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Research on the Mechanism of Allocating Rights and Responsibilities in the Transformation of University Patent Achievements under the Industry-Academia Collaboration Model

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Abstract: Industry-academia collaboration serves as a core engine for technological innovation and industrial upgrading, with the collaborative linkage among entities involved in the transformation of university patent achievements being a key factor in deepening industry-academia collaboration. Currently, there exists a mismatch between the existing mechanism for allocating rights and responsibilities and the actual needs of the diverse entities involved in industry-academia collaboration integration. Focusing on the practical dilemmas in core areas such as ownership division, benefit distribution, and responsibility allocation, this paper employs a multi-dimensional perspective to analyze the formation mechanisms and proposes optimized pathways for improving the allocation of rights and responsibilities. The paper aims to clarify the boundaries of rights and responsibilities among transformation entities, strengthen collaborative linkages, resolve the imbalance of rights and responsibilities, activate the vitality of industry-academia collaboration innovation, and promote the efficient transformation of university patent achievements into practical productivity.

Keywords: Industry-academia collaboration; Transformation of scientific and technological achievements; Allocation of rights and responsibilities

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1. Introduction

Universities possess technological innovation advantages in terms of advanced talent and cutting-edge technologies, yet they lack a complete institutional pathway for the transformation of patent achievements. The industry-academia collaboration serves as a core approach to promoting the innovation-driven development strategy and is also a key pathway for achieving the coordinated development of technological innovation capabilities between universities and enterprises [1]. However, with the widespread implementation of the industry-academia collaboration model, issues have emerged in the transformation of university patent achievements,

particularly concerning the inadequate mechanism for allocating rights and responsibilities. This has, to a certain extent, diminished the enthusiasm of universities, their researchers, and enterprises for engaging in industry-academia collaboration, running counter to the objectives of intellectual property protection and innovation incentive. Therefore, this paper attempts to explore the current status and optimized pathways for allocating rights and responsibilities in the transformation of university patent achievements under the industry-academia collaboration, from the perspectives of existing policy implementation and university practices. The aim is to fully leverage the institutional advantages of deep industry-academia collaboration, better safeguard the rights and interests of transformation entities in terms of technological innovation and cooperation, and enhance the quality and efficiency of university patent achievement transformation.

2. Practical dilemmas in the mechanism for allocating rights and responsibilities in the transformation of university patent achievements under the industry-academia collaboration

The industry-academia collaboration takes researchers as the main R&D entities, universities as the suppliers of patent achievements, and enterprises as the leading implementers of transformation, achieving high-quality transformation of university patent achievements through functional complementarity and collaborative linkage [2]. In this context, the mechanism for allocating rights and responsibilities in the transformation of university patent achievements under the industry-academia collaboration model refers to the rule system and operational logic that clarify the division of ownership, distribution of benefits, and allocation of responsibilities among universities, researchers, and enterprises in various processes of the innovation chain and industrial chain for the transformation of university patent achievements, based on legal provisions, policy norms, and university practices, within the framework of in-depth exchanges and sharing of various innovative elements in industry-academia collaboration [3]. Existing practices tend to overlook the mechanism for allocating rights and responsibilities among transformation entities, gradually becoming a prominent bottleneck for the industry-academia collaboration and the transformation of university patent achievements, necessitating research and improvement of this mechanism.

2.1. Issues of ownership division

2.1.1. Unclear co-ownership of patents

The issuance of the “Pilot Implementation Plan for Granting Scientific Research Personnel Ownership or Long-Term Use Rights of Institutional Technological Achievements” in May 2020 marked a new stage in China’s pilot reform of empowerment. The “Patent Law” and the “Law on Science and Technology Progress” also explicitly stipulate the empowerment reform. China’s empowerment reform policies have initially opened up the “front end”, with national top-level design and local university implementation methods complementing each other, forming a positive development trend. However, during the process of transforming university patent achievements, new bottlenecks have emerged in the subsequent operation of the empowerment reform, such as unclear co-ownership of patents for service inventions and obstacles to researchers exercising their rights. The law does not explicitly stipulate the joint ownership attributes and subsequent exercise of jointly-owned patent rights for service inventions. Whether researchers can independently exercise specific patent rights and whether university confirmation is a necessary prerequisite for researchers to exercise jointly-owned patent rights remain controversial. In judicial practice, if the transformation entities do not agree on the division of patent rights exercise, disputes over ownership division between universities and researchers may arise, seriously undermining

