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Study on Enterprise Intellectual Property Capacity and its Maturity Modeling and Evaluation

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Abstract: *The transformation of national defense intellectual property rights is an important way to promote the deep integration between the military and the civilian in the field of science and technology, which strongly supports the building of national defense and the armed forces and drives economic and social development. Using the tools and methods of new institutional economics, this paper first analyzes the key factors restricting the transformation of national defense intellectual property rights in China. Secondly, in order to accelerate the transformation and application of national defense intellectual property, this paper established a set of scientific, quantifiable, operational defense intellectual property into maturity evaluation model to objectively evaluate defense transformation of intellectual property management, ability innovation main body and effect, which is helpful to determine the state of intellectual property rights transformation process, identify the problems with priority and related to the process of IP transformation, and obtain the support of the unit to improve the process of IP transformation. Finally, the paper puts forward policy suggestions to promote the transformation of national defense intellectual property in China from the aspects of perfecting the legal system, secrecy and declassification mechanism, evaluation system, construction of information platform and management and operation platform.*

Keywords: *National Defense intellectual property rights, Military-civilian integration, new Institutional economics, Transaction cost, intellectual property transformation, maturity evaluation*

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1 INTRODUCTION

National defense intellectual property rights are mainly intellectual property rights related to national defense and military construction, including intellectual property rights formed by the state's direct investment in national defense and military construction and used for national defense purposes, as well as intellectual property rights generated by other investment and dedicated to national defense and military construction . National defense intellectual property is the most intensive , high-end , and active part of national scientific and technological achievements innovation, and it also reflects the core value of national defense scientific and technological achievements . In June 2017 , Xi Jinping emphasized at the first plenary meeting of the Central Military-Civilian Integration Development Committee to strengthen centralized and unified leadership, implement the overall national security concept and the military strategic policy under the new situation, highlight problem orientation, strengthen top-level design, and strengthen demand. Integrate, coordinate the incremental stock, simultaneously promote the reform of the system and mechanism, the integration of the system and elements , and the construction of the system and standards, accelerate the formation of an all-element , multi-field , high-efficiency military-civilian integration in-depth development pattern, and gradually build a military-civilian integrated national strategic system and ability . Promoting the transformation of national defense intellectual property rights and realizing the two-way smooth transformation and application of military-civilian technology is one of the important contents of military-civilian integration, and it is also an important link that urgently needs to be broken through in the in-depth development of military-civilian integration.

Intellectual property operation includes intellectual property transfer and transformation, acquisition and trusteeship, transaction circulation, pledge financing, etc. It is the bridge and link between innovation and the market. , Xi'an and Zhuhai have built national intellectual property operation service platforms and characteristic pilot platforms, and have given key support to some intellectual property operation institutions, forming a "1+2+20+N" strategic system of national intellectual property operation services . In 2015 , the " National Intellectual Property Operation Military-Civil Integration Featured Platform " was officially established in Xi'an . The establishment and operation of these platforms have provided convenient conditions for the marketization of

national defense intellectual property rights . However, in general, due to the nature of national defense intellectual property rights of confidentiality and public goods, for a long time, the tendency of national defense intellectual property rights to " emphasize rights confirmation and protection rather than transfer and use " still exists. The proportion is still very low, and many aspects of the national defense intellectual property operation mechanism still need to be improved.

Since the founding of the People 's Republic of China, China's national defense scientific and technological innovation has achieved fruitful results , especially the series of independent intellectual property rights formed by major national defense scientific and technological projects , such as " two bombs and one satellite ", " Tianhe series supercomputers ", etc. , not only effectively enhance the development of weapons and equipment. Capacity level also played an important and positive role in local economic and social development. Compared with the great improvement of national defense science and technology innovation capability and the substantial increase in the total amount of national defense intellectual property rights, the conversion rate of national defense intellectual property rights is relatively low. Using transaction cost theory, deeply analyze the key factors restricting the transformation of China's national defense intellectual property rights , explore effective ways to reduce the transaction cost of national defense intellectual property rights, improve the transaction efficiency of national defense intellectual property rights , and make national defense intellectual property rights better serve national defense and economic construction. It is a very important and practical problem that needs to be solved urgently.

