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Research Article

The Application of Adaptive Analytic Hierarchy Process Driven by Multisource Big Data in the Training of School-Enterprise Joint Engineering Ability

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The Chinese government has pointed out in relevant literature that by 2020, China is in short supply of high-level innovative technology talents, and China's engineering education will face unprecedented challenges. Based on the needs of China's future economic development, the Ministry of Education urgently launched the "Excellent Engineer Education and Training Program" in 2010, which aims to cultivate a large number of solid theoretical foundations, strong practical skills, and high innovation capabilities for the industry, the world, and the future. An outstanding engineer is the one who can quickly adapt to the needs of economic and social development. The program is divided into three levels of undergraduate, master, and doctoral training. The undergraduate level focuses on training in a series of high-quality applications capable of not only being competent in the management and marketing of the production site but also in the design, development, and operation of engineering projects. Talent: to achieve this training goal, the in-depth cooperation between schools and enterprises has become the key. In order to achieve the undergraduate-level training goals of the "Excellence Program," various local colleges and universities have adopted the method of school-enterprise cooperation, combined with their own school positioning, trying to explore a training path suitable for their own development. This research takes China's local application-oriented universities as the research object and uses the literature method to sort out and summarize the status quo of the school-enterprise cooperation in training outstanding engineers in China's local application-oriented universities. Select two different application-oriented universities located in areas with large economic development gaps, analyze their common problems, and try to put forward countermeasures and suggestions.

1. Introduction

Since China's reform and opening up, after more than 20 years of unremitting development, the economy has been rapidly improved, and the pace of industrialization is accelerating. By the end of the 20th century and the beginning of the 21st century, China's basic economic conditions have truly changed from an agricultural country to a big industrial country [1–3]. At the same time, China's engineering education has bathed in spring breeze, has grown rapidly, and has made great progress. However, after long-term development, the shortcomings of China's engineering education have gradually emerged, and the international community and enterprises have rarely recognized the engineers trained by the school. China has many workers, but not many qualified engineers. Why does this happen [4–6]? In 2009, the report of Chinese Academy of Engineering pointed out that there are many problems in the hierarchy and adaptability of China's engineering education. (2) The problems of lack of engineering and weak practical links in engineering education have not been solved for a long time. (3) The evaluation system is oriented to emphasize thesis, neglect design, and lack practice. (4) Industrial, educational, and political cooperation is not in place. (5) Enterprises do not pay attention to the process of participating in talent training [3, 7–10].

The education sector has separated from the industry and the business sector for a long time, and the lack of enthusiasm of enterprises to participate in the cultivation of talents in universities has caused the contradiction between supply and demand in the human resources market to become increasingly prominent. Enterprises are worried about not being able to recruit qualified employees, university graduates are becoming more and more anxious about not finding suitable jobs, social employment competition is becoming fiercer, and students' employment pressure is increasing. International competition, in the final analysis, is the competition of talents. Charles West once said that the country with the best engineering talent occupies the core position of economic competition and industrial advantage. It means that in the future international competition, whoever can train the best engineering talents will have a certain advantage in international competition. According to a McKinsey research report [11–13], by 2020, global high-tech companies will be facing a shortage of about 40 million technical talents, and China will face a shortage of 22 million engineering and technical talents. The "Outline of the National Medium and Long-term Talent Development Plan (2010–2020)" mentioned that by 2020, in China, the quantity demand of high-level innovative technology talents needed in key economic areas will reach more than 5 million.Intermediate and senior technical talents account for about 5% of the employees, while technical talents account for only 20% of the total human resources. This means that due to the needs of future economic development, China urgently needs a group of people who can master high-tech technologies [14–16].

In order to conscientiously implement the "National Medium and Long-term Education Reform and Development Plan Outline (2010-2020)" and the "National Medium and Long-term Talent Development Plan Outline (2010-2020)" and other major reform projects, to achieve the goals of engineering education reform. In June 2010, the Ministry of Education urgently launched the "Excellent Engineer Education and Training Program" (hereinafter referred to as the "Excellence Program"). Future-oriented high-quality compound talents for outstanding engineers will continue to improve China's innovation capabilities, enhance international competitiveness, and strive to develop China into a country with talents and skills [10, 17–19]. The "Excellence Program" divided into three levels of undergraduate, master, and doctoral training. The three levels of training highlight that school-enterprise cooperation is a key factor in the success of the program. In order to achieve the undergraduate level training standards, various local application-oriented universities actively carry out extensive and then they create technological innovation alliances, form a community of interests, and build a platform for industry-university cooperation. A school-enterprise cooperation road is suitable for long-term development [8, 20, 21].

At present, there are few educational research results on the use of school-enterprise joint training of engineers at the undergraduate level of engineering education in China, and most of them are concentrated on the cooperative education of industry-university-research in the relevant high and secondary vocational colleges. Therefore, a systematic review of the current situation of China's local application-oriented universities using school-enterprise joint training of outstanding engineers, analysis of its existing problems, and suggestions are helpful to improve the undergraduate level education of local application-oriented universities and school-enterprise joint training of outstanding engineers [22–25]. The research logical structure of this paper is shown in Figure 1.

2. Existing Research Results and Literature Review

2.1. Joint Cultivation of Postgraduates in a Collaborative Innovation Environment. The term "environment" is rich in meaning, including not only material or natural factors represented by the atmosphere, soil, etc. but also nonmaterial or social factors such as culture, concepts, and systems. Different disciplines also have different definitions of "environment." In recent years, some scholars have conducted preliminary research on the "innovation environment" or "collaborative innovation environment" with synergy characteristics and believe that it will have a profound impact on the scientific and technological system and promote the elements of scientific and technological innovation from "isolation, decentralization, and closure" to convergence and integration. We think that an innovation environment with synergistic characteristics formed under the long-term effects of various factors and a stable network system dedicated to improving innovation capabilities. Its subelements include infrastructure level, financial environment, and entrepreneurial level, etc. [26–28]. In addition to having the basic characteristics or basic attributes of "collaborative innovation environment" a knowledge and information exchange space must also be constructed by multiple subjects in interactive cooperation. The narrow sense of collaborative innovation environment refers to the collaborative innovation center and universities in our country and is composed of various participants [29–31].