the normal exercise of researchers' patent rights, raising doubts about whether researchers have the right to independently exercise or authorize others to exercise specific patent rights, and thus negatively impacting the overall effectiveness of patent transformation [4].

2.1.2. Fragmented exercise of rights by research teams

Universities can grant ownership of institutional technological achievements to the achievers (teams), making them co-owners. This provision provides a clear basis for research teams as the empowered entities in the transformation of university patent achievements. However, in university practices, there are often missing or ambiguous provisions regarding the specific terms for research teams to exercise their rights, leading to frequent doubts about the effectiveness of research teams exercising their rights, resulting in the exercise of jointly-owned patent rights by research teams often relying on individual researchers within the team, limiting the overall exercise of rights by the team. Nevertheless, individual researchers exercising patent rights also have certain drawbacks. In terms of transformation efficiency, independent exercise of rights by researchers can easily lead to overly dispersed property rights, increasing the costs of decision-making integration and negotiation [5]; in terms of transformation risks, university researchers are mostly university professors with relatively weak market management and operational capabilities, making them prone to difficulties in fulfilling transformation obligations and participating in transformation work.

2.2. Issues of benefit distribution

2.2.1. Ineffective distribution of property rights incentive benefits

The state has established a distinctive benefit distribution system for patent achievement transformation through legislation, known as "property rights incentives." In university practices, many universities have implemented the property rights incentive system, increasing the proportion of rewards and remuneration for researchers, and distributing economic benefits such as equity, options, and dividends, with the aim of effectively motivating university researchers to engage in scientific research and innovation. However, there is still a gap between the operational effectiveness of this benefit distribution system and its intended design. Firstly, it is difficult to quantify the contribution to patent transformation. Universities determine property rights and reward and remuneration proportions with researchers before transformation, completing benefit distribution through agreements. However, universities often neglect to explicitly quantify the contribution of researchers in projects, leading to ambiguity in distribution proportions and resulting in reward and remuneration disputes between researchers and universities. Secondly, there is a lack of guarantees for changes in rewards and remuneration before and after patent transformation. The initial agreements on rewards and remuneration between universities and researchers may differ from the actual amounts formed after transformation [6]. At this point, if there is no explicit agreement on the contract subject, disputes over the distribution of remuneration may easily arise between the parties.

2.2.2. Inefficient distribution of benefits from decentralized property rights

Most institutional achievements in Chinese universities rely on financial support. Under the background of property rights decentralization reform, universities actively explore paths to empower university researchers with patent ownership or long-term use rights, while also retaining some patent rights. At this point, the patent achievements transformed by universities still possess the attributes of state-owned assets, which, compared to general property, have the prominent characteristics of complex approval processes and increased investment risks.

From the perspective of approval processes, university state-owned assets require rigorous evaluation through feasibility studies and collective decision-making within the university, and must be successively reported to the competent authorities and the finance bureau for approval, resulting in long approval times that are not conducive to the signing of technology contracts and the change registration of patent rights. From the perspective of investment risks, external investments in state-owned assets need to achieve the goal of preserving and increasing the value of state-owned assets, and failure to do so may result in liability for the loss of state-owned assets [7]. However, current regulations have not yet clarified exemptions from liability for the loss of state-owned assets, leaving transformation entities facing uncertain risks of accountability, becoming a chronic issue that hinders the transformation of university patent achievements.