From different perspectives, the existing research on the evaluation of national defense intellectual property rights can be divided into the comprehensive evaluation of intellectual property rights at the management level of defense enterprises such as aerospace companies, and the quality evaluation and value evaluation for specific intellectual property objects, such as the value of defense patents. From a trend point of view, more emphasis is placed on evaluating the comprehensive capability, quality and value of national defense intellectual property based on quantitative indicators, and tends to evaluate the transformation effect.

Maturity is a description of the developmental status or maturity of a research subject. Maturity method is a general term for techniques, standards and procedures for evaluating the maturity of research objects. Capability Maturity Model (CMM) originated in November 1986 and was first proposed by the Software Engineering Institute (SEI) of Carnegie Mellon University in the United States to evaluate the capabilities of software suppliers. At present, CMM has developed into Capability Maturity Model Integration (CMMI) stage. The CMMI model establishes a grading standard to describe the capability maturity of an enterprise. The CMMI model has been developed into three categories: acquisition-oriented, service-oriented and development-oriented. Development-oriented CMMI consists of best practices applied to product and service development, including 22 process areas, of which: 16 core process areas, 1 shared process area, 5 development process areas. CMMI can be widely used in the fields of enterprise production / development / service process capability and system engineering other than software engineering. The transformation of enterprise intellectual property rights can be understood as the key process of transformation from immature to mature process. Therefore, CMMI can be used to evaluate the transformation process and transformation ability of enterprise intellectual property rights.

Search for the topic of "Transformation of National Defense Intellectual Property Rights" in the "Journals" of CNKI.net. As of February 24, 2022, there are 74 related topics, which are listed in the references for readers with the same interest [1-74]. There are many applied researches on the maturity model in management , but there are few literatures on the application of the maturity model to the research on the transformation of national defense intellectual property. References list several applications of maturity model [75-83] , and there are many literatures on national defense intellectual property policy, including several [84-90]. Several of these literatures were referenced in the research of this paper on new institutional economics. This paper firstly analyzes the importance of the transformation of national defense intellectual property rights and the key factors that restrict the current transformation of China's national defense intellectual property rights. Secondly, in order to accelerate the promotion of the transformation and application of national defense intellectual property rights, this paper constructs a set of scientific, quantifiable and operable evaluation models for the transformation maturity of national defense intellectual property rights, in order to objectively evaluate the process, capability and effect of intellectual property transformation management of innovative subjects in the national defense field. It is helpful to determine the status of the national defense intellectual property transformation process, identify the problems faced with priority and related to the intellectual property transformation process, and obtain the support of the unit for the improvement of the intellectual property transformation process. Finally, policy suggestions for promoting the transformation of China's national defense intellectual property rights are put forward from the

aspects of improving the legal system , confidentiality and decryption mechanism, evaluation system, building an information platform , and a management and operation platform .

2 THE IMPORTANCE OF THE TRANSFORMATION OF NATIONAL DEFENSE INTELLECTUAL PROPERTY RIGHTS

2.1 The transformation of national defense intellectual property rights is the need to promote the development of deep military-civilian integration

Intellectual property work is an important source and driving force for promoting scientific and technological innovation. At present, China has initially formed a military-civilian integrated military-industrial system in which military- industrial enterprises and civilian enterprises complement each other's advantages. The sources of national defense intellectual property rights are not only military enterprises and private enterprises, but also many innovative entities such as military industrial research institutes and military universities. How to release the market potential of national defense intellectual property rights and stimulate the driving force of innovative entities is to promote the deep integration of military and civilian development. important aspects . Crack down the important factors that restrict the transformation and application of national defense intellectual property achievements, and promote the transformation and application of national defense intellectual property achievements formed by military-industrial units and civilian population units to participate in national defense construction , realize the improvement of the core competitiveness of enterprises, and effectively promote the deep integration of military and civilian in the field of science and technology, is the general trend and imperative.

