Review Article

The Transmutation Logic of China University Science and Technology Innovation System since the Founding of the Communist Party of China One Hundred Years Ago: Three-Chain Perspectives Led by Party-Building

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The university science and technology innovation system is an essential bridge between higher education and national innovation development. Since the founding of the Communist Party of China, the scientific and technological innovation system of Chinese universities has intermingled with the historical environment and internal and external factors and has gone through several stages of development from weak to strong and from fragile to solid. In this process, the Communist Party of China has always been firmly based on the central concept of people-oriented, using a forward-looking vision to develop the macro deployment of the university science and technology innovation system and finally using the combination of ideology and politics, the three-wide education throughout the sustainable development, and optimization of the system, returning to the “university” nature of the university science and technology innovation system, to achieve the fusion of the system and the Party-building development. To this end, the university science and technology system in the new era must continue to uphold the leadership of the Communist Party of China, draw on the power of the three chains led by the Party, inductively form contemporary inspiration from the logic of construction over the past century, and adapt to the complex and changing world situation of the future.

1. Introduction

The historical intersection of the world’s unprecedented changes and China’s development has brought about profound changes in our domestic and international environment. China’s high-quality development under the new normal has put forward more urgent demands for accelerating science and technology innovation. Under the guidance of the “innovation-driven development strategy” and the impact of crises such as the “science and technology embargo and sanctions,” the logic of the transformation of China’s science and technology innovation business is presented [1]: to improve the science and technology innovation ecology, to stimulate innovation and creativity, to promote the demand- and problem-oriented science and technology innovation, and to focus on the construction and optimization of the innovation system with the core advantage of the socialist system of centralizing power to do great things. The “science and technology innovation system” here is not a combination of units with innovation resources and technology replication and creation capabilities in a broad sense [2], nor is it a brief system of talent, capital, science, and technology base and other elements that are gathered around a particular goal in a micro perspective such as industry or enterprise [3]. On the one hand, it is a complex emergence of scientific research, technological progress, and applied practice. On the other hand, it is a joint product of the triple helix structure of scientific research as the core of the knowledge innovation system, technological progress as the goal of the technological innovation system,
and applied practice as the carrier of the practice optimization system [4]. In many science and technology innovation systems, the university science and technology innovation system has an irreplaceable and pivotal position [5], and the connotation of the rest of the science and technology business is shown in Figure 1. From the height of the great strategic significance of science and technology innovation, scientists and science and technology workers in the university system must undertake the historical mission of confronting unilateralism and protectionism, leading the improvement of original innovation capability and achieving the breakthrough of science and technology innovation from 0 to 1 [6]. From the realistic perspective of speeding up the solution of the problems that restrict the development of science and technology innovation, the main battlefield of universities must play a central role in the integration of demand- and problem-oriented links, the integrated use of science and technology resources, the sustainable promotion of breakthroughs in basic research, and the inexhaustible cultivation of innovative talent education [7]. On the one hand, the university science and technology innovation system bears the critical task of talent export and curation and is the primary source of science and innovation talents and knowledge shaping; on the other hand, the university science and technology innovation system builds a complete science and innovation mechanism [8] and carries the science and innovation activities with a massive power of innovation resources. In promoting the spirit of scientists, the university science and technology innovation system has the inherent advantage of being youthful, dynamic, and energetic. As social development evolves, science, technology, and innovation in higher education become a connecting tool for the realization of higher education and the clarification of China’s development goals.

