it is necessary to accelerate the development of talents in the open source industry, strengthen the cultivation and introduction of talents, improve the quality and ability of talents, and promote the formation and development of new productivity.

4.1. THE OPEN SOURCE COMMUNITY IN CHINA STARTED RELATIVELY LATE AND IS IN A WEAK POSITION COMPARED TO FOREIGN COMMUNITIES

China's OpenAtom Open Source Foundation was established in 2020, while the foreign Apache Software Foundation was established in 1999; China's open source platform Gitee was launched in 2013, while the foreign open source platform GitHub was launched in 2008. From the data point of view, compared with the Open Source Foundation, the number of contributors to the Open Source Foundation in China is about 22,000, while the number of contributors to the Apache Software Foundation in foreign countries exceeds 630,000; Compared with open source platforms, the number of developers on Gitee in China has reached 11 million, hosting 25 million code repositories, while the number of developers on GitHub abroad has exceeded 100 million, hosting 280 million code repositories. Foreign open source foundations and platforms are better in attracting talents. Although China's open source industry has developed rapidly, due to its late start, it is not on the same level as foreign open source industries.

4.2. CHINESE ENTERPRISES HAVE MADE OUTSTANDING ACHIEVEMENTS IN PARTICIPATING IN OPEN SOURCE, BUT THERE IS STILL A SIGNIFICANT GAP WITH FOREIGN COUNTRIES

Among the top 20 global enterprises in OpenRank, American enterprises Microsoft, Google, Amazon, Meta, etc. occupy 14 seats in the total number of all open source projects initiated by them, with 31,084 repositories and 370,862 participants; Chinese enterprises Huawei, Alibaba, Baidu, Ant, and Tencent occupy 5 seats, with 20,455 warehouses and 65,405 participants, and the gap is still relatively obvious. From the perspective of major areas of enterprise open source, among the six major areas of cloud native American enterprise Grafana, artificial intelligence American enterprise Meta, big data American enterprise Elastic, database Russian enterprise Yandex, front-end American enterprise Google, and operating system Chinese enterprise Huawei, American enterprises lead in four major areas. Although Chinese enterprises lag behind American enterprises, they have outstanding achievements in some fields, such as the operating system Huawei ranking first and the artificial intelligence Baidu ranking third.

4.3. THREE NEW TRENDS IN COLLABORATIVE EDUCATION IN CHINA'S UNIVERSITIES, AND THE SERIOUS SHORTAGE OF OPEN SOURCE TALENT RESERVES

In terms of universities, Western countries, especially the United States, have formed a good open source environment on campus. For example, Spark, one of the most active open source projects of the Apache Foundation, was born in American universities. Its initial founder was a student from the University of California, Berkeley. In addition, Carnegie Mellon University released the first open-source time series basic large model, the University of Michigan released the free open-source software Franklin for 3D printing motion control, and Rutgers University released the open-source code for 6D object pose tracking. These projects have also received good feedback in their respective fields. Google began to hold the annual GSoC in 2005, attracting a large number of college students to join the development and maintenance of open source software. In China, the Institute of Software of the Chinese Academy of Sciences has launched the Open Source Supply Chain Lighting Program (OSPP) since 2020; In 2021, Tencent launched the Rhino Bird Open Source Talent Training Program in universities; In 2023, Kaiyuan Hongmeng, in collaboration with 17 renowned universities including Shanghai Jiaotong University and Beijing Institute of Technology, established the Kaiyuan Hongmeng Technology Club. Although open source is gradually gaining attention in domestic universities, there is still a serious shortage of open source reserve forces.

5. THE PROMOTION PATH OF DOMESTIC OPEN SOURCE TALENT CULTIVATION TO EMPOWER NEW QUALITY PRODUCTIVITY

In the process of promoting new productivity, the cultivation of domestic open source talents plays a crucial role. By deepening the concept of open source education and building a sound open source talent training system, we can not only cultivate a group of open source talents with innovative spirit and professional skills, but also promote the deep integration of open source software and industry. These talents will become an important support for new quality productivity, promote China's breakthrough in scientific and technological innovation and industrial transformation, and achieve high-quality development. Therefore, strengthening the cultivation of domestic open source talents is not only an important task at present, but also a key path to empower new productivity.

At the community level: create a fertile ground for talents in open source communities and amplify the siphon effect of talents

First, support the standardization of talent in the open source community. Focusing on open source projects in the fields of artificial intelligence, industrial Internet, autonomous driving, big data, cloud computing, blockchain, operating system, etc., support open source communities to develop a number of talent evaluation standards for subdivided fields, providing guidance for the growth of domestic open source talents. Second, strengthen the talent service ability of open source community. Encourage the open source community to build a team of domestic open source technology experts, develop open source technology certificates based on talent standards, organize open source technology training, and enhance talent service capabilities. Third, we should increase the publicity of typical cases of domestic open source talent cultivation. Encourage the open source

community to establish incentive mechanisms such as "open source mentors" and "MVPs", and amplify the talent siphon effect of the open source community by hosting open source expert lectures, open source ecosystem conferences, open source project innovation competitions, and skills competitions. Fourth, we should give full play to the ability of open source community talents to serve the industry. Promote the deepening and practical implementation of activities that bring talents from the open source community into parks, enterprises, and clusters, widely promote new concepts, technologies, models, experiences, and achievements of domestic open source, and promote the transformation of open source projects into industrial projects.