2.2 The transformation of national defense intellectual property rights is the need to integrate into the innovation-driven development strategy

Concept of innovation-driven development is the inheritance and enrichment of Schumpeter's innovation theory, and its core essence is to effectively enhance the ability of independent innovation, so that scientific and technological innovation becomes an important support for China's in-depth reform and transformation and development. National defense intellectual property is an important output of national defense scientific and technological innovation, and its transformation and application system is an important part of the innovation system of "production, education, research and application ", which maximizes its industrial value, military value and commercial value. The "last mile" of the market can not only release the productivity of national defense innovation achievements, but also can feed back scientific and technological innovation through the obtained industrial and economic value, optimize the allocation of national defense resources and economic resources, and effectively promote the realization of the innovation-driven development strategy.

2.3 The transformation of national defense intellectual property rights is the need to promote the transformation and upgrading of the local economy

Based on the special needs of national defense, national defense technology plays a leading role in the development of science and technology, and is gradually applied to the civilian field to drive economic and social development. The military-civilian integration industrial parks and military-civilian integration industrial bases established in many places in China are closely related to local industrial development and economic growth, forming a huge industrial cluster effect and effectively promoting the transformation and upgrading of local economies. Promote the transformation and application of national defense intellectual property rights, especially the cluster incubation of the serialized national defense intellectual property rights results produced by major national defense science and technology projects, to form a large number of military-civilian integration industry clusters, give full play to their radiating and driving roles, and foster new kinetic energy for economic development and optimization. It is of great significance to lay out the local industrial structure and enhance the core competitiveness of regional industries.

3 ANALYSIS OF TRANSACTION COSTS AFFECTING THE TRANSFORMATION OF CHINESE NATIONAL DEFENSE INTELLECTUAL PROPERTY RIGHTS

Based on the confidentiality and quasi-public product attributes of national defense intellectual property rights, the transformation chain of national defense intellectual property rights involves the process of property rights and interest allocation, encryption and decryption, and property rights transactions. To study the transaction cost of the transformation chain of national defense intellectual property rights, it is necessary to use the transaction cost theory in the new institutional economics. The idea of transaction cost was put forward by Coase

in 1937. Due to the difficulty and complexity of directly measuring transaction cost, Williamson, from the perspective of comparing the transaction costs incurred under different contract forms, expounded three basic attributes that affect transaction costs, namely: Transaction frequency, uncertainty and asset specificity. Starting from the theoretical interpretation of transaction costs by new institutional economics , some scholars have studied the compositional aspects that affect the transaction efficiency of a country, including government governance (tax system, legal system, property rights system, etc.), communication infrastructure conditions, and education levels. Due to the complexity of the connotation and extension of the transaction cost of defense knowledge, this paper studies the influencing factors of the transaction cost of defense intellectual property from the perspective of transaction cost and transaction efficiency.

3.1 Transaction costs caused by unreasonable property rights system and organizational management system

According to the COASE Theorem, the transaction cost of the transformation of national defense intellectual property rights is not zero, and the setting of the property rights system has a great influence on the transaction cost. The state owns the ownership, disposal and benefit rights of national defense intellectual property, making the contract for national defense scientific research and equipment procurement a contract of a symbiotic nature. Use efficiency . In addition, due to the unsound national defense intellectual property decryption system, the complicated approval system and the lack of specialized management agencies, the number of national defense patent decryption work carried out in China is relatively small, and the intangible transaction costs caused by the unreasonable organizational system are relatively large. From the perspective of "opportunity cost", the invisible transaction costs caused by the uncertainty of property rights and the difficulty in allocating property rights actually make the "potential" transaction costs infinite, hinder the realization of transactions, and cause great loss of efficiency.

