

Current Situation, Challenges, and Countermeasures for the Development of Higher Education in Heilongjiang Province

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Abstract: High-quality development of higher education is the key to high-quality economic and social development in Heilongjiang Province. Strong education is a strategic project for the development of a high-quality population, and high-quality education is the key to improving the overall quality of the population. The current northeastern region is in a critical period of comprehensive revitalization, there is an urgent need for education, science and technology, and human resources to provide a trinity of all-round, multi-factor support. It is essential for colleges and universities in Northeast China to consolidate their strengths, apply targeted efforts, and serve the Party and the state by playing a renewed and more prominent role within the broader strategic context. In light of the comprehensive revitalization of the Northeast, identifying the challenges facing higher education in Heilongjiang Province and proposing appropriate development pathways has become a pressing and widely discussed issue in both academic and practical circles.

Keywords: Higher education; High-quality development; Heilongjiang Province; Challenge; Countermeasure

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1. Introduction

The General Secretary emphasized in the party's second tenth report that "implementing the new development concept is the road to development and growth in China in the new era," and that as China's economic development enters a new stage, high-quality development has become a new requirement for China's economic development, and that the quality and effectiveness of economic development must be improved in order to achieve China's modern-style development. Education is a national plan, the party's plan, that determines the future of a country and nation. Education is the micro-unit of economic and social development, and the quality of education, especially higher education, is related to the overall quality of economic and social development. The level of development of higher education is an important indicator of a country's level of development and development potential. Since the expansion of higher education in 1999, China's higher education has experienced a period of rapid development for more than 20 years. 2023 National Education Development

Statistical Bulletin data show that China now has a total of 3,074 ordinary higher education institutions, adult higher education institutions of 252, with all types of higher education enrolled in a total of 47.63 million people, and the gross enrolment rate in higher education is as high as 60.2%. In terms of quantity and scale, China has entered the ranks of the world's major higher education countries. However, it goes without saying that a big country in education is not necessarily a strong country in education, and compared with developed countries in Europe and the United States, the overall quality of China's higher education is on the low side, and it is not yet able to effectively support and promote the high-quality development of the economy and society.

In September 2023, the General Secretary hosted a forum on promoting the comprehensive revitalization of the Northeast in the new era and delivered an important speech stressing that “the overall quality of the population should be improved, and the comprehensive revitalization of the Northeast should be supported by the high-quality development of the population,” “the development of basic education should be vigorously pursued, and support for the operation of colleges and universities in the Northeast should be stepped up to enhance the education level of the whole population, especially young people, and improve the quality of the population.” The General Secretary pointed out in May 2023 during the fifth collective study of the Political Bureau of the 20th Central Committee that, building a strong education country is a strategic precursor to building a socialist modernization power in an all-round way, an important support for realizing a high level of scientific and technological self-reliance and self-improvement, and an effective way of promoting the common wealth of all the people. It is a basic project to promote the great rejuvenation of the Chinese nation with Chinese-style modernization. This series of important exposés for the northeast high-quality development, sustainable development points out the direction. Strong education is a strategic project for the high-quality development of the population, high-quality education is the key to improve the overall quality of the population, the current northeast is in a critical period of comprehensive revitalization, there is an urgent need for education, science and technology, human resources to provide a trinity of all-round, multi-factor support, and there is an urgent need for northeastern colleges and universities to condense their characteristics, gather their strengths, and make precise efforts to show a new role in serving the party and the country's strategic situation, and to achieve a new role.

Therefore, “high-quality development” has become the theme of China's economic and social development. It has been given an important mission in the national high-quality development, and shoulders an important responsibility in different directions. The high-quality development of higher education in Heilongjiang Province is of great importance. It is of great practical significance to assess the quality level of higher education development in Heilongjiang Province, analyze its influencing factors, and explore the specific path of its high-quality development.

2. Status of development of higher education in Heilongjiang Province

2.1. Heilongjiang Province is rich in higher education resources

Heilongjiang Province is one of the regions in China where higher education resources are more densely distributed on a per capita basis, with strong schooling strength and a pivotal position in China's higher education map. As of June 2023, there were 78 ordinary colleges and universities in Heilongjiang Province, including 39 undergraduate colleges and universities and 39 higher vocational colleges and universities, accounting for 2.54% of the total number of colleges and universities in China. There are 4 “double first-class” colleges and universities represented by Harbin Institute of Technology and other old, strong schools.