The important feature of the multisubject cooperation space created by undertaking specific national major scientific and technological research and development projects or cultural inheritance innovation projects is that it is substantive and presented in a dot-like manner according to the distribution location of collaborative innovation. A broad collaborative innovation environment: it refers to the knowledge sharing. The cooperation philosophy and collaboration culture of complementary resources, organizational collaboration, and multiple win-win results not only include the physical interaction space, based on the collaborative innovation center, but also include those inspired by the concept of collaborative innovation, widespread and recognized by all parties to the cooperation values and codes of conduct. Since collaborative innovation is becoming a collective behavior for universities and governments at all levels to promote the reform of the scientific and technological system and accelerate the cultivation of innovative talents, the collaborative innovation concept has become a ubiquitous shared value beyond the "collaborative innovation center" itself. Therefore, the "collaborative innovation" in this research "Environment" is a broad sense of

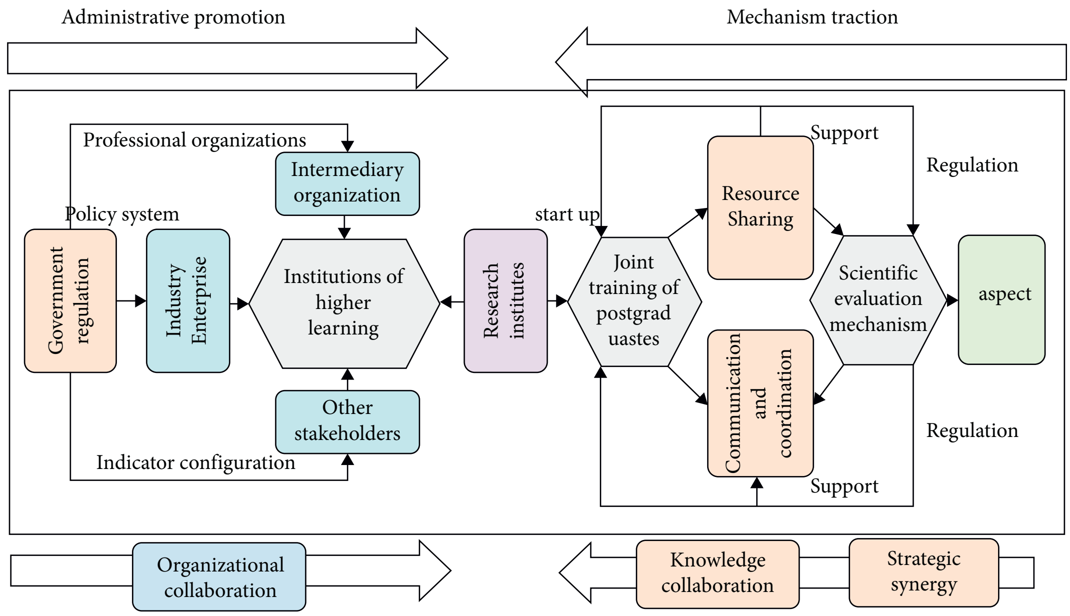

Figure 1: The research logical structure of this paper.

collaborative innovation environment. It believed that the joint training of research and students under the collaborative innovation environment is a high-end talent cultivation paradigm formed under the guidance of the collaborative innovation concept and guided by a sound and scientific mechanism [32]. Model analysis results are shown in Figure 2.

2.2. Reform of Joint Training Mechanism for Graduate Students under the Environment of Collaborative Innovation. The word "Mechanism" originated from Greece, and its original meaning is the relationship between the principle of mechanical braking and the interaction between mechanical internal components and the realization of certain functions through mechanical operation. Generally speaking, the "mechanism" has the following definitions. The structure and working principle, such as the mechanism of the computer; the structure, function and relationship of the organism. The mechanism of arteriosclerosis shows the physical and chemical laws of certain natural phenomena. Such as the mechanism of optimizing objects in the optimization method, also called mechanism. The process of the interaction shows the organization work system, such as market mechanism and competition mechanism. The "mechanism" in the ordinary sense is mostly the fourth interpretation of it in the "Modern Chinese Dictionary." In social science disciplines such as psychology, sociology, political science, and management, "mechanism" generally refers to the internal structure and mode of action that cause and restrict the movement, transformation, and development of things, including the coherent relationship of internal factors of things, and the mutual interaction of various factors such as the form of action, the procedure of function action, and the opportunity for change. The "mechanism" can also be understood from the perspective of the system, which means that the working system is formed by the internal laws of things and their connections with external things. In this system, the study believes that the joint training mechanism under the collaborative innovation environment is defined as the realization of the self-interest of the training subject, and Shanghai is cooperating to cultivate high-end talents with a broad interdisciplinary knowledge background and capable of solving major scientific and strategic issues in national development.

Mechanism reform is the core and key to ensuring the sustainable development of joint training. The reform of the postgraduate joint training mechanism guided by the concept of collaborative innovation pays more attention to the diversity of high-end talent training subjects, the nonlinearity of the training process, and the integration of training resources; more attention paid to opening up the system and mechanism of multiple subjects to solve the impact. This paper analyzes the key issues of student educational development. This paper studies in-depth institutional reform and scientific mechanism design. At present, science and technology, economy, and cultural undertakings have been developed in a highly coordinated manner. The development of science and technology has promoted the long-term linkage between various disciplines and improved the comprehensive quality and innovation ability of postgraduates. The reform of the mechanism is the key to the success or failure of the joint training of industry, university, research, and other subjects. These contents are closely related to the improvement of talent quality and innovation ability in various disciplines. The connotation of the reform of the joint training mechanism under the collaborative innovation environment mainly reflected in four basic aspects: in the development path, from the past administrative-driven development; the type of training transformed into a new type of cross-integration training; in the cooperation paradigm, from the past homogeneous and

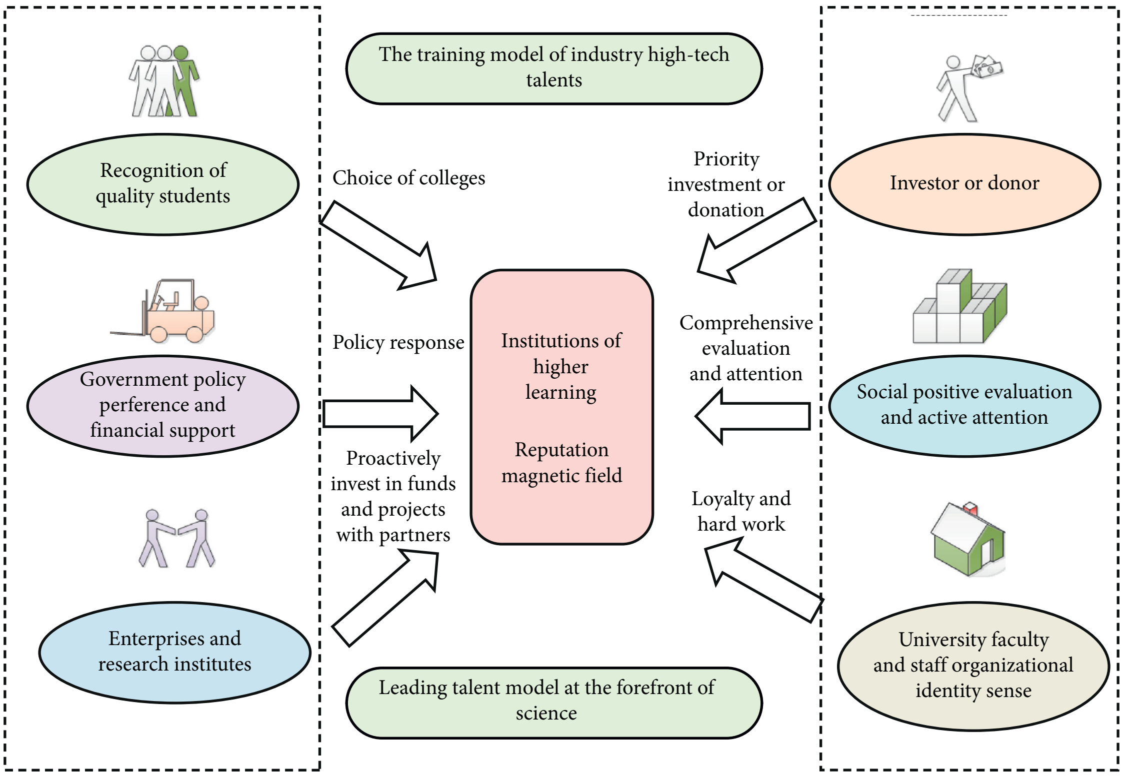

Figure 2: The magnetic field effect on the reputation of colleges and universities.

decentralized cooperation to a new type of large-scale linkage cooperation; in the distribution of benefits, from the past competition for resource acquisition to a new type of create a community of interests. Taking the concept of collaborative innovation as the starting point, it is undoubtedly of important strategic significance to carry out adequate system reform and perfect mechanism design in the multisubject joint training research and student career. The interrelationships between model elements are shown in Figure 3.