3.2 Transaction costs caused by the technical characteristics of national defense intellectual property rights

A national defense patent is a type of patent and has the technical characteristics of the patent itself. The patentee has more right to know about the maturity, reliability, practicability and other information of the patented technology than the patent buyer. The exogenous asymmetry of the patented technology information determines the high transaction cost of the patent . In addition, the successful conversion of patents depends on the compatibility of incentives between patent holders and patent buyers, and the expected benefits of both parties are greater than the expected costs to reach a transaction. Due to the unreasonable national defense patent system, it is difficult to transform in the best period of patent transactions. If both parties cannot reach a consensus on the benefits and costs, the transaction cannot be completed, which restricts the transformation and application of national defense patents. The transformation of national defense patents also involves secondary development, non-unification of military standards and civil standards, etc., which leads to large transaction costs.

3.3 Transaction costs caused by information asymmetry between military and civilian

For a long time, the military and civilians have been unequal and asymmetric in obtaining national defense intellectual property information, and the lack of national defense intellectual property information platform has greatly reduced the number and frequency of national defense intellectual property transactions, resulting in higher information transaction costs. Affected by the traditional planning system and the confidentiality requirements of national defense intellectual property, there is a lack of a transparent national defense intellectual property information platform within the military and between the military and civilians and rights. In addition, due to the information asymmetry between the military and the civilians and the narrow access to national defense intellectual property rights, it is difficult for military and civilian scientific research units to have a good understanding and grasp of the actual needs of the military and dual-use technology requirements in the process of national defense project research and development, the supply and demand sides are difficult to achieve effective docking.

3.4 Transaction costs caused by the unsound intellectual property operation market

Compared with the world's scientific and technological powers, China has not yet established a complete defense intellectual property trading platform, the number of high- level science and technology intermediaries and intellectual property intermediaries is insufficient, there is a lack of national defense patent commercialization and application value evaluation institutions, and the quality and quantity of defense intellectual property talents. The insufficiency of national defense intellectual property rights greatly restricts the number and frequency of

transactions of national defense intellectual property rights. The training of national defense intellectual property professionals has just started, and the curriculum setting and training mode are not reasonable enough, which affects the quantity and quality of the training of national defense intellectual property talents. In addition, national defense patent value evaluation plays a fundamental role in the transformation of national defense intellectual property rights, and the requirements for national defense patent value evaluation talents are higher, and the demand for talents is also large. Improving the quality of personnel training, improving the property rights transaction market, and improving the intellectual property service support system are of great significance to improving a country's national defense intellectual property transaction efficiency and reducing defense intellectual property transaction costs.

3.5 Transaction costs caused by the imperfect legal system and judicial system

Since China has not yet established a sound legal system and judicial system related to national defense intellectual property rights, there is no effective supervision and punishment for violations and opportunistic behaviors of national defense intellectual property rights, resulting in high transaction costs. From the current legal perspective, except for the "National Defense Patent Regulations", the provisions on national defense intellectual property rights in other regulations tend to be macro-level guidance , many patent types are blank in legislation, and the comprehensiveness and effectiveness of institutional arrangements are insufficient.

On the other hand, from the perspective of the judicial system, although intellectual property courts have been established one after another, the professionalism and efficiency of trials are insufficient. The average compensation amount of intellectual property litigation in China is still far behind that of developed countries such as the United States, and it is difficult to compensate. The loss of relevant enterprises, institutions and individuals is not enough to restrain intellectual property infringement.