After clarifying the positioning and significance of the university science and technology innovation system, it is necessary to address the construction and optimization of the university innovation system, that is, to promote the precise integration of the university science and technology innovation system with the development of Chinese society and the innovation of higher education. Moreover, in this process, the leading force of the Communist Party of China in science and technology innovation in universities is significant. Based on the top-level design and macro layout of the Communist Party of China, the university science and technology innovation system has clearly defined its political direction and essential task to meet the growing needs of the people for a better life as a relentless pursuit. Based on the grassroots implementation and micro-practice of the university science and technology innovation system [9], China’s development presents a new dynamic and power to achieve the great rejuvenation of the Chinese nation by improving national quality and technological civilization. It is thus clear that the Chinese higher education system under the leadership of the Communist Party of China is taking scientific and technological innovation as its mission [10] and constantly strengthening its role in innovation-driven development [11]: focusing on the needs of the country, based on the interests of the people, and combining scientific research with the major theoretical and practical issues of the development of the Party and the country under the unprecedented changes of the century. The deep integration of the university’s science and technology innovation system with the Communist Party of China lies in the convergence, influence, and guidance of party-building. In April 2020, General Secretary Xi Jinping presided over a meeting of the Central Government to deepen reform, emphasizing that the construction of the science and technology innovation system must focus on the innovation layout of the innovation chain, industry chain, and value chain, pointing out the direction for the science and technology innovation business of universities. In September 2020, General Secretary Xi Jinping pointed out at a seminar for grassroots representatives that the Party should insist on leading governance activities, integrating the three major chains of “innovation, service, and industry,” and enhancing the fighting power of the Party organizations. The cause of science and technology innovation in universities and the cause of governance of the Communist Party of China take “party-building” as the linking point and breakthrough to realize the linkage development, and the mechanism of integration is shown in Figure 2. The innovation chain of governance under the Party-building activities dovetails with the innovation chain of the university science and technology innovation system to promote the creative sources of the university from the product to the market with the system innovation and thought innovation under the leadership of the Party. The industrial chain of governance under the Party-building activities is docked to the industrial chain of the university science and technology innovation system to form a cadre and group synergy to promote the high-quality development of the industry with the unity of the Party and the group, which leads to the upgrading of the fused layout of the university innovation system and the industrial chain and improves the problem of the fragile association form under the original relative independence, weak logical relationship, and objective formation of the spatiotemporal layout between the two. The governance service chain under the Party-building activities is docked to the value chain of the university science and technology innovation system, and the Party’s organizational function and service essence promote the status of the university science and technology innovation system in the value chain and make every effort to realize the inner integration of innovation and development and contribute to the achievement of the innovation-driven development strategy. Despite the different roles played by the CPC in the university science and technology innovation system during the revolutionary, construction, reform, and new periods and the different emphasis of its promotion work, the CPC has always paid attention to the “Chinese characteristics” of the university science and technology innovation, adhered to socialist schooling, and promoted the construction of the university science and technology innovation system reliably. In recent years, academics have also focused on the themes of “universities” and “scientific and technological innovation” to strengthen the perception of the role of the
CPC in the construction of the university scientific and technological innovation systems [12]. On the one hand, the research results of a collaborative model of university science and technology innovation [13], policy ideas [14], and optimization and enhancement [15] have been formed, laying a solid theoretical foundation for empowering the transformation and upgrading of China’s university science and technology innovation system. On the other hand, Li and Hu [16] explored the inner changes of the university science and technology innovation system, hoping to realize the adjustment of the university science and innovation organization through the docking of the three chains of objectives and the three chains of structures, to meet the new tasks of the university science and innovation system for future development. Ren and Lu [17] also combined the characteristics of university science and technology innovation system and the spiral characteristics of the innovation system and proposed the innovation path of university system under the domination of three-chain spiral. Both types of research are rooted in the construction of university science and technology innovation systems and offer new perspectives on the leadership of the Communist Party of China around the optimization of specific elements within them. However, the maximum power and fitting role of party-building have been overlooked in existing research. As the core leader of science and technology innovation in higher education and society [18], it must be clearly understood that the CPC understands the logic of its practice in promoting the university science and technology innovation system. Then it is the key to reflect the connotation, actual situation, and future direction of the university science and technology innovation construction. Against this background, this paper examines the logic of transmutation of university science and technology innovation system in the past century of the Communist Party of China, clarifies the core leading direction of university science and technology innovation in each stage, takes this as a microcosmic microcosm, sums up and forms the inspiration of the times for
the construction of China’s university science and technology innovation system, and further expands the theoretical basis for the transformation of university science and technology innovation. With the perspective of three chains, furthermore, analyze the leading role of party construction on university science and technology innovation system in different periods and realize the re-optimization of university science and technology innovation system in the new period with the help of the docking of party construction service, innovation and industrial chain with the value chain, and innovation chain and industrial chain of university science and technology innovation system.

2. The Evolution of University Science and Technology Innovation System in the Past Century since the Founding of the Party

Considered comprehensively from the perspectives of historical tasks and system focus, the university science and technology innovation system since the founding of the Communist Party of China has gone through four stages of development: the New Democratic Revolution, the establishment of New China to reform and open up, and the new period since the 18th National Congress. The heterogeneity of national conditions, international environment, and internal and external factors make the university science and technology innovation system significantly different in terms of goal orientation and internal characteristics. The historical intersection of the world’s unprecedented changes and China’s development trend has adjusted to university science and technology innovation system under the new regular and new period the development interpretation and inevitable result of historical university science and technology innovation system. The gradual improvement, evolution, and innovation of the university science and technology innovation system are all scientific decisions made by the Communist Party of China based on historical experience and practical judgment, thus forming a history of the evolution of the university science and technology innovation system in line with historical stages.

3. The First Signs of a University Science and Technology Innovation System during the New Democratic Revolution (1921–1949)

In 1921, combining Marxism-Leninism with the Chinese workers’ movement, the Chinese Communist Party was born. It can be said that Marxism-Leninism itself played the role of “higher education” in its activities of arming thought and guiding action [19], based on political, revolutionary, military, situational, and theoretical education, to achieve a high quality of training for the majority of young students, in order to achieve the realistic goal of “higher” “re-education.” In leading the great struggle of the New Democratic Revolution, the Communist Party of China always upheld the slogan of “democracy and science” and made every effort to develop scientific and technological work. Forced by the limitations of natural conditions and social environment, the science and technology innovation system of Chinese communist colleges and universities at that stage manifested itself in the form of scattered connections. The establishment of a science and innovation organization system centered on teams, groups, and associations, the promotion of science and innovation by magazines and scientific societies, and the export of science and innovation by new higher education schools such as Yan’an University and Shaanbei Public School, are the three elements that gradually led the formation and transformation of the university science and technology innovation system. This phase of the university science and technology innovation system is characterized as follows:

First, the importance to free innovation and scientific and technological expression, constantly highlight the core position of “people-oriented” in universities' scientific and technological innovation system [20], and highlight the critical contribution of small and micro organizations in scientific and scientific and technological innovation. Due to the development line of the Chinese Communist Party at that time, the revolutionary base undertook the multifaceted task of “government, industry, academia, and research,” and the new universities at that time were integrated with the revolutionary base and even the people, making the technological innovation at that time more grounded and the corresponding barrier to entry lower. In this context, the university science and technology innovation system has formed a vertical organizational structure of “party members-science and innovation groups-the public” and a horizontal structure of “output institutions-science and innovation organizations-propaganda organizations.” Vertically, in 1941, the Central Committee of the Party put forward in Yan’an the “Decision on the Participation of Party Members in Economic and Technical Work.” In the same year, the Senate of the Border Region formally adopted the "Proposal on the Development of Scientific Business in the Border Region.” The Liberation Daily pointed out clearly in “On Economic and Technical Work” that every Party member needs to study theory and participate in practical work, which is an unshirkable responsibility. Most revolutionary base construction party members were trained in Soviet universities, Red Army universities, and Marxist communist schools and are typical university-type talents, making party members the basic unit of the university science and technology innovation system. In response to the needs of the industrial and agricultural production movement and the economic blockade imposed by the Kuomintang reactionaries, many party trainees formed themselves into scientific and creative teams and groups, focusing on technological innovation on essential products such as military industry, leather, chemicals, alcohol, pottery, and paper. The paper-making and printing technology in northern Jiangsu
supported by the JACB formed an extremely high level of paper-making technology and innovation far beyond that of the Japanese. Under the breakthrough of the science and innovation group, many people joined spontaneously, either as productive personnel or technical learners, further promoting the expansion of the university’s science and technology innovation system in terms of personnel and technical sources. Horizontally, with science and innovation organizations as the central source, the upstream relies on technical and financial support from universities for small-scale technological R&D attempts. In contrast, the downstream rely on publicity positions such as Science, Tai Bai, and Reading Life to popularize natural science articles and cutting-edge science and innovation achievements. In general, the university science and technology innovation system was only in its infancy at that time. However, its characteristics of inclusiveness, practicality, and freedom have been inherited to this day, even responding to the scientific and creative trend of “mass entrepreneurship and innovation” a century later, which is the deepest connotation of our university science and technology innovation system: The masses and scientific creators create freely and initially, taking into account the needs of reality, without ignoring anyone’s creativity. Through the extension of the multidimensional structure, the solidity of the university science and technology innovation system is achieved, which eventually carries the needs of various industries such as national defense, military, and life development [21].