2.3. Issues of responsibility allocation

2.3.1. Lack of supervision mechanisms for contract defects

The industry-academia collaboration model involves multiple entities and relatively complex processes, making it prone to contract defects during the signing and performance of technology contracts by transformation entities. The main defects in the implementation of university patent transformation can be divided into two categories: defective agreements and defective performance. Defective agreements mainly include inconsistencies in initial agreement content, doubts about the effectiveness of amended agreement content, and doubts about the effectiveness of newly concluded agreements. Due to the lack of a normalized management system for transformation entities signing relevant technology contracts and the low level of technology contract conclusion and amendment, hidden dangers for subsequent non-performance may easily arise. Defective performance mainly includes the failure of both parties to the contract to fulfill agreed obligations, failure to make contributions as agreed, and failure to conduct transfer registration. Due to the lack of specific supervision paths for defective performance, cooperation entities are unable to obtain or update information on the other party's performance during the subsequent transformation process, leading to continuously expanding risks of asset loss and transformation failure.

2.3.2. Difficulties in identifying transformation risk liabilities

Based on the applied R&D and re-innovation nature of university patent achievement transformation, the value of transformed patents is uncertain [8]. In practice, risks in patent achievement transformation occasionally arise, which can be specifically divided into two scenarios: one is the depreciation of patent value due to market changes or other objective factors compared to when cooperation was reached; the other is the overestimation of patent value due to inaccurate assessments by patent holders or patent invalidity. For the first scenario, the state provides protection from a top-level design perspective. For example, when patent achievements are used for valuation investments, the law explicitly stipulates that, in the absence of agreements, contributors do not need to bear the responsibility for making up contributions. For the second scenario, patent holders are required to bear corresponding responsibilities. However, in reality, due to complex market changes and weak risk awareness among transformation entities, the distinction between the two scenarios is relatively blurred, leading to difficulties in identifying liabilities. It can be seen that currently, there is a lack of a mature mechanism for identifying transformation risk liabilities in university patent achievement transformation, and there are no effective early warning and handling measures for patent value fluctuations caused by complex market changes [9].

3. Analysis of the causes of issues in the rights and responsibilities allocation mechanism for the transformation of university patent achievements under the industry-academia collaboration model

3.1. Causes of issues in ownership allocation

3.1.1. Unclear implementation system for patent co-ownership of rights

The patent rights for university service inventions in China have undergone a developmental trajectory from state ownership and university ownership to shared rights and benefits between universities and researchers. Through top-level design, efforts have been made to actively adjust the balance of interests in service inventions between universities and researchers [10]. However, the level of detail in the existing implementation system in China needs improvement. At the legal level, the Patent Law only provides general provisions on the distribution of benefits from the separate implementation by co-owners of service inventions, but lacks specific safeguard provisions for the implementation of joint patent rights. In actual distribution, universities often overlook agreeing with researchers on the subsequent implementation of joint patent rights, with the joint ownership system manifesting more as joint tenancy rather than tenancy in common [11]. This may result in the non-recognition of researchers' eligibility as the subject of exercise for independently exercising patent rights and hinder their claims for rights protection [12]. This conflicts with the purpose of the property rights incentive system, fails to effectively safeguard researchers' independent exercise of their patent rights, weakens their motivation for transformation, and exposes university patents to the risk of depreciation.

3.1.2. Undetermined subject status of research teams

Currently, the subject status of research teams has not been established, limiting the possibility for research teams to exercise rights as a whole. In judicial practice, although research teams representing universities in signing technology contracts do not have legal subject status, the validity of technology contracts is recognized based on established transaction practices and behavioral norms in technology contract formation. This also provides a basis for research teams to exercise rights as a whole. Thus, designating research teams as the subject of exercise for joint patent rights has its legitimacy. Compared to individual researchers, research teams have advantages in exercising patent rights and participating in transformation activities under the industry-academia collaboration model: Firstly, it improves the efficiency of decision-making and operation in patent transformation. Collective decision-making by research teams can more efficiently reflect the common will of the team, effectively avoiding obstacles in exercising rights due to unclear patent ownership among researchers [13]. Secondly, it enhances the stability of patent transformation implementation. Internal personnel changes may occur within university research teams, but research teams are relatively stable, reducing the impact of personnel turnover on the operation and management of patent achievement transformation and providing stable talent and technical support for patent transformation implementation to enterprises [14]. In summary, recognizing research teams as eligible subjects of exercise for the transformation of university patent achievements and granting them more complete rights to better respond to the exercise mode of research teams under the empowerment reform should be further examined and confirmed in combination with university practices.