4 THE MATURITY EVALUATION MODEL AND APPLICATION FOR THE TRANSFORMATION OF NATIONAL DEFENSE INTELLECTUAL PROPERTY RIGHTS

4.1 Design ideas

The evaluation of intellectual property transformation is built following a certain work logic. The management process of the innovation subject (ie the unit) is guided by a certain goal, and it coordinates and uses various internal and external resources to carry out the intellectual property transformation work, and thus brings about the goal of intellectual property transformation. Desired substantial change, improvement or benefit. Referring to the above logical framework, this study establishes an evaluation model for the transformation of intellectual property rights in the aerospace field based on the CMMI model, and decomposes the intellectual property transformation work of a unit into two parts: actions (management process) and results (management results). Among them, the management process is a collection of activities that coordinate and manage a series of activities and resource allocation in the process of intellectual property transformation. It is the basic condition for considering the unit to complete the task of intellectual property transformation, and it also reflects the gradual improvement of the unit's intellectual property transformation management. It is measured through four aspects: intellectual property creation, intellectual property transformation management, intellectual property transformation process and intellectual property transformation guarantee . The management result is a powerful tool to measure the value of the unit's intellectual property transformation work, and it is evaluated through the effect of intellectual property transformation.

4.2 Evaluation object and evaluation content

The evaluation object is the innovation subject in the field of national defense. This research selects the second and third-level legal entities under the China Aerospace Science and Technology Corporation (hereinafter referred to as "Aerospace Science and Technology"), which has a wider main business scope and a relatively large scale, as the main evaluation object. The evaluation content is the intellectual property transformation process and capability level of each unit during the "Twelfth Five-Year Plan" period. As a scientific and technological enterprise in the field of national defense and a unit that manufactures weapons and equipment, the intellectual property rights of the second and third-level legal entities of aerospace science and technology are mainly patents, technical secrets, software copyrights, etc. The actual intellectual property transformation work is mainly based on patents. Therefore, the intellectual property transformation in this study mainly refers to the patent transformation.

4.3 Construction of indicator system

According to the construction idea of the national defense intellectual property transformation evaluation model and the construction principle of the evaluation index system, the national defense intellectual property transformation evaluation index system and its structure are designed. Among them, the first-level indicator is the dimensional division of national defense intellectual property transformation work, with a total of 5 indicators; the second-level indicator is the common representation of the transformation subject in each dimension, with a total of 18 indicators; the third-level indicator is the transformation subject in the transformation process. In terms of specific activity domains, comprehensively considering availability, measurability and comparability, a total of 45 key indicators were selected, as shown in Table 1.

4.4 Determination method of indicator weight

According to the evaluation objectives and content, the research designs an indicator weight questionnaire. The Delphi Expert Survey Method was used to determine the weights, and the weights of the primary and secondary indicators in the indicator system were scored on a five-point Likert scale. The questionnaires are checked and sorted through reliability and validity tests, and the expert scoring results of the valid questionnaires are controlled by group decision-making with equal weight per person, and the result aggregation method of weighted geometric mean is used. Using SPSS software, the national defense intellectual property rights are measured and calculated. The weights of the primary and secondary indicators of the transformation evaluation index system. The weight of the three-level indicators adopts the processing principle of equal weight of each indicator under the same dimension. See Table 1 .

Table 1 The evaluation index system and index weight of the transformation maturity of national defense intellectual property rights