Second, it has a broad vision and attaches importance to the formation and improvement of the scientific research system and the establishment of a scientific and technological line of thought and system [22]. It has long been pointed out in the policy program of the Chinese Communist Party that all scientific research needs to be subordinated to the development of the political, economic, and cultural construction of the resistance to Japan. This clear guiding ideology of science and technology defines the point of departure for scientific and technological innovation, which is still valid today to meet China’s political, economic, and cultural construction and development in the new era. Thus, as early as a century ago, the Chinese Communist Party specified the core tasks of the university science and technology innovation system. In this context, the university science and technology innovation system has formed a scientific and technological line of thought “with development as a service objective” and a scientific research system “with scientific research, production departments and technical departments in tandem.” The prosperity and maturity of the scientific and technological line of thought and the scientific research system gave birth to higher education institutions such as Shanghai University, North China United University, Yan’an University, Yan’an Agricultural College, and Mao Zedong Youth Cadre School. They carried scientific organizations such as the Shanghai Natural Science Research Association, the Chongqing Science Symposium, the Chinese Science Society, the Chinese Association of Scientific Workers, and the Yan’an Academy of Natural Sciences. In general, based on the embryonic university science and technology innovation system, the Chinese Communist Party quickly injected a line of thought. It promoted the security of the research system, based on the future, to grow the strength and quality of the science and technology innovation business. From then on, the structure of the three chains of party-building was relatively weak, among which the party-building innovation and industrial chains were far from being formed. However, a strong Party-building service chain led to the formation of the embryonic university science and technology innovation system and, by doing so, gave its most central feature and goal: value chain shaping. Based on a historical perspective, forming an embryonic university science and technology innovation system relies on deep roots. Moreover, the then steadily extending and growing function of the party organization unites a strong driving force to focus on building the innovative resources of the university and laying the foundation of the university’s science and technology innovation system. Through Party-building organization mode, the scattered R&D points of university science and technology innovation system are gradually linked in series. The original product value points become a systematic operation system, which is guided to become the prototype of the value chain. For example, the military-industrial chain and agricultural chain at that time all originated from the guidance of the party-building service chain.

4. Continuous Improvement of University Science and Technology Innovation System during the Construction Period of New China (1949–1977)

During the 29 years from the construction of New China to the reform and opening up, the university science and technology innovation system showed an inverted “V” change trend, which can be roughly divided into two sub-stages: the rapid promotion period from 1949 to 1965 and the sinking and stagnation period from 1966 to 1977. The establishment of New China marked a brand new starting point for China’s science and technology innovation career [23]. In the new cycle, the university science and technology innovation system ushered in a new metamorphosis, which manifested itself in optimizing and upgrading the original two-dimensional university science and technology innovation system and shaping a three-dimensional grid form to meet the future development needs country. This is reflected
in the restructuring of the science and innovation organizational system into large-scale organizations such as the Chinese Academy of Sciences, special research institutes, laboratories, and industrial sectors and the restructuring of the science and innovation promotion forum into specialized media such as professional journals, science and technology bulletins and exchange platforms, scientific research conferences and expert symposiums, and the formal transformation of the scientific research output institutions into higher education school formations. The solid and detailed three-dimensional grid construction gradually supports the growth of the university science and technology innovation system. The university science and technology innovation system at this stage also has the following unique characteristics:

The first is through the political elite to assist the scientific and technological elite, guide the university science and technology innovation system to shed the "military" color, and further highlight the "people-oriented" construction characteristics. Based on a three-dimensional grid of university science and technology innovation systems, the CPC does an excellent job of complementing the various elements of the system. Due to the limited scientific and technological talents and resources, the Communist Party of China introduced military and political talents into the university science and technology innovation system to become the internal support of the university units and then used several political means to strengthen the induction and collection of scientific and technological talents, gradually expanding the size of the scientific and technological elite in the science and technology innovation system. After the scientific and technological elite has been firmly established, we will proceed to eliminate the "militarization," achieve complete and authentic scientific and technological innovation, and sink the focus to the concept of university scientific and technological innovation "for the benefit of the people and at the service of the people." In essence, there is a significant difference between university science and technology innovation and the national science and technology innovation system, with the former being expected to undertake specific and important frontline work as a subordinate part of the latter. However, due to the early years of the country’s existence, university science and technology innovation at that stage were equated with the national science and technology innovation system. This nation-raising system and highly integrated construction method set the great stroke and tone for the university science and technology innovation system. After the Chinese Academy of Sciences in 1949, the National Congress of Natural Scientists in 1950, and the restructuring of faculties in 1952, higher education institutions became a critical stage for the presentation of Mao Zedong's scientific and technological thought. The country’s founding could not be achieved without science and technology and intellectuals, and the initial concern of the Chinese Communist Party for scientific and technological innovation in higher education institutions has been upheld since the birth of Mao’s scientific and technological thought.