3.2. Causes of issues in benefit distribution

3.2.1. Inadequate design of the property rights incentive reward and compensation system

The actual effectiveness of the property rights incentive reward and compensation system is unsatisfactory, essentially due to its disconnection from the practice of university patent transformation. The existing system

is mostly based on increasing the proportion and amount of rewards and compensation for researchers, not only raising the legal standard for researchers' rewards and compensation to 50% at the legislative level, but also presenting a diverse incentive model at the university practice level. However, relevant policies and practices generally lack specific standards and procedural designs to ensure the smooth operation of property rights incentives, resulting in the rewards and compensation system for researchers remaining only at the preliminary institutional level, with actual safeguard mechanisms still incomplete [15]. Firstly, the current system lacks standard settings for individuals making significant contributions. As mentioned earlier, Chinese law only provides a summary generalization of the subjects eligible for rewards and compensation for patent achievements. When universities have not issued specific criteria for identifying "individuals making significant contributions" and authorization agreements are unclear, contradictions arise in the determination of reward and compensation proportion allocations. Secondly, the follow-up implementation safeguard mechanism for the reward and compensation system lags behind. Chinese universities have not yet formed scientific rules for reward and compensation changes in the follow-up implementation of the reward and compensation system. When there are discrepancies between preliminary agreements and transformation practices, payment obligations are mostly fulfilled based on agreements, lacking the ability to make changes based on transformation practice situations [16]. In actual cases, the rigidity of reward and compensation changes affects researchers' inability to actually receive the reward and compensation amounts in transformation practices, contradicting the original intention of incentivizing researchers to implement transformation.

3.2.2. Imbalance between state-owned asset supervision and market benefit distribution

The root cause of the obstacle posed by the state-owned asset attribute of university patents to patent achievement transformation lies in the difference in fundamental value orientations between state-owned asset management and patent achievement transformation. The fundamental goal of state-owned asset management is to achieve the preservation and appreciation of state-owned assets and safeguard social and public interests. Therefore, in its implementation process, based on state-owned asset supervision responsibilities, relevant departments often adopt a cautious attitude towards external transformation implementation and impose stricter accountability on transformation personnel, indirectly increasing the transformation burden on transformation subjects. In contrast, patent achievement transformation under the industry-academia collaboration places greater emphasis on transaction efficiency and security, tending to adopt efficient and convenient procedures to reach mutual agreement, change property relations, and complete registration and publicity, to meet the rapid development requirements of the market and promote the orderly conduct of transformation implementation and enterprise operations. It can be seen that under the existing system, when university patent achievements are transformed, there is a certain contradiction between the private right attribute required by market transformation and the public right attribute of state-owned asset management [17]. Therefore, on the basis of steadfastly advancing the decentralization of university patent disposal rights, it is necessary to further continuously explore reasonable solutions that balance the valuation investment of university patents and the protection of the total amount of state-owned assets.