Some non-“double first-class” colleges and universities also have distinctive features and strong disciplines, and in the fourth round of disciplinary assessment, three local colleges and universities have disciplines of A class, and the strength of schooling is at the national first-class level. There are also many provincial colleges and universities that have made great contributions to the service of northeastern revitalization by providing human and intellectual support based on their own schooling characteristics and the actual economic and social development of the local community, and by continuously strengthening the construction of academic disciplines.

2.2. The quality of the population has improved, but the increase in human capital has slowed down

Table 1 shows the number of people with various levels of education per 100,000 people in the country and in the Northeast. Compared with 2010, the data from the Seventh National Population Census in 2020 show that the quality of the population in the three northeastern provinces has improved, with an increase in the number of people with high school education or higher per 100,000 people, especially the increase in the number of people with college education or higher. However, in the 10 years from 2010 to 2020, the increase in human capital in Heilongjiang Province has slowed compared with the national rate of increase in human capital, and the number of people with a college degree or higher per 100,000 people in Heilongjiang Province in 2020 will already be lower than the national average.

Table 1. Population with various levels of education per 100,000 people in the country and in the region of Heilongjiang Province (persons)

	College and above		Senior high school		Junior high school		Elementary school	
	2010	2020	2010	2020	2010	2020	2010	2020
China	8,930	15,467	14,032	15,088	38,788	34,507	26,779	24,767
Heilongjiang	9,067	14,793	14,911	15,525	45,081	42,793	24,078	21,863

2.3. The strategic support role of “double first-class” universities in promoting the revitalization of Northeast China has been highlighted

“Double first-class” colleges and universities is the northeast economic and social development of valuable resources and source of vitality. In the process of striving for the world’s first-class strategic support for the comprehensive revitalization of the northeast is also increasingly prominent. As the main force of talent training, the northeast “double first-class” colleges and universities have cultivated a large number of top talent. Over the past 10 years, four “double first-class” colleges and universities have trained a total of nine academicians of the two academies (**Table 2**). The report on the employment quality of graduates of colleges and universities shows that, according to estimation, in the past three years, most graduates of colleges and universities in Heilongjiang have stayed in the northeast for employment, accounting for about 52% of the total number of graduates, which has injected a strong support for the revitalization of the northeast in terms of human resources.

Table 2. Number of elected academicians of the two academies in the “double first-class” colleges and universities in the northeast, 2013–2023 (persons)

Provinces	Name of the school	Academician of the Chinese Academy of Sciences (CAS)	Academician of the Chinese Academy of Engineering	Total
Heilongjiang province	Harbin Institute of Technology	4	8	12
	Harbin Engineering University		2	2

In the past three years, Heilongjiang Province colleges and universities have significant growth rate in the field of artificial intelligence, intelligent manufacturing, and other areas of additional undergraduate professions. In 2020, for example, the Ministry of Education approved the colleges and universities in the Northeast region to set up an additional 209 undergraduate professional sites, of which the “double first-class” colleges and universities in the field of artificial intelligence set up an additional 9 undergraduate professional sites (see Table 3).

Table 3. Statistics of new artificial intelligence majors added to the undergraduate programs of “double first-class” colleges and universities in 2020

	Name of the school	Name of profession
1	Harbin Institute of Technology	Information Engineering
2	Harbin Institute of Technology	Intelligent Construction
3	Harbin Institute of Technology	Intelligent Medical Engineering
4	Harbin Engineering University	Artificial Intelligence
5	Harbin Institute of Technology	Intelligent Measurement and Control Engineering
6	Northeast Forestry University	Artificial Intelligence
7	Northeast Forestry University	Robotics Engineering
8	Northeast Agricultural University	Data Science and Big Data Technologies
9	Northeast Agricultural University	Intelligent Agriculture

In terms of the transformation of scientific research achievements, the Ministry of Education has built a number of experimental platforms, national scientific and technological innovation bases, and major scientific and technological infrastructures based on the layout of “double first-class” universities. According to the “China Science and Technology Achievement Transformation 2018–2021 Annual Report” (Colleges and Research Institutes), the statistics on the contract amount of scientific and technological achievements transformed by colleges and universities from 2017 to 2020 show that a total of nine colleges and universities in the Northeast region have been listed among the top 100 colleges and universities for the transformation of China’s scientific and technological achievements, and five “double first-class” colleges and universities were listed among the top 100 colleges and universities for four consecutive years. Among them, Harbin Institute of Technology ranked at the forefront of national universities with a high income of about 3.69 billion yuan for four years.