The second is to continuously promote the basic construction of university science and technology innovation system, gradually promote the degree of specialization, clarify the internal redundancy and complex relationship of university science and technology innovation system, and transform the decentralization, individualization, and coarse scattering of university science and technology innovation into centralization and refinement. The establishment of the National Science and Technology Commission and the Department of Scientific Research of the Ministry of Higher Education in 1956 marked the end of the process of building the foundation of the university science and technology innovation system [24] and the diversion of university science and technology innovation from the national science and technology innovation system. The Opinion on the Guidelines and Institutions of Scientific Research specifies the direction of constructing the scientific and technological innovation system in universities: basic and applied sciences as the central task, with practical applications and technological improvements as subsidiary tasks. Through the division and adjustment of the science and innovation system, the university science and technology innovation system has undertaken more than 70% of the national research and innovation work [25], and the increase in specialization and concentration has strengthened the load and productivity of the university science and technology innovation system.

Undeniably, during the Cultural Revolution of 1966–1976, higher education was more adversely affected, and the formally formed and well-established system of scientific and technological innovation in universities was destroyed and crumbled. However, with the end of the Cultural Revolution and the advent of reform and opening up, the university science and technology innovation system has been steadily restored, further upholding the political and revolutionary overtones of the New Democratic Revolution and the early years of the founding of the country and ushering in the addition of many new elements. During this period, the university science and technology innovation system showed a "V" shape development.

From then on, the three chains of party-building were formed, of which the chain of party-building services showed a shift from extension to contraction: in the first five and second five years, the party-building services were diversified and grassroots around the issues of development and innovation, reforming the shortcomings and raising the new, and gathering strength in the service of reform and innovation. During the Cultural Revolution, the service chain was slightly narrowed, and there were problems of stagnation and stagnation in the organization's internal resources and ability to reform services. Therefore, under the role of the party-building service chain, the industrial
categories and economic development value chain supported by the scientific and technological innovation system of China’s universities have also changed in the same direction, and the penetration and influence of party-building should not be underestimated. Moreover, party innovation and industrial chains were formed and strengthened during this period as the capacity of party organizations increased. With the shift of the center of gravity of national development, the Party gradually activates the innovation factor and development kinetic energy, leading the construction of scientific and technological innovation system in universities with the spirit of “innovation” and “double hundred,” covering and promoting the extension of the innovation chain of the system. In terms of the industrial chain, the Party focused on developing the collaborative economy and the grassroots economy, strengthening the support of primary industries, and putting “heavy effort” and “heavy work” into the linkage of universities, academia, and research. In addition, the Party-building activities actively penetrate the university science and technology innovation system, "building" the party-building industry chain in the innovation “industry chain,” effectively promoting the transformation of organizational advantages into development and innovation advantages. In addition, the Party-building activities actively penetrate the innovation system of universities and transform the advantages of the organization into the advantages of development and innovation.

5. Rapid Development of University Science and Technology Innovation System during the Period of Reform and Opening up (1977–2012)

After entering the stage of reform and opening up, the university science and technology innovation system has ushered in brand new policy support, injected policy vitality on top of the original three-dimensional grid form, and ushered in the transformation opportunity of opening up and sharing. In 1978, the National Science Conference was held, and the high evaluation of “science and technology are productive forces” set the future tone for university science and technology innovation. Based on the judgment that “intellectuals are part of the working class,” the university science and technology innovation system gradually dispelled the shadow of the Cultural Revolution. With the influence of the policy revolution, the structure of the university science and technology innovation system was reorganized, and order was restored. It began to take up the tasks set out in the National Science and Technology Development Plan 1978–1985. In 1985, the Communist Party of China formulated the Decision on the Reform of Science and Technology System, which gradually eliminated the existence and obstruction of the Soviet model [26], integrated science and technology with production, guided the mechanism of transformation of scientific and technological achievements, and brought ample interest motivation and realistic orientation to the university science and technology innovation system. In 1995, the Chinese Communist Party issued the Decision on Accelerating Scientific and Technological Progress. At that time, the contradictions between science and technology and economic integration were becoming increasingly prominent. Despite the gradual maturation of the science and technology system reform practice, the future science and technology system and science and technology policy of universities needed further top-level design under the guidance of the “future-oriented and policy-reliant” policy technology innovation system in 1985. The Decision on Accelerating Scientific and Technological Progress became an extension of the “orientation and reliance” policy paradigm, and the strategy of developing the country through science and education was born. In addition, the Knowledge Innovation Project of the Chinese Academy of Sciences, the 985 and 211 programs, and the National Key Basic Research Program (973 programs) have come in iterations to add to and empower the university’s science and technology innovation system. In 2006, the Communist Party of China announced the Outline of the National Medium- and Long-Term Scientific and Technological Development Plan, with “independent innovation, key leapfrogging, supporting the development, and leading the future” as the new idea and leadership of the university science and technology innovation system [27].