3.3. Causes of issues in responsibility allocation

3.3.1. Inadequate synergistic mechanism for subject responsibilities

The frequent occurrence of defects in university patent achievement transformation contracts under the industry-

academia collaboration has both subjective and objective factors. Subjectively, both parties to the contract have insufficient agreements and fulfillment capabilities regarding transformation. Some universities lack departments for the transformation of scientific and technological achievements, specifically responsible for the regular and comprehensive supervision of the formation and fulfillment of technology contracts for patent achievement transformation; Within enterprises, there is a lack of thorough examination of contract contents such as the subject matter of transformed patents and the scope of rights and obligations before contract formation, and patent changes and registrations are not promptly handled during implementation. Objectively, patent transformation is closely related to market changes and technological innovations. To achieve transformation goals, both parties to the contract may engage in multiple consultations and modifications of the content of the technology contract for transformation; special circumstances, such as failure to promptly conduct publicity and registration due to time constraints, may also arise. Thus, to overcome subjective and objective factors in patent transformation and reduce subsequent rights and responsibilities disputes, transformation subjects need to establish and improve a synergistic mechanism for responsibilities among subjects, strengthen supervision measures for the formation and fulfillment of technology contracts, and reduce the occurrence of defects in technology contracts for transformation.

3.3.2. Unreasonable allocation of transformation risk responsibilities

Faced with uncertain risks in the transformation process, transformation subjects rarely conduct regular re-evaluations of patent values, leading to the easy oversight of patent value changes, posing capital loss risks to enterprises, and even causing the loss of state-owned assets in universities. Meanwhile, most universities in China have not yet implemented a pre-application assessment system for patents, creating obstacles for the determination of responsibility for transformation risks. In practice, the assessment of university patent achievement transformation in China does not require joint commissioning with cooperative enterprises, and universities can also conduct separate assessments of patent values before cooperating with enterprises. Since universities place more emphasis on the academic research value of patents while enterprises focus more on the market value of patents, separate assessments sometimes lead to actual inconsistencies in patent values between the two parties. According to overseas experience, many international universities apply a pre-application assessment system for patents, ensuring that patents meet commercialization prospects by determining industrialization needs with enterprises before application, thereby reducing the risk of failed university patent transformations [18]. However, due to the much larger patent application base in China compared to foreign countries and the relatively weak quantity and capabilities of dedicated personnel in university intellectual property management institutions, it is currently difficult for universities in China to uniformly implement a pre-application assessment system for patents and measures [19].

4. Optimization pathways for the mechanism of allocating rights and responsibilities in the transformation of university patent achievements under the integration model of industry-academia collaboration

4.1. Optimization pathways for ownership division

4.1.1. Improving the implementation system for jointly-owned patent rights

In response to the unclear co-ownership of patents for service inventions, the author believes that the implementation system for jointly-owned patent rights for service inventions at universities should be further improved. Firstly, the quality of prior agreements should be enhanced. Universities and researchers should

clarify the allocation of rights and obligations after joint ownership of patent rights before implementing property rights incentives, stipulate the scope of patent rights enjoyed by researchers in the transformation of patent achievements, clarify the eligibility of researchers as right-exercising entities, negotiate and determine situations where researchers can independently exercise specific patent rights, and reach timely agreements with enterprises on the later exercise of rights by researchers to define the specific implementation space of researchers' patent rights through prior agreements. Secondly, the level of guarantee at the university level should be improved. The specialized technology transfer departments at universities can regularly conduct surveys on the exercise of rights by researchers, focusing on investigating whether researchers cooperate with enterprises in fulfilling corresponding obligations for the operation and transformation of patent achievements, as well as whether they effectively exercise their rights to be informed and make decisions regarding patent transformation, and promptly address issues related to the implementation of patent rights raised by researchers [20]. Through institutional optimization, researchers are ensured to effectively exercise their patent rights, improving the efficiency of patent transformation at universities and maintaining the economic interests of state-owned assets.