2.3. The Reform of Joint Training Mechanism Is the Only way to Realize the Strategic Task of Collaborative Innovation. The strategic task of the "plan" is to "accelerate the reform of colleges and universities mechanism. Transform the innovation methods of colleges and universities, gather and cultivate a group of top innovative talents, produce a group of major landmark achievements, and give full play to higher education as the first productive force of science and technology and the number one talent. The unique role of the important integration point of resources to make greater contributions to the country's innovation and development." As an important part of the reform of the system and mechanism of universities, the reform of the joint training mechanism can fully release the comprehensive disciplines and strong academic atmosphere in universities. We will build the platform for joint training and capability innovation of graduate students with universities as the center and bring together innovative forces such as enterprises Based on equality, integrity, and mutual benefit, resource sharing mechanism, evaluation mechanism, and other systemic institutional innovations. The core of the collaborative innovation strategy is high-end talents, and the core of joint training is high-end talents. Colleges and universities can only seize the important combination of high-end talents, vigorously promote the reform of the postgraduate joint training mechanism, and give play to the synergy of scientific research, industry and education. Collaboration and industry-university collaboration jointly promote the innovation of postgraduate joint training concepts, training models, and training processes, and cultivate high-quality research students suitable for scientific research, industry, and national and regional development needs. Transformation of actual productivity, cultivate top-notch innovative talents, promote the development of interdisciplinary and emerging disciplines, enhance the comprehensive innovation capabilities of universities in knowledge creation, knowledge dissemination and knowledge transfer, and promote the transformation of university development methods.

2.4. The Reform of the Joint Training Mechanism Is to Promote the Needs of Education and Scientific Research. Institutions of higher learning have obvious advantages in subject clusters, academic environment, mentor teams, international exchanges, and knowledge inheritance. Scientific and technological leaders of scientific research institutes, scientific research teams, R&D and manufacturing equipment and innovation platforms, major national topics and industry-leading projects, etc. One aspect is its outstanding

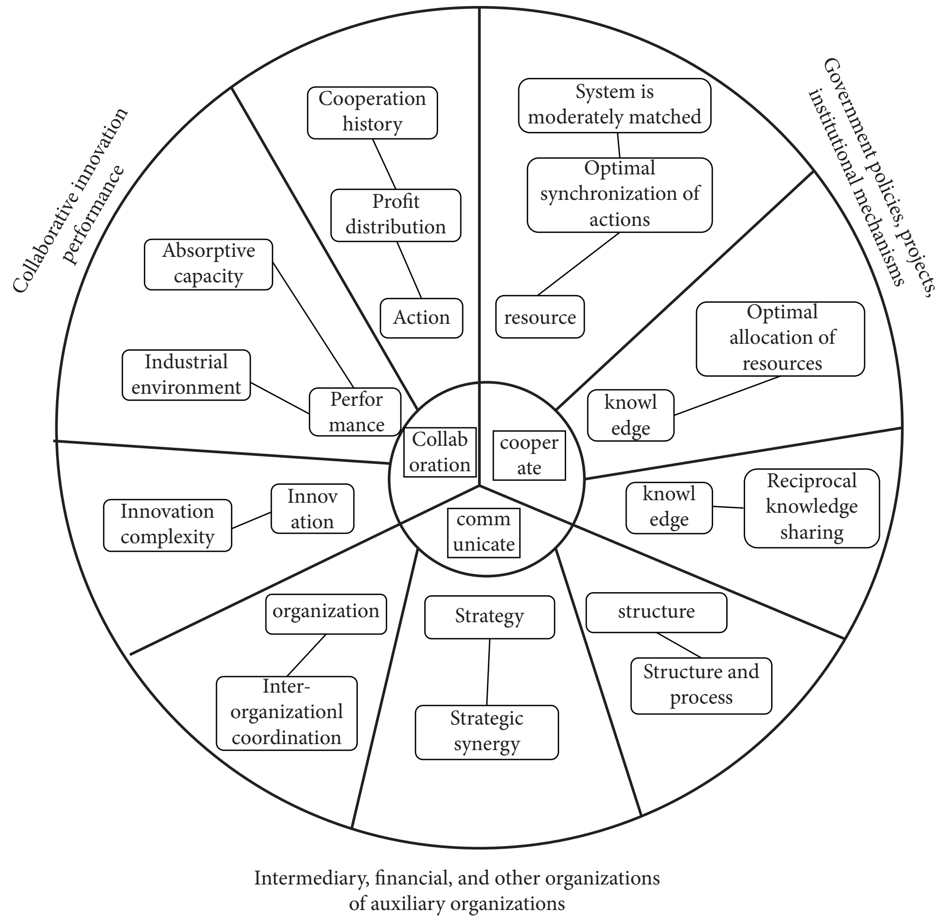

Figure 3: Schematic diagram of the ecological allocation of talent resources for postgraduate joint training.

strengths. The large- and medium-sized national backbone enterprises have abundant resources and strong demands in applied talent teams, R&D funds, demand for high-end talents, technological transformation, and application demands. The basic starting point of the joint training of research and students is to integrate the advantageous resources of the main body of industry-university-research training and jointly cultivate high-end talents that meet the needs of the country, region, and industry. However, in the practice of joint training, "the level of industry-university-research cooperation is not high, the depth of industry-university research cooperation is insufficient, the funds for industry-university-research cooperation are insufficient, the motivation for industry-university-research cooperation is insufficient, and the phenomenon of industry-university-research disconnection still exists" has always existed. The fundamental reason is that the existing joint training mechanism fails to give full play to the educational advantages of colleges and universities, the R&D advantages of scientific research institutes, and the market advantages of industry enterprises.

Therefore, to develop the joint training of research and students under the collaborative innovation environment, we must start from the basic design of the collaborative innovation strategy, take the reform of the joint training mechanism as the starting point, and focus on the major national and regional needs and the core tasks of high-end talent training. The reform of the joint training mechanism is an inherent requirement to improve the quality of high-end talent training. High-end talents have a strong sense of social responsibility, noble personality, and innovative spirit, able to stand on the commanding heights and forefront of international scientific and technological development, gather cross-cultural and interdisciplinary resources, and solve national development. Leading talents and innovation leaders on major scientific and strategic issues "all countries in the world" take research and education as a strategic choice for cultivating high-end talents, achieving national development goals, maintaining international competitive advantages, and a powerful way to seize the commanding heights of science and technology, education, and talent. Now when we actively promote interdisciplinary, cross-organization, cross-field, and cross-border joint training of research students, the quality of joint training models and mechanisms directly determines the quality of national high-end talent training. However, the "quality of postgraduate training in my country, including joint training, is not optimistic, which is mainly reflected in the quality of conditions to be improved, process quality to be improved, and structural quality to be improved." At present, high-end talents lack performance in innovative thinking and innovative results. It mostly regulated by the society, which closely related to the failure of the existing joint training mechanism for the main body to effectively support high-end talent training.