2.4. Deep integration of local universities into revitalized development

Local colleges and universities are an important part of the higher education system in Heilongjiang Province, accounting for more than 95% of the number of schools and close to 90% of the cultivation scale.

In Heilongjiang Province, for example, local colleges and universities have provided strong talent support for regional economic development. With the continued promotion of the strategy of talent retention in the province, the proportion of college graduates who stayed in the province for employment in the class of 2024 has reached 52%, and the number of people who stayed in the province for employment has continued to grow for the past six consecutive years, and the trend of talent gathering and returning to the province has been good across the board. As for the integration of production and education, six higher vocational colleges and universities have been selected for the National Higher Vocational “Double Higher” Construction Program. Colleges and universities have taken the initiative to adjust their disciplines and specialties, actively promote the transformation of achievements, and serve the needs of local industries with scientific and technological innovations.

3. Challenges to the development of higher education in Heilongjiang Province

3.1. The mismatch between the flow of talent from universities and the demand for talent in economic and social development

The level of human capital in a place determines whether it can attract more investment, and a large proportion of the contribution of physical capital to economic growth can be attributed to education ^[1]. Influenced by the environment of economic downturn in Heilongjiang Province, the lack of development platforms in Heilongjiang Province, and lower salaries, although the relevant state departments have introduced a number of policies to regulate the flow of talent, the trend of the exodus of young and middle-aged key talent is more obvious, and colleges and universities and enterprises in Heilongjiang Province are generally caught in the difficult situation of retaining and attracting talent ^[2].

In recent years, Heilongjiang Province has introduced an unprecedented strength of talent policy. Heilongjiang Province has been deeply implementing its strategy of strengthening the province through talent development. It adheres to an inclusive approach to attracting talent, employs multiple measures to cultivate talent, and makes dedicated efforts to retain talent. By embracing diverse methods and introducing the “New Era of Talent Revitalization in Longjiang 60” initiative, along with a series of supporting implementation rules, the province has successfully attracted an increasing number of high-end professionals and encouraged more graduates to remain in Heilongjiang Province. However, the rate of high-end talents staying in the province has to be further improved. In addition, the pressure of outflow of high-level talents from universities is greater, it is reported that in 5 years, the outflow of full-time teachers above the deputy high level in Heilongjiang Province is more than 3:1, and some colleges and universities have shown a negative growth in high-level talent in the last 3 years, and the number of high-level talents does not match with the scale of universities and colleges, talent cultivation, and the demand for service to the local economy.

3.2. Insufficient fit between academic disciplines and local industries, and low rate of transformation of scientific research results

There is a dialectical relationship between the construction of first-class disciplines and the development of local economy. Heilongjiang Province has a large number of first-class disciplines and a wide range of disciplines, but the degree of fit between the development of pillar industries and the construction of disciplines is not very high, and the development of many pillar industries lacks the corresponding first-class disciplines.

The transformation of scientific and technological achievements of “double first-class” universities is an important part of the revitalization of the Northeast, and is a key step in truly transforming science and

technology into productivity. Despite the fact that there are more scientific research achievements of universities in Heilongjiang Province, the output capacity of high-quality achievements is not strong, and there are certain dilemmas in terms of demand, supply, motivation, policies, etc., and the transformation implementation is not satisfactory. According to the statistics of the Report on the Transformation of Scientific and Technological Achievements of Higher Education Institutions in 2019 and 2020, only 2 universities in Heilongjiang Province have been listed in the top 100 list of the contract amount of scientific and technological achievements of national universities for two consecutive years (**Table 4**), and the rankings are both different from the overall ranking of the school. From a practical point of view, one of the important reasons for the low rate of transformation of scientific and technological achievements of colleges and universities in Northeast China is that local enterprises, as the main body of innovation, are not clear enough about the technological needs to lead the innovation of industrial technology frontiers and form core competitiveness, and are not willing to undertake early scientific and technological achievements of higher risk and uncertainty due to lack of ability to digest and absorb results of the universities' bias in favor of the basic and cutting edge achievements. There are also some enterprises that lack strategic vision and are not willing to invest in research and development. From the point of view of universities, teachers' understanding of the transformation of scientific and technological achievements, their knowledge of the technology market, and the evaluation of teachers by the university are also important factors affecting the transformation of achievements. On the whole, the innovation chain for the transformation of achievements has not really been formed.