4.1.2. Facilitating the pathways for university research teams to exercise their rights

To address the fragmented exercise of patent rights by university research teams, this paper suggests focusing on exploring two aspects: clarifying the subject status and optimizing the management of right exercise. In terms of clarifying the subject status, the legitimacy of research teams exercising their rights should be confirmed and guaranteed. Relevant departments should officially confirm university research teams as legitimate entities for exercising university patent rights, treating them as relatively independent units for right exercise, distinguishing them from universities and individual researchers in terms of right exercise, effectively responding to doubts about the subject status of research teams [21]; and based on cooperation habits and the characteristics of right exercise by research teams, they can principally and generally define the scope of rights for research teams through policy documents or guiding cases, including negotiating and signing technology contracts with enterprises and implementing transformation work, clarifying the boundaries between their right exercise and that of representatives from universities and researchers, and reserving reasonable institutional space for research teams to uniformly exercise their rights. In terms of optimizing the management of right exercise, universities should also refine corresponding management measures for research teams to exercise their rights based on policy regulations and practical experience, considering regional and university-specific conditions, stipulating the allocation ratios and exercise scopes of jointly-owned patent rights for research teams and their internal researchers; at the same time, improve the implementation of internal benefit distribution and personnel admission and exit mechanisms, fully leveraging the advantages of research teams in terms of efficiency and security, and promoting more mature and efficient transformation of university patent achievements.

4.2. Optimization pathways for benefit distribution

4.2.1. Improving the construction of a positive property rights incentive system

Under the integration model of industry-academia collaboration, the full and in-depth participation of researchers throughout the transformation process is a necessary prerequisite for the successful transformation of patent achievements [22]. Therefore, it is necessary to further improve a positive property rights incentive and benefit distribution system to ensure that researchers receive corresponding rewards and compensation. The author believes that the system should be updated from the perspectives of legal norms, university management, and

implementation guarantees. Firstly, from a top-level design perspective, the focus of property rights incentives should be extended. Relevant legal norms can incorporate practical explorations of property rights incentives at Chinese universities, supplement explanations for the standard identification of "individuals making significant contributions", clarify the scope of applicable entities, and provide a basis for identifying entities for benefit distribution at universities. Secondly, from a university management perspective, the level of property rights incentive and right-responsibility allocation should be improved. Most disputes over the distribution of such benefits arise from unclear negotiation ratios between universities and researchers in the early stages. Therefore, this paper suggests that universities can learn from the patent management experience of Japanese universities, focusing on the reasonableness of benefit distribution procedures, and enhancing the legitimacy of benefit distribution by ensuring researchers' right to be informed and negotiate regarding benefit distribution [23]. Thirdly, from an implementation guarantee perspective, the benefit distribution model for property rights incentives should be improved. Considering the complexity and variability of patent achievement transformation, to more effectively positively incentivize researchers' innovation capabilities, universities can innovate benefit distribution models, expanding from a single pre-transformation agreement on exercise to adjusting benefit distribution as transformation practices change. With mutual consent, both parties can agree on the redistribution of benefits in the event of changes in later transformation circumstances, ensuring researchers' reasonable compensation through more flexible distribution methods.

4.2.2. Refining policy management rules for property rights devolution

Essentially, coordinating the relationship between the state-owned asset attributes and the transformation of university patent achievements requires further refining policy management rules for property rights devolution under the integration model of industry-academia collaboration. The author suggests improvements from two aspects: innovating the state-owned asset management system and standardizing exemption scenarios. Firstly, universities should innovate the state-owned asset management system. Based on the efficiency requirements for patent achievement transformation, universities can conduct pilot programs for separate management of patent achievements and state-owned assets, distinguishing patent achievements from traditional state-owned assets for management, simplifying and clarifying regulatory requirements for state-owned assets in patent achievement transformation, and reducing the burden of reporting and approval for universities and enterprises to achieve efficient and convenient transformation implementation. Secondly, the state and universities should also formulate and refine due diligence exemption clauses for university patent transformation based on practical situations, determining the types of patent achievement transformations and due diligence scenarios for which university patent investment decision-makers are exempt from responsibility. In cases where decision-makers do not maliciously seek illegal benefits and fulfill their regulatory obligations, reasonable property losses incurred during the implementation of university patent achievement transformation should be exempt from holding relevant personnel accountable.