3. The Applicable Analysis and Model Construction of Joint Training Mechanism Reform

Collaborative innovation strategy is a major project to improve the quality of my country's higher education, especially the quality of high-end talent training. It takes the frontiers of science, cultural inheritance, industry, and regional development as the main body of collaboration and the direction of the convergence of innovative resources and uses the collaborative innovation platform to integrate government, industry, university, research, and application. The advantages of collaborative education of other subjects are in the direction.

3.1. Synergetic Innovation Theory Overview and Connotation Analysis. The conditions and institutions ensure the smooth progress of the joint training of graduate students and provide strong conditions and main directions for the reform of the joint training mechanism. Scientific mechanism design and effective mechanism operation are one of the fundamental guarantees for the quality of high-end talent training. For joint training subjects, only through systematic mechanism incentives and regulations can they stimulate their endogenous motivation to train first-class talents, for graduate students. The sound external and internal mechanism is the guarantee of the quality of learning and scientific research. It imperceptibly draws research students to devote themselves to academic or R&D careers and guides and urges graduate students to become high-end talents. Model analysis results are shown in Figure 4.

The core idea of collaborative innovation theory is "integration" and "interaction." Since the concept of "collaborative innovation" was put forward in 2000, etc. (he has conducted in-depth discussions on the theory of collaborative innovation from the perspectives of "integration" and "interaction," among which collaborative innovation from the perspective of "integration" mainly refers to knowledge, resources, and actions. These involve the integration between different performance factors. The concept of collaborative innovation mainly refers to the sharing of knowledge and the optimal allocation of resources among innovation subjects. These ideas continue to be implemented. Existing studies have continuously refined the innovation process according to the unreasonable positioning of the main elements of innovation in the collaborative process. In this theoretical framework, "communication and coordination" is the basis of "collaborative innovation theory," and its corresponding elements are knowledge and resources. Its meaning means that the development of collaborative innovation activities must first be constructed and perfected.

Shape the general functional relationship between the output y of the injury model and the input $x_1, x_2, \ldots, x_n$. The Kolmogorov–Gabor polynomial is as follows:

$$y = f(x_1, x_2) = a_0 + a_1 x_1 + a_2 x_2 + a_3 x_1^2 + a_4 x_2^2 + a_5 x_1 x_2. \tag{1}$$

And treat each of the monomials as m input models in the original structure of the modeling network:

$$\begin{aligned} v_1 &= a_0, \\ v_2 &= a_1 x_1, \\ v_3 &= a_2 x_2, \ldots, \\ v_6 &= a_5 x_1 x_2. \end{aligned} \tag{2}$$

The final information $i_t \times C_t'$ is expressed as the value that can be obtained C_t from the output information of the joint forgetting gate:

$$C_t = f_t * C_{t-1} + i_t * C_t'. \tag{3}$$

The calculation method is

$$\begin{aligned} O_t &= \sigma(W_o \cdot [h_{t-1}, x_t] + b_o), \\ h_t &= o_t * \tan h(C_C). \end{aligned} \tag{4}$$

As a generalization of ordinary linear model, GLM introduces connection function in the model in order to fit some nonlinear relationships. The model can be expressed as

$$g(\xi) = g(\sigma) + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n, \tag{5}$$

where $g(\sigma)$ is the connection function, $\sigma = E(Y)$.

$$g(\xi) = a + f_1(X_1) + f_2(X_2) + \cdots + f_n(X_n). \tag{6}$$

The function of forgetting gate is to determine the part discarded from the input information h_{t-1} and x_t and output a value between 0 and 1. The larger the value, the more information is retained. The output of forgetting gate is calculated as follows:

$$f_t = \sigma\left(W_f \cdot [h_{t-1}, x_t] + b_f\right). \tag{7}$$

The "communication and coordination" mechanism of knowledge and resources is followed by collaborative innovation. Participating organizations' cooperation at the action level will eventually achieve synergy at the performance level. Through the aforementioned research, we know that the results of "collaborative innovation" include science, technology, culture, etc. The output of tangible innovation results also includes the collaborative training and joint forging of innovative talents. Therefore, from this perspective, "joint training" can regarded as a sub-part of collaborative innovation activities in a broad sense. Joint development carried out in a collaborative innovation environment. Cultivation activities must follow the basic framework of the collaborative innovation theory, and the construction of the "communication and coordination" mechanism is the primary task of the joint training of graduate students. "Communication and coordination" is the joint training activities of graduate students in a collaborative innovation environment to achieve resource

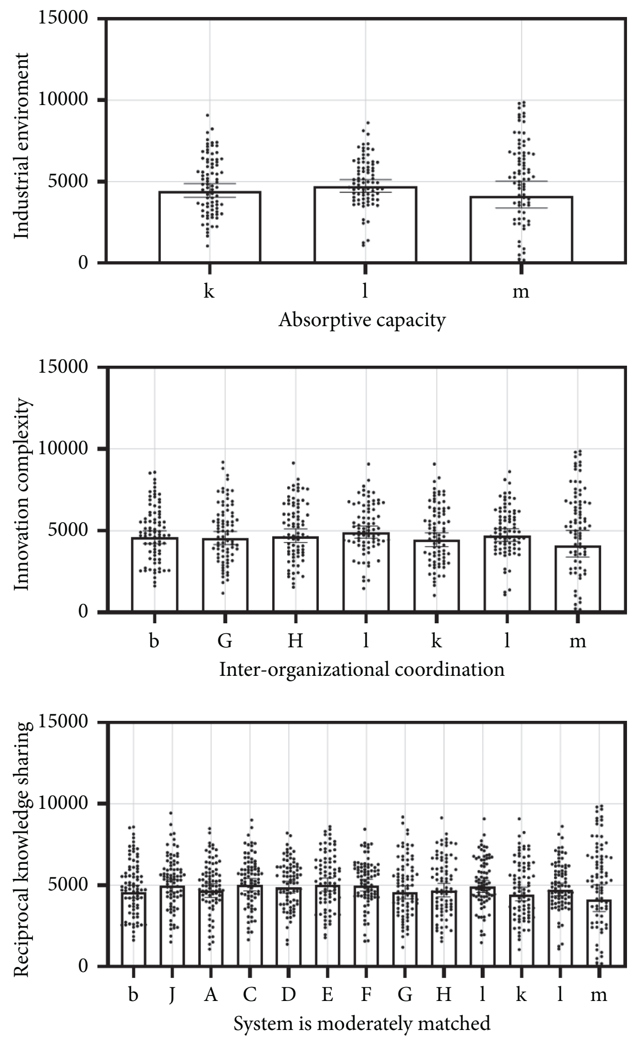

Figure 4: The applicability of collaborative innovation theory in joint training.

sharing and knowledge transfer. Model analysis results are shown in Figure 5.