Table 4. One of the top 100 universities in China in terms of contract value of scientific and technological achievements in 2019 and 2020 for two consecutive years

Ranking of universities and colleges	2019		2020	
	Amount converted (¥ bn)	Rank	Amount converted (¥ bn)	Rank
Harbin Institute of Technology	9.47	10	7.32	25
Harbin Engineering University	1.64	93	3.31	58

3.3. Inter-university competition intensifies, limiting the development of local high-level universities

Most of the local high-level universities are provincial universities, which are not only highly dependent on the insufficient financial allocations from local governments for their operating funds, but also have relatively limited autonomy in terms of personnel and financial systems. Local high-level universities generally have the problem of talent shortage, especially after the implementation of the “double first-class” construction, the competition for talents among local universities and colleges and universities at all levels has become more intense, which leads to the attraction and retention of local high-level universities in economically underdeveloped areas and puts them in a greater predicament. Compared with the “double first-class” construction universities, the scale of funding for local high-level universities is obviously on the low side, and they are unable to provide sufficient financial support for the introduction of talents and retention of talents; local high-level universities lack national platforms, doctoral enrollment indexes, and other key resources for running schools, and the total number of establishments is generally tight and under strict control, which reduces the efficiency of the introduction of talents; local high-level universities are unable to attract and retain talents after acquiring the “double first-class” construction universities; local high-level universities are at a disadvantage in obtaining national talent titles, and the mechanism for cultivating

leading talents is not smooth ^[3]. Multiple factors have led to the fact that the existing disciplinary teams of local high-level universities are generally significantly weaker, with fewer leading talents and high-level teams, and insufficient leading and driving effect on disciplinary construction; the quality of the introduction of young and middle-aged scholars varies, and the development of disciplines has little momentum.

3.4. Local colleges and universities have a more ambiguous understanding of the positioning of their operation

Local colleges and universities still have a strong impulse to seek high, big, and comprehensive, and generally have a vague understanding of the school's positioning, the goal of talent training, and the pursuit of the "double first-class" path. It is not fully understood that colleges and universities in Heilongjiang Province are the main force to improve the overall quality of the population of Heilongjiang Province and an important main body to improve the quality of labor. Through the research on the development planning and curriculum of local colleges and universities in Heilongjiang Province, colleges and universities are still stuck in the stage of professional education to locate the target of talent training, and after entering the stage of popularization of higher education, they have not timely turned to the target of combining the three aspects of quality education, professional education, and vocational education. The teaching concepts, specializations, curricula, training methods, and teaching paradigms of most schools have failed to adapt to the major changes that have taken place in the mission of higher education, making it a great challenge for university students to improve their scientific and cultural qualities, their physical and mental health, and their ideological and moral qualities.

4. Countermeasures and suggestions for the development of higher education in Heilongjiang Province

Throughout the history of the development of higher education in the world, counting from the origin of modern universities in medieval Europe, universities have always been in the process of serving major national strategies and regional economic and social development, breaking through the boundaries of human knowledge by solving major technological problems, continuously improving the level of governance through positive interaction and synergistic development with the industrial market, and earning a high reputation in the world. Regions flourish because of universities, and universities thrive because of regions. In his book *The Triumph of the City*, Harvard University economics professor Edward Glaeser points out that for industrial cities in the decline stage, the road to revival is long and difficult, and not every city can achieve revival ^[4]. Apart from investing in education and providing core public services through sound taxation and regulation, there is very little that governments can do to accelerate the process of regeneration. If Detroit in the Rust Belt had used its wealth and political power to invest in educational institutions at all levels since the 1920s, it might have gained the human capital necessary for the renaissance of a post-industrial city. Colleges and universities are an important combination of science and technology as the first productive force, talent as the first resource, and innovation as the first driving force, and they must give full play to their important supporting role to provide a strong boost for the revitalization of the Northeast.