As far as the system construction is concerned, the three-dimensional grid system of university science and technology innovation formed in the first and second stages has not required significant changes, and the infrastructure has become increasingly perfect. The reform and opening-up period was more about guiding the program, issuing tasks, and building momentum for the university science and technology innovation system. In terms of programmatic guidance, the university science and technology innovation system was previously unable to answer the endogenous questions of “why does it exist” and “how should it develop once it exists.” However, at this stage, it has clarified its mission and responsibilities. Combing history reveals that although the first phase of the New Democratic Revolution saw the university science and technology innovation system struggle for national independence and livelihood development, the circumstances and issues of that time can no longer guide the present. The second stage of Mao Zedong’s science and technology thought established the correct concept of science and technology innovation, but there was still a lack of heart in specific development ideas and detailed policy support. The university science and technology innovation system is linked to the lifeblood of national development. The first generation of leaders, such as Mao Zedong, made China stand up and formally established the university science and technology innovation system. In contrast, the second generation of central leadership group with Deng Xiaoping as the core realized China’s further enrichment and power and made the university science and technology innovation system meticulous and powerful. The university science and technology innovation system of the reform and opening-up period was supported by many policy structures and programmatic ideas for construction. As far as task issuance is concerned, universities in the first and second stages were small and weak. Many research
institutes and laboratories affiliated with universities were scattered and isolated, making it challenging to form valuable links, so they could not support large cross-regional, cross-unit, and cross-disciplinary research. In contrast, basic research required collaborative exploration by multiunit departments, making it difficult for the early university science and technology innovation system to withstand the pressure of huge tasks. Moreover, after the reform and opening up, the country itself faced a variety of development problems. With the improvement of higher education, universities’ scientific and technological innovation systems became increasingly mature. They had the strength and capital to solve the breakthrough problems of national basic research, thus forming a national-provincial-ministerial-local structure of various special scientific research funds and tasks-oriented. In terms of building momentum, as the university’s science and technology innovation system matures, incentives and feedback mechanisms become essential for building momentum. The original overly thin incentive activities have dampened the interest of many academics in scientific research. In the social context of the first and second stages, scientific and technological innovation in universities is more often driven by patriotism and the motherland’s future, the core motivation. However, after the reform and opening up, the living conditions and social standards of the nation have risen significantly, and the status of scientific talent cannot be driven by political care alone but more often still requires the optimization of treatment and welfare mechanisms as a driving force for upward mobility. In this context, all units, elements, and talents in the university science and technology innovation system in China have been given adequate external incentives: various universities have strengthened special funds for scientific research, and the scale of special state appropriations has increased year by year; the title mechanism has been increasingly improved, and the life security of talents has been gradually improved.

In general, the university science and technology innovation system at that stage, under the leadership of the Communist Party of China, received adequate policy and institutional support, and its depth and breadth continued to increase, achieving a significant development and positive leap forward across the century. The influence of party-building on the university’s science and technology innovation system is also clearly magnified. The integration model of government, industry, academia, and research of party organization + laboratory + practice platform, the service, innovation, and industrial chain of party construction is closely connected with the value, innovation, and industrial chain of university science and technology innovation system. First, based on the continuous construction of the organizational system, the party organization is guided to become the bridgehead of the university science and technology innovation system; play the leading role of the party organization, compatible with other democrats and intellectuals organizational structure; reasonably set up to divide the party organization system; rely on the advantages of party construction to achieve a significant leap in-service power; and drive the value chain of the university science and technology innovation system to be solid [28]. Second, innovative governance based on Party-building promotes the “re-innovation” of the innovation system to meet national development needs in the new era. Finally, based on the industrial power of party-building, the party’s resources are integrated and focused on the industrial chain of the university’s science and technology innovation system. The institutional advantages of government-industry integration are brought into play to make innovation concrete, marketable, and authentic.

6. Re-Launch of the University Science and Technology Innovation System in the New Era (2012–Present)

Since the 18th National Congress, the Party Central Committee, with General Secretary Xi Jinping at its core, has continued to promote the spirit of reform and innovation, taking the opportunity to deepen reform across the board and demonstrate its forward-looking and meticulous view of education and science and technology innovation [29]. In 2017, General Secretary Xi Jinping pointed out at the National Conference on Ideological and Political Work in Universities that the great rejuvenation of the Chinese nation requires the power of education, and the thirst for scientific knowledge and outstanding talents is more vital than ever at this time. In 2020, the Fourth Plenary Session of the 19th CPC Central Committee adopted the Decision, which clearly emphasized the need to build an “innovative country” and a “national strategic scientific and technological force.” It also put forward a great idea and a series of plans to improve the institutional mechanism for scientific and technological innovation. The national environment in the new period is more complex; at this time, the available position of the university science and technology innovation system in the national science and technology innovation system mechanism is more clearly defined, on the one hand combining the precise position of the university innovation subjects in the innovation chain links and imposing clear development tasks. On the other hand, based on the system framework of science and technology innovation governance, the university science and technology innovation system is integrated and dovetailed with other science and technology innovation dynamics such as science and technology services, science and technology finance, government, industry, academia, and research to stimulate the passion and energy of various subjects in science and innovation. The university science and technology innovation system in the new era is not alone; with the prominence and leading of the innovation status of the five development concepts, as well as the new echoes brought by the five-in-one construction, the university science, and technology innovation system has changed from the original main pioneer of science and innovation to the leader of driving the whole society’s science and innovation. Although the share of science and innovation in the university science and technology innovation system and its tasks have declined in terms of proportion, the multidimensional science and
innovation body of “a hundred flowers are blooming, and a hundred schools of thought contending” have become a realistic echo of Mao Zedong’s thought on science and technology. In addition, the new era of university science and technology innovation system echoes the original intention of the first phase of construction with its inclusive and interoperable characteristics. An exhaustive system can promote science and innovation. At the same time, the contemporary university science and technology innovation system stands at the forefront of the era of historic achievements and changes and continues to echo the original intention of the third stage of development. Four orientations, two more and four needs, promote the university science and technology innovation system to transform more realistic productivity and burst more scientific and technological innovation achievements. It can be said that the unforgettable university science and technology innovation system has realized the redevelopment and optimization of the multidimensional contents of China’s scientific research organization model, resource allocation mechanism, scientific and technological innovation talent echelon, and innovative economic development, which is an essential platform for the demonstration of China’s innovation ability and scientific research technology attack [30].