4.3. Optimization pathways for responsibility allocation

4.3.1. Improving the collaborative mechanism for contracting and performance supervision

To effectively reduce the incidence of contractual defects in the transformation process of university patent achievements, this paper proposes improvement suggestions from two aspects: improving institutional design and standardizing contract performance. Firstly, in terms of institutional design, this paper suggests that universities and

enterprises each establish specialized departments responsible for managing patent achievement transformation, conducting normalization, full-chain supervision and protection of patent achievement transformation, monitoring contractual defects in the contracting and performance processes, and forming an emergency response mechanism for legal risks in patent achievement transformation; it is recommended that universities further refine performance obligations and personnel responsibilities for patent achievement transformation, clarifying the specific responsibilities of universities and researchers in patent achievement transformation. Secondly, in terms of standardizing contract performance, this paper suggests that the transforming entities confirm the patent content and validity when signing contracts, understand and investigate each other's situations, specifically agree on each party's rights and obligations, clearly define liability for breach of contract, and negotiate possible changes in circumstances during subsequent transformation implementation; during implementation, they should fulfill agreed obligations, actively negotiate to achieve patent transformation goals, and promptly register any changes to ensure that the formal requirements for patent achievement transformation are complete, safeguarding the market operation security of enterprises and ensuring the effective implementation of university patent transformation.

4.3.2. Constructing a risk-sharing system for transformation

Firstly, the overall risk response capability for university patent achievement transformation should be enhanced, and the mechanism for identifying transformation risk responsibilities should be streamlined. Universities should actively establish internal intellectual property management institutions, increasing their overall numbers and professional levels, enabling them to meet functional requirements such as promoting intellectual property transformation, conducting value assessments independently, and commissioning third-party professional institutions for value assessments and following up with enterprise-end actual demands; at the same time, universities can adopt a model of jointly commissioning professional assessment institutions with enterprises for value assessments to avoid inaccuracies in patent values and reduce the risk of failed docking in patent achievement transformation. Secondly, exploring the construction of a dynamic patent assessment mechanism and implementing response strategies for identifying transformation risk responsibilities. Objective factors such as market changes are uncontrollable, making it difficult for transforming entities to accurately predict changes when signing contracts. Therefore, through mutual agreement, universities and enterprises can formulate a chained dynamic review and assessment plan for university patents, regularly conducting patent value assessments based on market changes or applications from relevant personnel, and taking timely action on changes in patent values to reduce losses to the interests of industry-academia collaboration entities due to factors such as market or technological iterations. Moreover, transforming entities can also stipulate through transformation technology contracts that when patent devaluation occurs due to objective factors, both parties can negotiate flexible risk response measures, such as adjusting benefit distribution ratios, to minimize the impact of market operations to the greatest extent possible.

5. Conclusion

The deep integration of industry-academia collaboration effectively opens up an efficient development pathway for the joint advancement of technology and the economy, with the collaborative and orderly allocation of rights and responsibilities among universities, researchers, and enterprises becoming a decisive factor in the quality of university patent achievement transformation. This paper conducts research on practical dilemmas in three

parts: ownership division, benefit distribution, and responsibility allocation, combining transformation practices with their root causes, attempting to propose targeted solutions, and offering improvement suggestions from both top-level design and practical norms, aiming to ensure the full exercise of the legitimate rights and interests of transforming entities, effectively activate university patent inventories, and facilitate the smooth conduct of industry-academia collaboration and university patent achievement transformation, providing theoretical references for the allocation of rights and responsibilities in university patent achievement transformation under the industry-academia collaboration. The transformation of university patent achievements under the industry-academia collaboration is currently in an exploratory development stage, with practical issues regarding rights and responsibilities allocation still potentially shifting and alienating. In the future, it is essential to closely integrate with the development practices of university patent achievement transformation, practically resolve institutional and practical dilemmas from a legal perspective, provide a basic theoretical foundation for the construction of a university patent achievement transformation system, contribute real-case experiences to the optimization and upgrading of the industry-academia collaboration, and thereby inject sustained impetus into promoting the deep integration of technological innovation and industrial innovation.

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