The "collaborative innovation" formed by enterprises, universities, and scientific research institutions in the promotion of the flow, sharing and integration of knowledge and resources between organizations must carried out on the three levels of strategic coordination, knowledge coordination, and organizational coordination. The core layer: it is the synergy of the elements of strategy, knowledge, and organization. Government policy guidance, project promotion, and institutional incentives are the support layer. Intermediaries, financial institutions, and other organizations can regarded as the support layer. Due to the different cooperation motivations, fundamental tasks, and resource capabilities between enterprises and universities. The purpose of its cooperation with enterprises is to obtain corporate funding to produce academic results that have a boosting effect on human society. From this point of view, the application culture of the enterprise and the research culture of universities and research institutes. It is difficult to integrate its cooperation, and it is difficult to carry out automatically. Model analysis results are shown in Figure 6.

3.2. Synergetic Innovation Theory Overview and Connotation Analysis. However, this kind of "difficult to integrate" or "mutual exclusion" is inevitable. The real obstacle to the cooperation of all parties is the lack of appropriate collaborative performance evaluation tools or evaluation systems. In the process of "knowledge synergy," collaborative innovation activities generally have the following characteristics: systematic. In this ecosystem, the integration or blending process of various elements is not a simple superposition of functions, but an effective reconciliation of the functions of each part. The form of sex and integration expresses the ways, functions, and goals of each part after cooperation. The level of "collaborative innovation" manifested in two aspects: one is the level and step of knowledge flow. Generally, the higher level knowledge layer flows to the lower level knowledge layer, and knowledge layers of the same level and different properties have mutual influence. The second is the level and style of organizational characteristics. Organizations participating in collaborative innovation activities must have a relative advantage in a certain field, and the organizational style is open. So as to ensure the

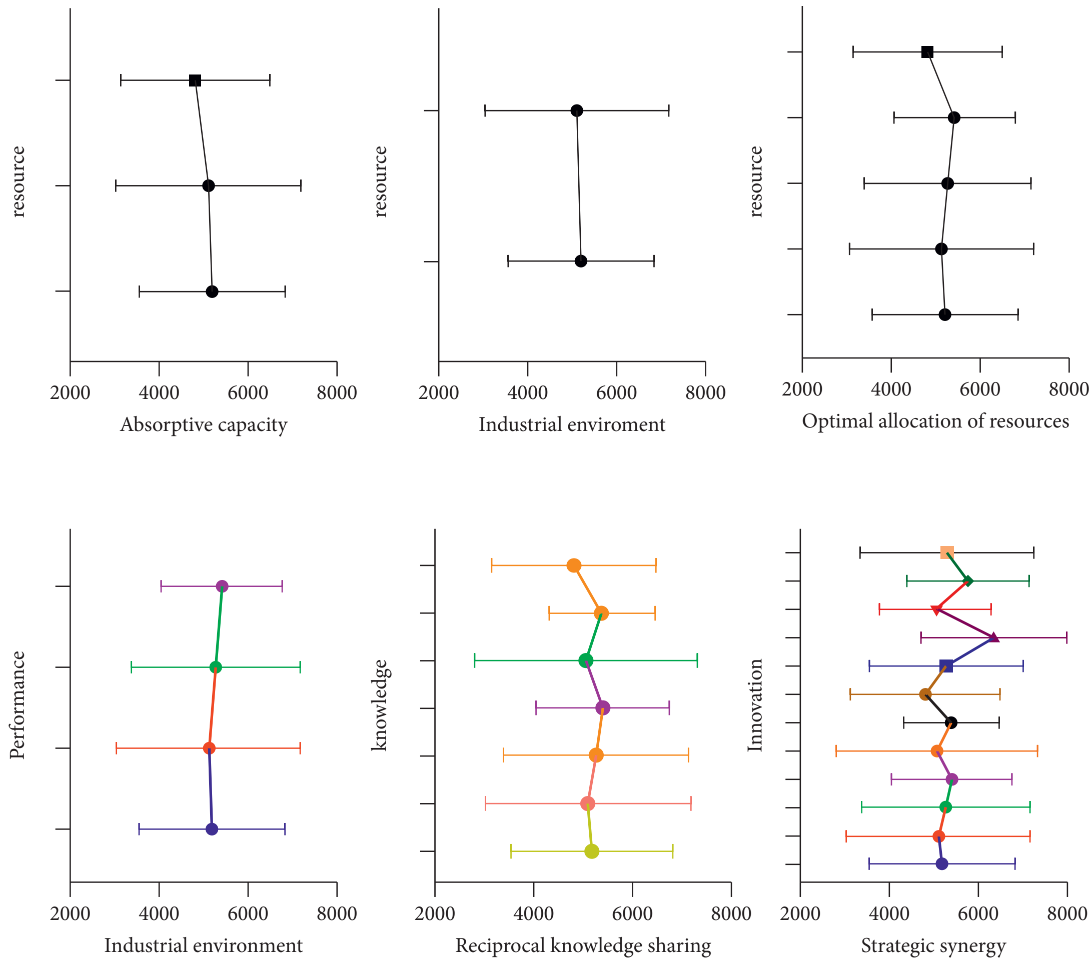

FIGURE 5: Model of joint training mechanism for graduate students in an innovative environment.

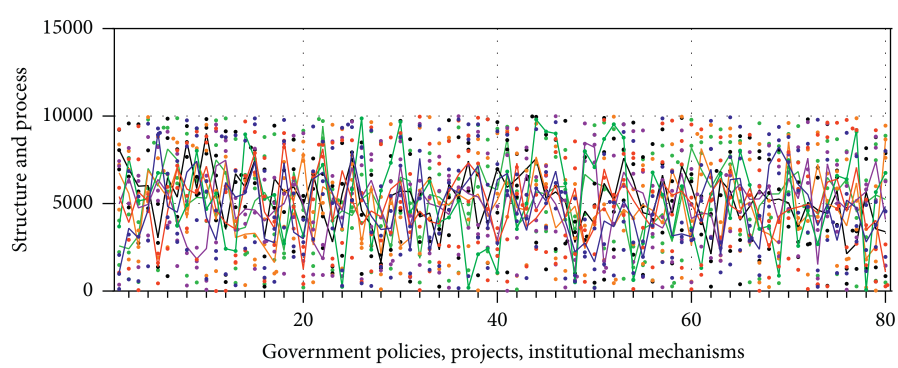

FIGURE 6: New public management theory in jointly cultivating government regulation mechanism.

interaction and complementarity of "collaborative innovation." Model analysis results are shown in Figure 7.

Dissipative: the innovation ecosystem will exchange information, energy, and material with the outside. "Collaborative innovation" is a new stable and orderly structure formed under certain conditions by an open system that is far from equilibrium and exchanging material and energy with the outside world. There are nonlinear interactions within the system. Dynamic: in collaborative innovation, there are a variety of interweaving and compatible behaviors of new ideas, new concepts, continuous updates, rapid response, flexible adaptation, and creative innovation.