Nowadays, the Party-building of China’s universities is becoming more and more mature. General Secretary Xi Jinping pointed out that strengthening and improving the Party-building of universities is the fundamental guarantee for running an excellent socialist university with Chinese characteristics. To refine it, (1) Party-building in universities in the new era gradually raises its standing, grasps the overall situation, raises the awareness of the importance of primary and secondary Party-building work, drives the extension and consolidation of the Party-building service chain, and eventually forms the concept of Party-building service network. Horizontally, based on the construction of small and micro party organizations at all levels within universities, they actively penetrate the university science and technology innovation system and form the party-building guidelines for grassroots innovation networks. Thus, with the help of the construction of grassroots party organizations, the university science and technology innovation system obtains a more stable “foundation,” gradually clarifies the direction of innovation points, forms the exploration path of value enhancement, and lays the foundation for the extension of the value chain of the university science and technology innovation system. Vertically, party organizations at all levels support the upper and lower pulses of the university science and technology innovation system, based on the services and delivery of party construction work, support and sustain the layers of university science and technology innovation resources, and provide kinetic energy for their outward extension and integration with the value chain. (2) The report of the 19th Party Congress sets out the general requirements for the construction of the Party in the new era from the perspective of the overall development of the Party and the state. The Party-building work in colleges and universities in the new context needs to adapt to the new situation, new tasks, and new requirements to enhance the creativity of the Party organizations in colleges and universities. This Party-building empowered innovation chain promotes the re-optimization and transformation of the innovation power of the university’s science and technology innovation system. Through the innovation of Party-building, all kinds of universities can realize the traction mechanism of innovation work of “decision, guidance, and inspection” to support “talents, management, resources, and results.” Ultimately, it serves the primary strategic needs of national innovation and promotes the economic and social development of the country with high-level innovation results and high-quality innovative talents. This kind of system innovation triggered by Party-building innovation will be more profoundly and groundedly integrated into the social operation mechanism and truly drive the realization of the value objectives of the university science and technology innovation system. (3) Inevitably, there is a problem of fragmentation or less integration between universities and industry in the new era, that is, a disconnection between the results of innovation and the activities of the industrial chain. On the other hand, the university itself is also the embodiment of the education industry. To solve two skins between the university industry and other industrial development, it is necessary to guide the idea of industrialization of university party-building. With the operation of the industrialization of Party-building, improve the system, strengthen the measures to guarantee with the long-term mechanism, and promote the Party-building and the industrial work of the university science and technology innovation system to enhance and achieve the goal of the Party-building industrial chain to pull the industrial chain of the innovation system.

7. The Logic of Transmutation of University Science and Technology Innovation System in the Century since the Founding of the Party

Looking at the evolution of China’s university science and technology innovation system, what is clear is the framework of action and internal structure adapted to the tasks of different historical stages, and what remains unchanged is the original intention of the Communist Party of China to attach importance to higher education, pay attention to science and technology innovation, and guide all parties to participate in the cause of science and innovation actively. Thus, the internal logic of “change and change” of the university science and technology innovation system can be understood through the progressive historical trajectory and the transmutation logic of the Chinese Communist Party in the evolution of the university science and technology innovation system in the past century. This is also the core of the CPC’s emphasis on “science and technology-driven development” and the definition of innovative nation-building as a national strategy.

7.1. A Solid People-Centered Central Philosophy. The nature and purpose of the Communist Party of China determine its people-centered values in the unfolding of its affairs and work. The people’s position has always been the core and
ultimate political position of the Communist Party of China. It may seem that there is a significant difference between science and technology innovation and political construction. However, from the New Democratic Revolution to China's construction in the new era, the Communist Party of China has always carried out the idea of "people-oriented" construction in the construction of the university science and technology innovation system, which the general public has also fed. First, from a macro perspective, the essence of higher education is to nurture high-quality talents for socialist construction. From a micro perspective, it is to help and bring up the comprehensive quality of every member of society to integrate into society and meet their self-development needs. It is here that the most basic "people-based" idea is formed, that is, the growth and strengthening of the people in education. Second, the science, technology, and innovation business appear to meet the needs of national development. At the same time, the country's progress is closely related to millions of people, and the maturity and advancement of the country's science and innovation business mean the improvement of the quality of life of the people. The second layer of "people-centered" thinking comes into play, that is, to ease the contradictions between the people and social development in science and innovation and make the people happy and satisfied [31]. Third, it seems that the door of science and technology innovation is only open to scientists and intellectuals. However, throughout the century-long history of the founding of the Party, it is easy to find that the university science and technology innovation system under the leadership of the Communist Party of China has always been open to every Chinese son and daughter who love science and innovation and are hard-working and wise. During the New Democratic Revolution, the military and the people were created together during the early stage of the construction of New China. Since the reform and opening up, the sharing and tolerance, and then in the new era, the government, industry, academia, and research highlight the "people-oriented" and "people-centered" status of science and innovation. In addition, the existence of the university's science, technology, and innovation system is a way to educate more intelligent people and provide them with a platform for science and innovation and free play. In the current university science and technology innovation system, senior corporate executives and frontline R&D staff are more or less vested with titles, subject participants, and talent programs. This is where the third layer of "people-centered" thinking comes into play, namely, the idea of giving the people hands-on practice in science and innovation to satisfy their spirit and show their style [32]. Based on a pyramidal approach of people-oriented promotion, China's university science and technology innovation system has thrived. With the cohesive strength of the Communist Party of China, the scientific and technological innovation system of China's universities and people's well-being form a powerful synergy, providing inexhaustible power for the country's modern development.