First-level indicator	Secondary indicator	Three-level indicator
Intellectual Property Creation B1 (0.22)	Technical Requirements Development C1 (0.33)	Technical Requirements Development C1 (1.00)
	R&D investment C2 (0.32)	R&D Expenditure D2 (0.50)
		R & D personnel investment D3 (0.50)
	Technical Achievement C3 (0.35)	Number of Technical Achievements D4 (0.34)
		Number of Patent Applications D5 (0.33)
		Invention Patent Application Ratio D6 (0.33)
Intellectual Property Transformation Management B2 (0.20)	Market Demand Management C4 (0.27)	Demand Collection Quantity D7 (0.50)
		Number of Information Released D8 (0.50)
	Conversion Program Management C5 (0.25)	Number of IP Conversion Plans D9 (0.25)
		Quantitative Transformation Work Index D10 (0.25)
		Transformation Plan Review Passed D11 (0.25)
		Effect of Conversion Program D12 (0.25)
	Track, Monitor and Control C6 (0.24)	Track, Monitor and Control C6 (1.00)
	Risk Management C7 (0.24)	Risk Management C7 (1.00)
Intellectual Property Conversion Process B3 (0.18)	Transformation Process Definition C8 (0.18)	Clarification of Transformation Form and Process D15 (0.34)
		Transformation Process Review Determined D16 (0.33)
		Effect of Conversion Process D17 (0.33)
	Conversion Process Focus C9 (0.21)	Clarification of the Key Link D18 (0.34)
		Clarification of Key Link Input and Output D19 (0.33)
		Completion of Key Links D20 (0.33)
	Problem Analysis and Solutions C10 (0.22)	Problem Analysis and Solving Skills D21 (1.00)
	Transformation Process Yields C11 (0.20)	Quantitative Process Output D22 (0.50)
		Adaptive Development / Secondary Development D23 (0.50)
	Transformational Performance Management C12 (0.19)	Performance Management Indicator System D24 (0.50)
		Performance Management Results Application D25 (0.50)
Intellectual property conversion protection B4 (0.19)	Organizational Training C13 (0.32)	Education and Training Program D26 (0.50)
		Education and Training Output D27 (0.50)
	Internal Assurance C14 (0.36)	Top Management D28 (0.25)
		Mechanism Setting D29 (0.25)
		Staffing D30 (0.25)
		Funding Support D31 (0.25)
	External Environment C15 (0.32)	Known Relevant Laws and Policies of the Country and the Group Company D32 (0.20)
		Implement Relevant Laws and Policies of the State and Group Companies D33 (0.20)

		Known Relevant Financial Support Policy D34 (0.20)
		Implement Relevant Financial Support Policies D35 (0.20)
		Intermediary Cooperation D36 (0.20)
Intellectual Property Conversion Effect B5 (0.21)	Transformation Result C16 (0.33)	Self-implemented Quantity D37 (0.20)
		License Quantity D38 (0.20)
		Transfer Quantity D39 (0.20)
		Cooperative Implementation Quantity D40 (0.20)
		The Number of Shares Purchased at the Price D41 (0.20)
	Economic Benefit C17 (0.35)	Economic Income Scale D42 (0.34)
		Economic Contribution Rate D43 (0.33)
		Reward Amount D44 (0.33)
	Social Benefit C18 (0.32)	Contribution to Technology Promotion D45 (1.000)

4.5 Determination of index values

With the help of the design concept of the Likert five-point scale, a comprehensive evaluation questionnaire was designed, and the relevant personnel of the evaluated unit were invited to score the three-level indicators in the indicator system. On the basis of data collection and processing, the method based on fuzzy mathematics was adopted The comprehensive evaluation method of the principle evaluation model is used for evaluation. The advantage of the fuzzy comprehensive evaluation method is that it can evaluate the problems that are difficult to quantify directly with accurate numbers. . In the calculation, each factor is matched with different weight coefficients, which can highlight important evaluation items.

4.6 Judgment of maturity level

According to the comprehensive evaluation results of the fuzzy mathematics principle evaluation model, the maturity level of intellectual property transformation of the national defense evaluation unit is determined. The evaluation results of this model are divided into five levels, and the total comprehensive score is 100. A score between 0 and 60 is defined as the initial level; a score between 60 and 70 means qualitative management level; a score between 70 and 80 means a defined level; a score between 80 and 90 is a quantitative management level; a score between 90 and 100 is defined as an optimal management level, see Figure 1.