The government, industry, university, and their innovative elements are diverse, and there are complex interactions and mutual influences among them. Various emergencies may also occur. It is unpredictable by the participating organizations. In addition, the results of innovation include both tangible and intangible results. The

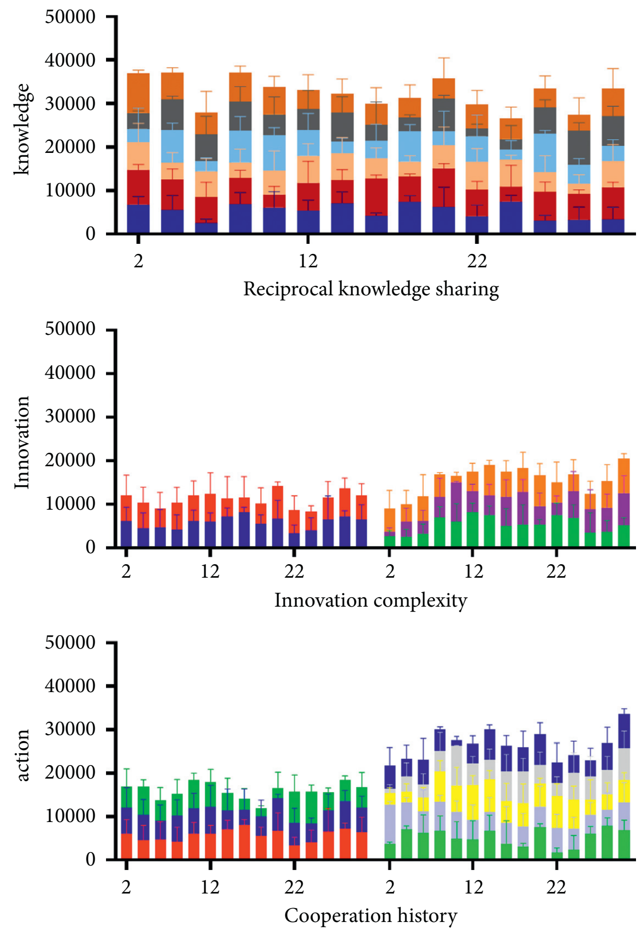

Figure 7: Systematic integration theory in joint cultivation, communication, and coordination mechanism.

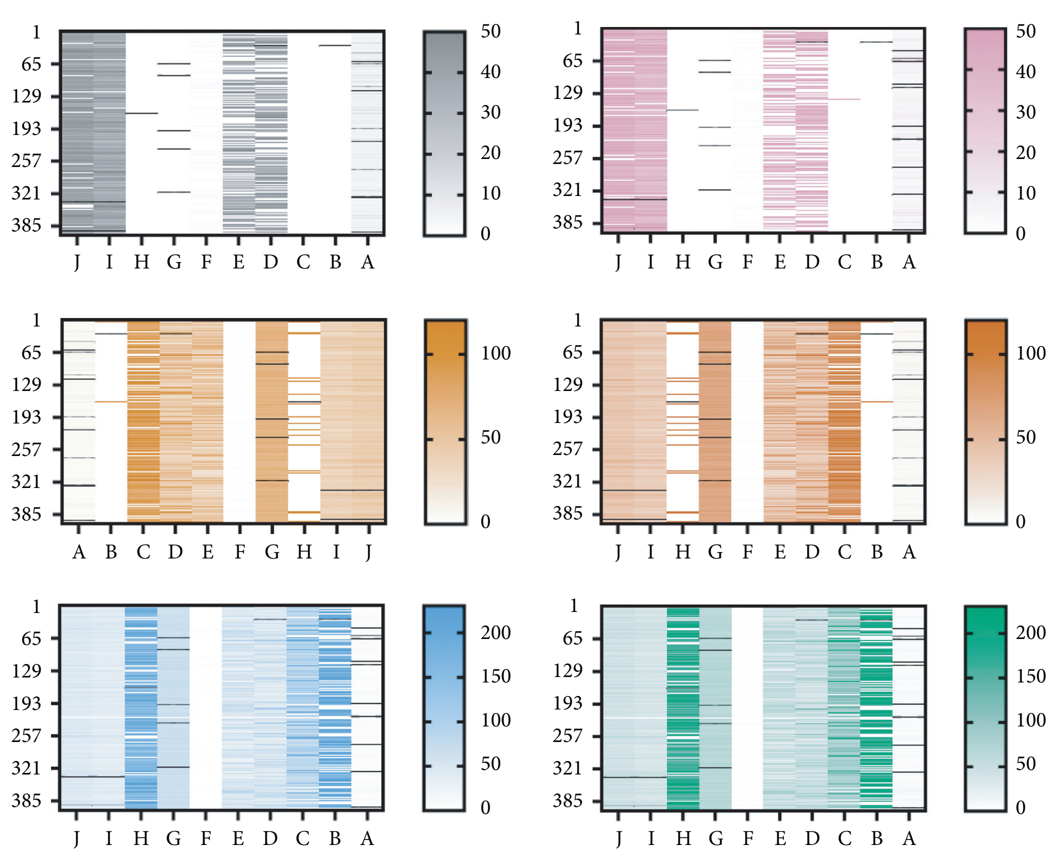

Figure 8: Resource dependence theory and its applicability in joint training resource sharing mechanism.

operation of collaborative innovation requires a complete mechanism system. Judging from the existing research results, the collaborative innovation mechanism system includes an incentive mechanism centered on the fair distribution of benefits, a sharing mechanism based on knowledge exchange, resource complementation, and subject trust. The platform based on the collaborative innovation center as the main body. The performance evaluation mechanism based on the reasonable setting of evaluation indicators and the government policy system aiming at adapting innovation policies to the environment. The setting of the mechanism system also profoundly affects the mechanism reform path of joint training activities under the environment it forms. Model analysis results are shown in Figure 8.

Organizational collaboration refers to collaboration and integration between the main bodies of industry, academia, and research (outside the organization) between science and technology R&D. The talent training business units (inside the organization), with clear technological innovation, R&D, and application, The talent training strategy and scientific governance process ensure the internal and external coordination of each subject and the process or state of continuous cyclic execution.

The calculation of the statistics of the hypothesis of the single-body sample is as follows:

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\left((n_1 - 1)S_1^2 + (n_2 - 1)S_2^2/n_1 + n_2 - 2\right)\left((1/n_1) - (1/n_2)\right)}}. \tag{8}$$

Set two random sequences X and Y, Pearson correlation coefficient between the two sequences is r, then

$$r = \frac{\operatorname{cov}(X, Y)}{\sqrt{\sigma_x^2}\sqrt{\sigma_y^2}} = \frac{\sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \overline{x})^2(y_i - \overline{y})^2}}. \tag{9}$$

In order to ensure the accuracy of the results, this paper uses two evaluation indexes, mean absolute error and root mean square error, to evaluate the optimization effect of the model. The specific calculation formulas are as follows:

$$\begin{aligned} \text{MAE} &= \frac{1}{s}\sum_{i=1}^{s}\left|\widehat{y}_i - y_i\right|, \\ \text{RMSE} &= \sqrt{\frac{1}{s}\sum_{i=1}^{s}\left[\widehat{y}_i - y_i\right]^2}. \end{aligned} \tag{10}$$

The calculation formula of single-sample statistics is as follows:

$$t = \frac{\overline{X} - \mu}{\left(\delta_x/\sqrt{n-1}\right)}. \tag{11}$$

Over the years, the differences in the value positioning, strategic goals, cooperation motivation of the joint training subjects, and the contradictions of their internal systems in the organizational structure, power structure, and functional structure have caused the sustainable development of cooperative education to face a series of difficulties. The fundamental reason is that the "modular" organizational operation and cooperative ecology cannot adapt to the collaborative needs of joint graduate training under the new situation. Model analysis results are shown in Figure 9.