7.2. Forward-Looking Vision and Macro Deployment Based on National Resonance. In the centenary of the Party's founding, the Communist Party of China has undergone numerous storms, but the construction of a university science and technology innovation system has been in place throughout. In the practice of building the scientific and technological innovation system in universities, it has shown a high level of insight and execution, not only from its forward-looking observation but also from the construction ideas that are in harmony with the national development. During the New Democratic Revolution, the Communist Party of China, in the challenging environment of the base and liberated areas, was ahead of its time in scientific and technological innovation and production, relying on the limited resources of universities to overcome difficulties and even reach the world's frontier in some of its achievements. Conversely, Chiang Kai-shek's national government was relatively well resourced, but its narrow vision and strategic outlook shrank scientific research, and what little scientific and technological innovation there was in universities could not be brought to bear. After the founding of New China, the Chinese Communist Party keenly grasped the future orientation of the world, emphasized the importance of universities, science, and technology innovation undertakings, and struggled to bend the curve in the global competition in geopolitics, talent and science, and technology, achieving such meritorious achievements as the two bombs and one star, which have contributed to the current status of China for ages. If the frontier vision had been lost, it would not have been possible to have the excellent development dynamics of China today. After the reform and opening up, the Communist Party of China creatively proposed the "local internationalization" and "overseas internationalization" of the university science and technology innovation system [33], based on the transformation of the identity of "importing" and "going out," promoting the interface between the university science and technology innovation system and the international community, breaking the shackles of the old model, and laying the foundation for the construction of an internationalized, shared, and cooperative science and technology innovation system in the future. From the perspective of vision, the Chinese university science and technology innovation system is connected to the world and has become a new force in the global science and technology innovation system. This strategic boldness has injected a new soul into the university science and technology innovation system. After the new period, the global situation has taken a sharp turn for the worse. The Communist Party of China has guided the university science and technology innovation system to provide Chinese solutions for global governance and the cause of science and technology, changing from one-sided and local research on science and innovation to comprehensive and macro scientific exploration, and the systematic system structure has promoted the participation of Chinese universities in the science and technology innovation governance activities of international affairs. What is more important is that behind the forward-looking vision, it is not the empty talk of the Communist Party of China. On the contrary, all the strategic
design and grass-roots practice are derived from the practical needs of the national macro deployment; through penetrating the frontline of world science and technology, the main battlefield of economic activities, the significant needs of the country, and the health and welfare of the people, the university science and technology innovation system achieves the dialectical unity of “height and sink degree” and “breadth and connotation degree.”

7.3. Sustainable Promotion of System Improvement, the Combination of Thinking and Politics, and the Three Whole Education, Back to the Nature of the University Science and Technology Innovation System. The Chinese Communist Party has enormous theoretical and political advantages. The theory is the precursor of action. Based on Marxist theory and the renewal and enrichment of theories of thought at all stages, the Communist Party of China has a pearl of ideological wisdom and great faith unmatched by any other political party. Ideology and politics are fine traditions based on the education of the socialist theory system with Chinese characteristics, which enables the people to strengthen their understanding in transforming the world. The most crucial difference between the university science and technology innovation system and the national science and technology innovation system at all levels lies in the fact that the fundamental nature of university cultivation is to establish moral education and provide the most primitive and fundamental talents for other science and technology innovation systems. Most of these talents are young intellectuals who are initially entering society, and the casting of ideals and beliefs is the key to guiding the long-term development and correct development of young intellectuals [34]. In terms of time, the university’s scientific and technological innovation system in China is continuously renewed and replenished. The talents delivered to the country also need to be sustainable and extendable, and this continuous growth needs to be guided by the faith of their souls after leaving the university. Science and technology innovation is by no means a one-day process, and the university science and technology innovation system cannot grow passively simply by relying on the guidance of the Communist Party. Young students and research units need a correct understanding of the laws of history by themselves. Based on faith, commitment, and ideas, they can achieve rational recognition of scientific theories and become successors and heirs of national development and construction of various science and innovation systems. The essence of the university science and technology innovation system is precisely the infusion of the theoretical guidance and political education of the Communist Party of China in the first lesson of research talents so that talents and the system can develop sustainably and autonomously and so that the university science and technology innovation system under the combination of ideology and politics and the three comprehensive education can usher in the ideological armament [35]. Eventually, the discipline, teaching, teaching materials, and management dimensions within the system will obtain ideological and political work coherence. Moreover, this is a lesson beyond the reach of any science and innovation system.

8. Conclusions: Contemporary Implications of the Transmutation of the University Science and Technology Innovation System in the Century since the Founding of the Party

As the innovation-driven development strategy enters the second phase, China initially enters the ranks of innovative countries, the basic construction of the innovation system with national characteristics. The university science and technology innovation system injects the soul of thinking and politics and the three comprehensive whole degree” and “breadth and connotation degree.” As such, the university science and technology innovation system ushers in a new development opportunity. According to the application of the three-inclusive education model proposed by General Secretary Xi, universities should strengthen practical education so that researchers and students can improve their problem-solving skills in applying what they have learned and better promote the integration of industry, academia, and research. At the same time, it has become an important issue to comprehensively enhance the development potential of the university’s scientific and technological innovation system. In this context, the core purpose of combing the historical process and transmutation logic of the Chinese Communist Party in promoting the university science and technology innovation system is to summarize the contemporary inspiration for the development of university science and technology innovation.

(1) Always adhere to and highlight the central position of the CPC in the construction of university science and technology innovation system.

The roots of the historic breakthroughs in higher education, science, and technology innovation in China over the past 100 years lie in the leadership of the Communist Party of China. The distinctive center, the open vision, and the distinct advantages determine that the university science and technology innovation system cannot leave the pull and guidance of the CPC. Deepening the high degree of integration between the university science and technology innovation system and the CPC and promoting the organic connection of the three chains is the need to build and construct innovative universities and innovative countries, as well as the need for universities to take the initiative to transform and upgrade their development. For one, the university innovation system needs to be led by the university party organization and implemented by grassroots party organizations such as various research institution groups to form a party organization linkage of the university science and technology innovation system. This is similar to the first phase of China’s university science and technology innovation system, highlighting the backbone of the Party’s role in supporting the correct development of the system. Second, it injects the soul of thinking and
politics, improves the guidance of moral education from institutions to individuals, and establishes a working system in which morality is the foundation and knowledge and action are united. Through the idealistic factors of “hope, belief, and creed,” the world of meaning of China’s university science and technology innovation system is constructed, and the leading role of the Communist Party of China is strengthened.