4.1. Facing the needs of revitalization and taking up the major mission of educating people for the Party and the country

Nurturing the new man of the age with all our hearts. Adhere to the Party's overall leadership of colleges and universities, fully implement the Party's education policy, carry out the fundamental task of establishing moral

education, unswervingly lead students with the Party's innovative theories, educate them with the values of the times, and infect them with excellent culture; implement the project of casting souls in the new era and the project of building a "big ideological and political class," and educate and guide the vast majority of young students to deeply understand the theoretical, historical, and practical logic of the "two establishment," firmly uphold the political and operational consciousness of the "two safeguards," firmly establish the correct beliefs and faith, and actively participate in the grand journey of comprehensively building a modern socialist country and the great cause of comprehensive revitalization of the northeast.

Reforming the talent training model. Adhere to the reform of the talent cultivation mode through the integration of science and education, and the integration of industry and education, as well as categorized cultivation. The "double first-class" universities should focus on the cultivation of top-notch innovative talents, cultivate students' professional theoretical foundation, actively promote the integration of science and education, and cultivate students' innovative and critical thinking. Applied universities should focus on promoting the talent cultivation mode of industry-teaching integration and collaborative education, implement case study teaching and project teaching, strengthen practical teaching such as experimental training and internship, and cultivate applied talents who have basic theories of their majors, possess basic vocational qualities, and are capable of solving practical problems to meet the needs of the industry. Higher vocational colleges and universities should innovate the technical and skilled personnel training mode of industry-education docking, face the needs of industry and enterprises, adhere to the unity of knowledge and practice, combine work and study, establish dual-education system between schools and enterprises, promote the reform of higher vocational colleges and universities in terms of profession, curriculum, and teaching materials, and cultivate high-quality skilled personnel with a high degree of fit with the development of industries in Heilongjiang Province.

Attracting talent to local roots. Comprehensive revitalization of the Northeast, the urgent need to build a large-scale, structurally sound, well-qualified talent team, especially the need to master the core technology and product development of innovative talents, to promote scientific and technological innovation and economic restructuring and upgrading. To strengthen the construction of talents in Heilongjiang universities, combined with regional policies, adhere to school-specific, smooth the introduction of high-level talent "green channel," improve the talent attraction system, through internal training, external attraction, training, attracting and retaining a number of high-end talent, reversing the trend of outflow of talent. To guide and encourage more graduates to stay in the local employment, the creation of college students to stay in the province employment network and public service platforms, smooth entrepreneurship and employment policy consulting channels for college students to stay in the province entrepreneurship and employment guidance, strengthen the local enterprise docking, and actively create a strong atmosphere of talent to stay in the province.

4.2. Demonstrating the mission and responsibility of "double first-class" universities in promoting the comprehensive revitalization of Northeast China

Accelerating the construction of "double first-class" for the comprehensive revitalization of Northeast China. The "double first-class" construction of universities should be based on the development of disciplines and academic frontiers, while strengthening the training of top-notch innovative talents, grasping the direction of the new round of scientific and technological revolution and industrial change, aiming at the major scientific theories, major basic research, major national strategies, and the needs of economic and social development of Heilongjiang Province, and striving to achieve breakthroughs in theoretical research and original innovation. We will strive to build world-class universities and disciplines at an early date. We should strongly support

the construction of disciplines related to the pillar industries of the three provinces, help upgrade traditional industries, and accelerate the layout of disciplines in strategic emerging industries such as artificial intelligence, intelligent manufacturing, big data, new energy, etc., so as to enhance the strength of the comprehensive revitalization and development of the Northeast region.

Fulfilling the role of a platform integrating education, science and technology, and human resources. As a regional high-end platform integrating education, science and technology, and talents, Heilongjiang “double first-class” universities have significant talent attraction, social influence, and international appeal. To give full play to its important role in cultivating and attracting outstanding talents, carrying out cutting-edge high-level scientific research, bringing together innovative teams, carrying out international and domestic co-operation, attracting alumni to invest in business, and serving local economic and social development. To play a leading role in the culture of the university, Heilongjiang Province, “double first-class” universities is to renew the vitality of the city, enhance the city’s taste of the ideological high ground, not only is the cultural symbol of urban construction, but also the development of the city’s microcosm, to let the “double first-class” university of the spiritual culture of the campus, forming an exemplary demonstration, and to make the “double first-class” university. We should let the spirit and culture of “double first-class” universities go out of the campus, form an exemplary demonstration, lead the social trend, and provide a constant ideological and cultural driving force for the economic and social development of the region.