3.3. The Organizational Collaborative Ecosystem Layer in the Collaborative Innovation Theory. Based on the abovementioned current situation, the collaborative innovation strategy is to pay more attention to the main position and linkage effect of the partners under the government's macro-control and focus on breaking through the institutional mechanism of joint training of various main organizations. Implementation of high-level performance in assessment, international cooperation, and innovative culture construction. The internal reform of the school, through the establishment of a coordination mechanism, a resource sharing mechanism and a benefit distribution mechanism in which participants have common goals, internal motivation, and direct communication to achieve external collaboration in the organization. The "collaborative innovation center" used as a common value platform for cooperation in running schools. Education maintenance, industry maintenance, service maintenance, and public maintenance (government maintenance) form a network system for technological innovation, R&D reference and talent training, and mutual knowledge sharing, resource optimal allocation, optimal synchronization of actions, optimal matching of organizations, and open information sharing Win the joint cultivation of "ecosystem." Model analysis results are shown in Figure 10.

Strategic synergy refers to the integration of talent, capital, information, technology, market, and other innovative elements of joint training subjects. The method improves the efficiency and overall value of talent training, in the establishment of organizational structure, talent quality assurance, teacher resource allocation, and innovation platform application. The unified deployment and overall planning of technological innovation, R&D, and application. It is easy for the subjects of joint training to reach a consensus on the "organizational synergy" at the meson level and the "knowledge synergy," while it is difficult to form a unified opinion on the macro level "strategic synergy." Universities, research institutes, industries, or companies in finance. The six dimensions of technology, strategy, education, politics, and theory have different motivations for cooperation in forty-six indicators. More importantly, the lack of a scientific evaluation mechanism has led to joint training of multiple organizations at the level of talent training quality and work performance. There are often differences at the level. Model analysis results are shown in Figure 11.

Collaborative innovation strategy provides a suitable institutional environment for the joint cultivation of strategic

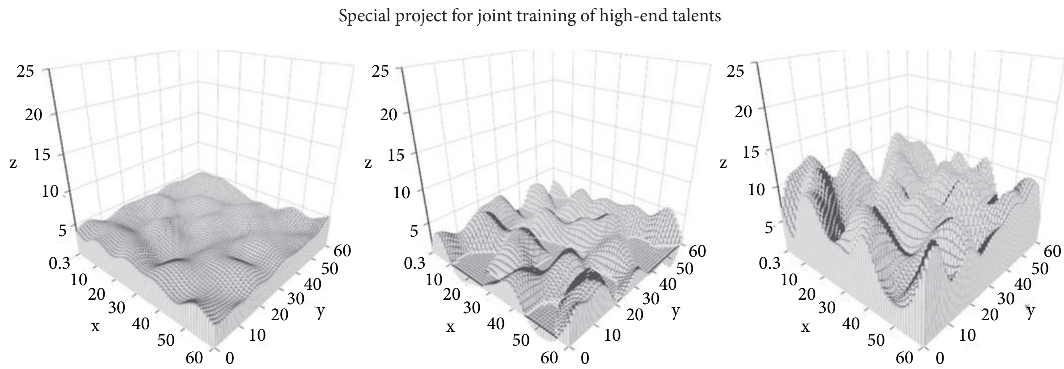

FIGURE 9: Scientifically formulate joint training enrollment plan and distribution plan.

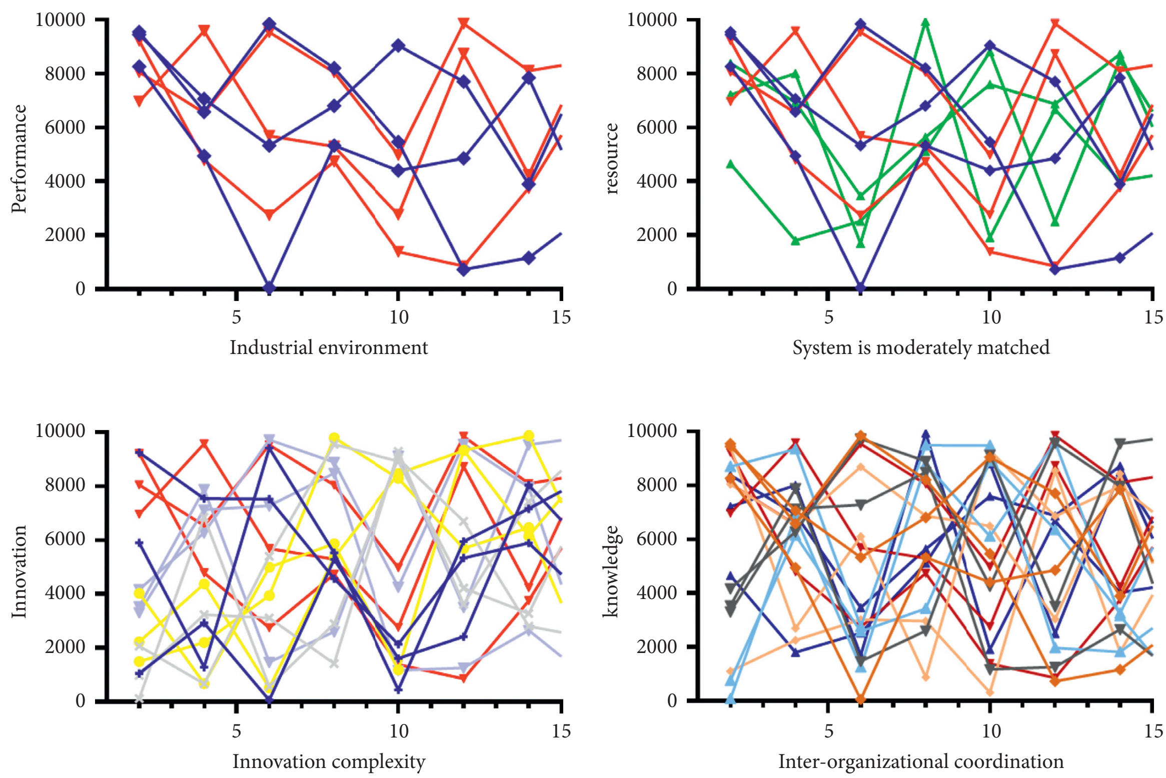

FIGURE 10: Scientifically plan the subprojects and types of joint training.

synergy among multiple organizations. First, it uses the collaborative innovation center as the platform and the cultivation of top-notch innovative talents as the carrier. It is committed to promoting the integration of the research culture of universities and enterprises, which create a value identity combination for the joint training of graduate students. This lays the conceptual foundation for the implementation of the scientific evaluation mechanism in multiple organizations. Second, the goal of the collaborative innovation strategy to bring together innovative resources is to serve the major needs of the country's science and technology. Support and build a long-term mechanism for sharing results to achieve a win-win cooperation among all subjects in terms of scientific and technological innovation, talent training, and economic development. This provides a driving force for the benefit of collaborative education work, which provides a scientific evaluation mechanism within a diverse organization. The implementation laid the foundation for power.