(2) Closely focus on small and micro innovation units to enhance the penetration and creativity of university science and technology innovation system

Expand the enthusiasm and creativity of all types of researchers, appropriately adjust downward the performance indicators, optimize the weighting of indicators, and restore the guiding significance of scientific indicators to stimulate the scientific research vitality of small and micro innovation units. As far as inspiration is concerned, one of them is to follow the “people-oriented” innovation line, follow the first stage of the university science and technology innovation system prototype, attract non-academic talents with social knowledge and creativity, expand the inclusiveness of the university science and technology innovation system, and thus promote university cooperation between enterprises, research institutes, and higher education institutions. Second, strengthen the policy support for small and micro innovation units and innovation platforms that are jointly run by the private sector and universities to stimulate the endogenous power and initial vitality of the university innovation system so that more innovation elements can be gathered and flow to the society through the combing and re-engineering of the university innovation system to form an efficient transformation of scientific and technological achievements.

(3) Follow the law of science and innovation, strengthen the service orientation, and clarify the mission and responsibility of the university science and technology innovation system

The significance of the construction of a university science and technology innovation system is to comply with the law of science and innovation and to regularize, sustain, and learn from the process of science and technology innovation in the form of a system paradigm. The system-based operation guarantees the stable transformation of science and technology innovation inputs and outputs. In this process, the university science and technology innovation system need to clarify its service orientation; strengthen its result-driven role; bring into play the role of the university science and technology innovation system in the practice of government, industry, academia, and research and the three-wide education of people; and thus reflect the practical evolution of the university science and technology innovation system under the leadership of the Communist Party of China. Whether it is to meet the production needs during the New Democratic Revolution or the needs of national construction during the reform and opening-up period, the critical meaning of science and technology innovation to serve production remains unchanged. Therefore, promoting the mission and responsibility of the university science and technology innovation system is the most important thing to enhance the inner quality of the system and the construction route.

(4) Fully stimulate the main and active role of university researchers in scientific and technological innovation

Researchers in universities are the decisive force in the development process of scientific and technological innovation. The Communist Party of China has continued to inspire university researchers to implement scientific and technological innovation during its century-long history of development, which is a profound practice of Marx’s materialistic view of history. From the New Democratic Revolution to the 18th and 19th National Congresses, the Communist Party of China has actively led university researchers in university science and technology innovation and national science and technology innovation. Respect the originality of university researchers and fully maintain and stimulate the subjectivity and enthusiasm of university researchers towards scientific and technological innovation. Maintaining the subjectivity of researchers requires the continuous innovation and development of forms of consultation and democracy for researchers and the effective pooling and support of their scientific and creative abilities. To stimulate the enthusiasm of scientific researchers, on the one hand, we should pay attention to the construction of the organizational system of scientific researchers, provide economic and organizational guarantee for the scientific and creative environment of scientific researchers, play the leading position of the government in the management of industry-university research, and build a comprehensive information disclosure system of industry-university research [36]. On the other hand, it is necessary to guide the thoughts of scientific researchers, increase the ideological education of the Party, and constantly improve the ideological height to ensure the active role of scientific researchers.
(5) Relying on Party-building activities to support the sustainable development of university science and technology innovation system

Under the objective of constructing the “value chain, industry chain, and innovation chain” of the university science and technology innovation system, the Communist Party of China persistently uses the power of party-building as the driving force. It extends the “service chain, industry chain, and innovation chain” with the Party-building activities to achieve the deep-level integration of the two. In integrating Party-building and university science and technology innovation system, the docking between the three chains needs to be viewed appropriately and guided. For one, in the docking of the value chain between the Party-building service chain and the university science and technology innovation system, the Party-building should play the essence of service and actively and correctly listen to the system’s demands to promote science and technology innovation activities on the right track. In addition to the supply of resources, policies, and other practical elements, the Party-building service chain must also pay attention to the spiritual cultivation of the university science and technology innovation system, guide the correct development of the system, and lead the shaping of its value chain with correct and appropriate values. Second, in the docking of Party-building activities and university science and technology innovation system, Party-building itself is faced with a system structure that is constantly changing, dynamic, and innovative tension. If we want to promote the development of university science and technology innovation systems with party construction, we must maintain continuous innovation and change power ourselves to realize the innovation chain of Party construction. Third, grasp the industrial nature of university education and the realistic nature of university science and technology innovation system oriented to industry and take the Party-building industrial chain as an opportunity to integrate and realize the close interaction between government, industry, academia, and research. In this process, the Party-building resources are guided to be based on industrialized activities, and various departments at all levels are coordinated to promote the contribution and active use of resources. Through in-depth cooperation, practical enterprises and training platforms are used as staging points to promote innovative talents to gain practice. Based on the social frontier, Party-building leads the university science and technology innovation system to integrate into industrial channels and achieve deep penetration of the Party-building industrial chain and the industrial system chain.

All in all, the Chinese university science and technology system has undergone a century of leadership by the Communist Party of China and has formed a pattern with character and style. In the centenary year of the founding of the Communist Party of China, it is possible to foresee the continued improvement of the university science and technology system in the future. Led by the superior system of China’s three-wide education and deepening education system reform, China’s university science and technology innovation system will be further improved to play its role in government, industry, academia, and research. Thus, the Chinese university science and technology system will be more centered under the governance and leadership system of the Communist Party of China and will continue to provide significant impetus for the country’s high-quality development.

Data Availability

No data were used in the study.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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