Exploring mechanisms for synergy with local universities. To give full play to the radiation, leading, and demonstration role of the “double first-class” universities, explore the “double first-class” construction of universities and high level local universities with high comprehensive strength in Heilongjiang province to carry out twinning and co-construction, and form alliances and academic communities in terms of disciplines, scientific research, talents, and cooperation among industries, universities, and research institutes. We will support and lead local universities to actively explore and achieve breakthroughs in key areas such as deepening the reform of institutional mechanisms, scientific research system, personnel system, remuneration system, and talent cultivation, so as to realize complementary advantages and synergy, and contribute to the revitalization of Northeast China together.

4.3. Giving full play to the “backbone” of local high-level universities

Repositioning of schools with the goal of improving the quality of the population. In 2022, the national higher education popularization rate reached 59.6%, and the popularization rate in Heilongjiang Province is much higher than this rate. Colleges and universities in Heilongjiang Province should make corresponding adjustments to the positioning of schools and the objectives of talent cultivation according to the new characteristics of higher education entering the stage of popularization and the spirit of the General Secretary’s speech, with the goal of improving the quality of the regional population and the quality of the workforce. Adjust the objective of professional education as the main training goal to the objective of combining quality education, professional education, and vocational education. To better serve the training of students’ professional ability, vocational ability, and the improvement of the quality of the population in the northeast region.

Adjusting the structure of disciplines and majors to serve the needs of the comprehensive revitalization of Northeast China. Strengthen the demand orientation, improve the classification and evaluation system of local colleges and universities, increase the proportion of enrollment in majors that conform to the direction of industrial development, have high employment quality and fit well with regional development, accelerate the development of new engineering disciplines, new medical disciplines, new agricultural disciplines, and

new liberal arts disciplines, and adapt to the significant changes in the mission of higher education in terms of teaching concepts, professional settings, curriculum, training methods, and teaching paradigms, and create a number of Heilongjiang Province economic.

Concentrating on the characteristics of school running with the purpose of service. Based on the positioning of the university, not blindly pursuing “high and comprehensive,” taking “application-oriented” and “serving localities” as the cultural consciousness and value pursuit of local universities ^[5], and implementing differentiated competition strategies. On the basis of scientific analysis of their own historical deposits and the reality of the effectiveness of school running, adhere to the original mission, adhere to something for nothing, the relatively limited resources for school running in the most reflective of regional natural resources, regional culture, the characteristics of the leading industries and has the corresponding advantages of the accumulation of disciplines, so that it becomes a growth point of the characteristics of the growth point. Focusing on the technological bottlenecks of industrial enterprises, we will carry out scientific and technological research oriented to solving real problems, forming a characteristic scientific research system, solving the urgent needs of the national and regional economic and social development, and enhancing the school’s ability to contribute to society and the degree of its contribution.

Modernizing the university governance system to help and empower Northeast revitalization. Comprehensively strengthen the Party’s leadership of universities, build a new type of relationship between universities and the government and society, improve the external governance structure of universities, change the functions of the government, deepen the simplification of government and decentralization of power, innovate the way of service, expand the implementation of the autonomy of the use of university funds, the autonomy of the setting and adjustment of academic disciplines and specialties, as well as the autonomy of the setting of organizations and institutions, and the autonomy of the selection of personnel and recruitment of personnel, and “loosen the belt” of the talent and financial issues in the layout and construction of academic disciplines and specialties of universities ^[6]. “Untying” and truly letting universities become the main body of governance. To build an internal governance system led by the party leadership, to form a governance pattern of “party leadership, presidential responsibility, professorial governance, democratic management,” to release the vitality of running schools, to stimulate the motivation to run schools, and to continuously improve the governance capacity of universities to run and govern schools and the ability to serve the local community. Colleges and universities should also take the initiative to change their concepts, reverse the tendency of homogenization, give full play to their advantages in talent cultivation, technological innovation, transfer and in-depth integration of industry, academia, and research, enhance their comprehensive ability to serve the revitalization, and form a relationship of in-depth interaction and mutual achievement between the university and the society.

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