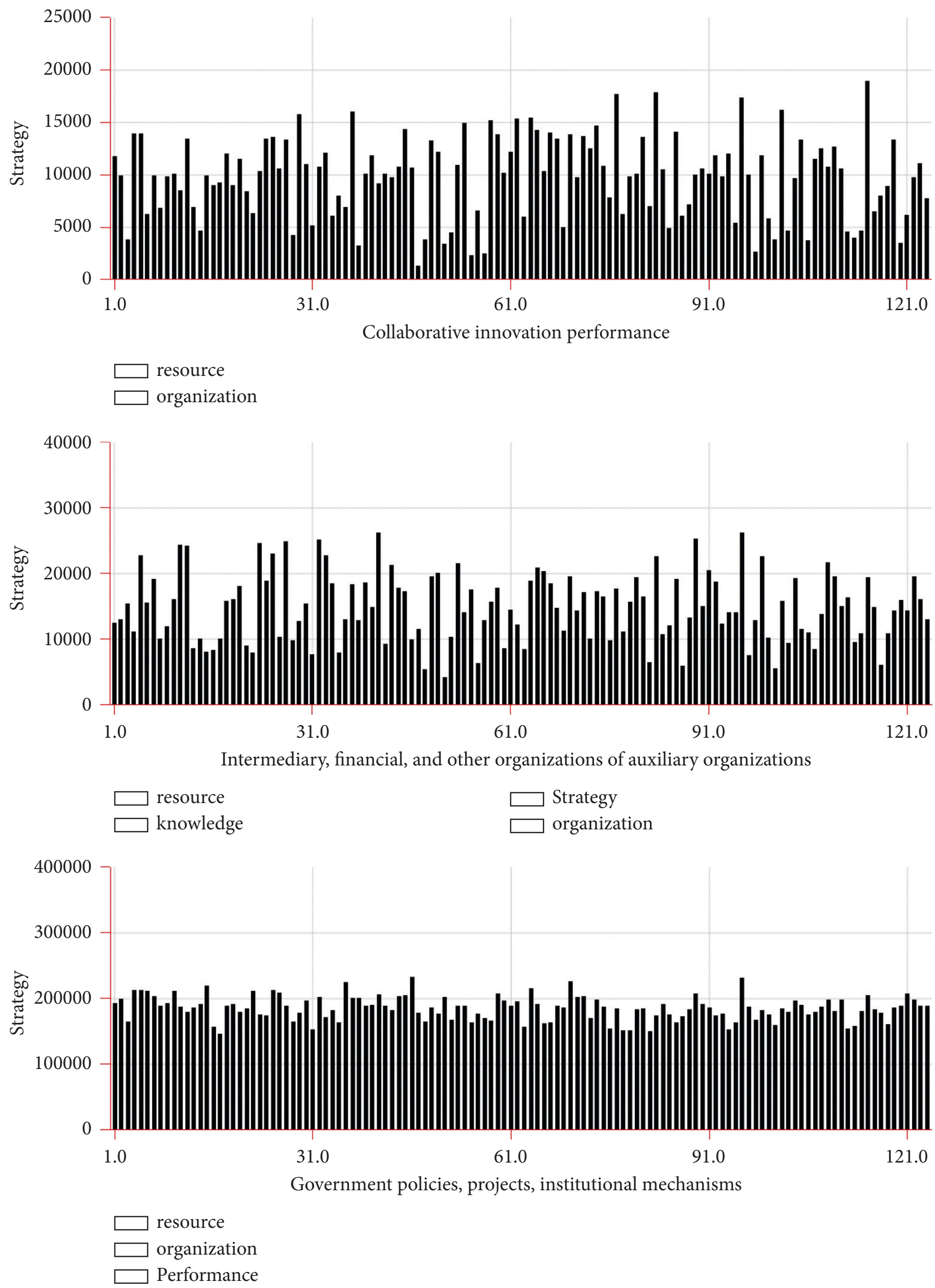

Figure 11: Implement dynamic management of joint training special projects.

4. Conclusion

After combing the development history, evolution trend and the basic requirements of the joint training of Chinese graduate students under the environment of collaborative innovation in the whole process, this study found that there are still some problems in the process of mechanism construction that are not suitable for research under the new situation. The endogenous development of the joint training cause urgently needs to be guided by a systematic theory to construct a complete reform plan for government regulation, communication and coordination, resource sharing, and scientific evaluation.

(1) Conducive to the reform and development of local applied universities. Local application-oriented colleges and universities developed to a certain stage of economic and social development in order to meet

the needs of China's economic modernization and the needs of higher education popularization. Its appearance is a microcosm of the transition from elite education to popular education. Different from research universities, applied universities insist on implementing applied undergraduate education, always based on market needs, rooting in industries, serving localities, and making contributions to the regional economy. However, after long-term development, the college itself has exposed many problems, such as unclear understanding of the school's philosophy, fuzzy positioning, inaccurate positioning, convergence of development models, backward teaching methods, improper teaching methods, and teacher team lack of engineering practice experience and single evaluation system. The talents cultivated by the school consistently show insufficient innovation ability, weak hands-on ability, insufficient learning ability, and fail to keep up with the new needs of the development of the enterprise (industry). To solve the above problems, local application-oriented colleges and universities need to develop in-depth cooperation and exchanges with enterprises, understand the trends of enterprises in the first place, and be familiar with what kind of talents are needed for the development of enterprises, and what types are needed for the development of society. Then, relying on these needs to formulate the school's talent training standards. It will help the school cultivated people to be used by the society, enterprise engineering, and technical experts are invited as consultants to participate in the school's teaching plans and curriculum settings.

(2) Conducive to improving the quality of training of outstanding Chinese engineers. The training of outstanding engineers is concentrated on the three levels of undergraduate, master, and doctoral degrees. The purpose of implementing the "Excellence Plan" at the undergraduate level is to pass practical training and theoretical teaching so that students can adapt to the development requirements of the society in the shortest time, with strong learning ability and practice. High-level engineering and technical talents with strong hands-on ability serve the country to take a new road to industrialization, implement the strategy of strengthening the country with talents, and build an innovative country. School-enterprise cooperation is the key to the success of the "Excellence Project." The joint training of talents by schools and enterprises is also a new demand for social development. Accurately grasp the social demand for engineering talents, from the basic qualities of engineers, engineering awareness, learning ability, and innovation Ability, practical ability and management ability, etc. start to train outstanding engineers to improve the overall quality of outstanding engineers in China.

(3) Conducive to the continuous development of students' careers. Since China's accession to the WTO, China's economic development has shown a prosperous scene. With the development of China's economy, applied-skilled talents who can only master technology and serve as the front line of production can no longer meet the needs of society. What society needs more are innovative engineering science and technology talents who can use the principles and methods of technological cross-convergence, the use of technological integration and innovation technology to carry out product creative design and development, and at the same time take into account engineering management and consulting. These talents not only have a solid theoretical foundation knowledge and basic scientific and humanistic quality but also can combine the actual operation of the enterprise to propose and solve the actual problems of the enterprise and carry out technological innovation. The school-enterprise cooperation to build a training base is precisely to allow students to have more opportunities to have access to the company's advanced machinery and equipment, understand and master the company's most advanced production technology, and continue to accumulate practical experience in the process of internship and training. Continuously improve their comprehensive practical ability and employment competitiveness.

Data Availability

The dataset can be accessed upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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