At the enterprise level: build a solid foundation of open source talents and gather the backbone of talents

First, we should enhance the awareness of small and medium-sized enterprises to cultivate open source talents. Support enterprises to set up open source committees or open source management offices, mobilize their enthusiasm, encourage enterprise managers to participate in domestic open source project management, and increase the proportion of enterprise R&D personnel participating in domestic open source technology contributions and using domestic open source technology. Second, we should give play to the leading role of leading enterprises in the field of open source. Taking leading enterprises as examples, accelerate the cultivation of open source talents for other enterprises in the same industry and upstream and downstream enterprises in the industrial chain, and promote the collaborative construction of open source talent ecosystems in key areas by large, medium and small enterprises. Third, support the construction of leading talents and teams in the open source industry. Support enterprises with high participation and contribution in the open source community to strengthen the cultivation of open source industry leaders and team building based on specific domestic open source projects, and create a talent development environment conducive to the emergence of high-end open source talents. Fourth, strengthen the international training of talents for enterprises. Encourage enterprises to serve regional industries through overseas strategic layout and domestic open source projects, strengthen talent exchanges and cooperation with international open source organizations, and enhance the voice and influence of domestic open source talents in the global open source system.

At the level of three universities: cultivate open-source incubation bases in universities and build an open-source talent team

First, support universities to establish domestic open source organizations. Relying on the domestic open source community, establish open source academic groups and student associations in colleges and vocational schools, and jointly carry out open source activities with the open source community to enhance the influence of domestic open source technology. Second, encourage universities to carry out specialized open source talent cultivation. Promote institutions of higher learning and vocational colleges to offer open-source "micro-majors" or courses based on software, computer, electronic information and other majors, encourage institutions and open-source communities to jointly develop practical courses or carry out open-source technology practices, and cultivate a reserve force of domestic open-source talents. Third, promote universities to carry out research and development of domestic open source technology. Focusing on domestic open source technology, we encourage universities, vocational colleges, and open source communities to jointly build open source common technology research and development centers and open source project pilot bases, and give full play to the

academic and research capabilities of institutions. Fourth, we should give full play to the ability of universities to serve the society. Encourage universities, enterprises, and open source communities to customize open source talent training plans and carry out academic upgrading education or ability improvement training.

Practice of Shenzhen Polytechnic University in the field of domestic open source

As one of the important technologies for forming new productivity, blockchain is listed as a key industry in the digital economy in the national 14th Five-Year Plan. Shenzhen Polytechnic University will build with FISCO BCOS, the largest domestic blockchain open source community, since 2021, and will jointly carry out open source talent training with Tencent, WeBank and other top 50 blockchain enterprises in the world. Through joint development of open source courses, open source lectures and training, organizing teachers and students to participate in community open source projects, contributing open source code, participating in open source conferences, developing open source certificates, and other forms, a group of high-quality technical and skilled talents will be trained. Among them, more than 20 teachers and students have received various kinds of recognition from the open source community, 3 students have been awarded the MVP of the open source community, and have developed multiple open source projects that have received positive feedback in the open source community, establishing a new brand of open source talent training for "community-enterprise-university".

6. CONCLUSION

In the current context of global technological competition, the open source industry, as an important driving force for innovation, plays an irreplaceable role in promoting the development of new productivity. The cultivation of domestic open source talents is the key to promoting the sustainable and healthy development of the open source industry. This article analyzes the current situation and problems of domestic open source talent cultivation. Although the development of China's open source industry is in good momentum, there are still obvious deficiencies in the international competitiveness of open source communities, the degree of enterprise participation in open source, and the reserve of open source talents in universities. These problems have restricted the further development of China's open source industry and the improvement of new productivity. This article expounds the connotative characteristics of domestic open source talent cultivation and empowerment of new productivity. On the one hand, the cultivation of open source talents helps to promote technological innovation and industrial upgrading, providing a continuous driving force for the development of new productivity. On the other hand, through the construction of open source communities and the popularization of open source culture, we can stimulate the innovative vitality of the whole society and create a good atmosphere of mass entrepreneurship and innovation. In terms of the direction of progress, the article proposes a series of specific countermeasures and suggestions. including strengthening the construction and management of open source communities, and improving the quality and influence of open source projects; Promote enterprises to participate in open source projects and establish a sound open source talent cultivation mechanism; Strengthen the cooperation between universities and enterprises to jointly cultivate high-level open source talents; At the same time, the government and all sectors of society should also increase their support and investment in the open source industry, creating favorable conditions for the cultivation of domestic open source talents and the development of new productivity. We hope to further improve the

domestic open source talent training system, enhance the international competitiveness of China's open source industry, and inject more impetus into the development of China's new productivity.

CONFLICT OF INTERESTS

None.

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