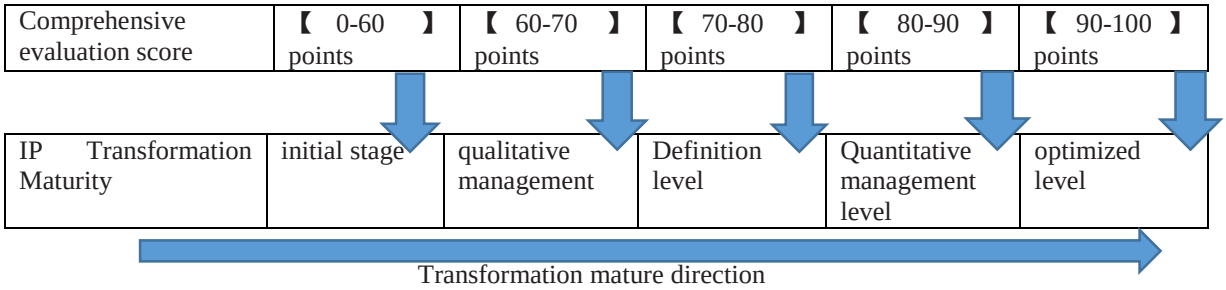

Figure 1 Judgment of maturity level of national defense intellectual property transformation

4.7 Evaluation implementation process

On the basis of model construction, this study selected 6 typical second- and third-level legal entities related to aerospace science and technology in national defense science and technology to carry out empirical research, and invited the leaders in charge, model commanders, chief designers, intellectual property managers, Experts such as department/office directors and technical backbones conducted questionnaire surveys and interviews, and used the transformation maturity model to analyze the transformation of intellectual property rights, as shown in Table 2.

Table 2 Empirical survey of defense enterprises

Type of business	specific unit	interviewer _	investigators _
Overall enterprise	Overall company A	30	70
	Overall Enterprise B	20	80
Sub-system enterprise	Subsystem Enterprise C	40	60
	Subsystem Enterprise D	20	80
Pure private enterprise	Pure private company E	40	60
	Pure private company F	20	40
Total		170	390

4.8 Evaluation results

The results of the investigation and analysis show that: (1) the intellectual property transformation maturity level of puremin company is higher than that of the overall unit, and the maturity level of the overall unit is higher than that of the sub-system units; (2) the intellectual property creation of each unit is relatively good, and the intellectual property transformation management and The overall process is relatively poor, and there are also weak links in the protection of intellectual property conversion in individual units, and the overall effect of intellectual property conversion is not good. The specific results are shown in Table 3.

Table 3 Evaluation results of intellectual property transformation maturity of sample units of national defense science and technology enterprises

	Overall company A	Overall Enterprise B	Subsystem Enterprise C	Subsystem Enterprise D	Pure private company E	Pure private company F
maturity level	Quantitative management level	Definition level	Definition level	qualitative management level	Quantitative management level	Quantitative management level
Comprehensive score	86.0	79.6	75.4	68.5	87.5	80.3
B1	91.3	84.5	83.6	72.2	87.7	81.1
B2	84.4	84.0	75.4	65.1	90.7	82.0
B3	84.8	70.0	70.3	69.0	82.9	88.2
B4	87.8	82.8	73.6	71.2	89.7	89.7
B5	81.6	75.8	73.0	64.9	86.3	62.6

4.9 Countermeasures and suggestions

According to the above evaluation results, it is recommended that national defense enterprises and institutions: (1) establish a market-oriented mechanism for technology research and development. While "guaranteeing success and ensuring delivery", we should seize the opportunity of military-civilian integration, invest resources in the secondary development of aerospace technology, strengthen the creation and distribution of intellectual property rights from the perspective of market demand, and promote it to the civilian field. Civil technology research and development, adhere to the market demand-oriented, act in accordance with market rules, timely commercialize civilian technology, and improve the development capacity of the civilian market. (2) Build a coordinated operation mechanism for the transformation of intellectual property rights. Strengthen the top-level design and overall planning of intellectual property transformation, establish specialized transformation management institutions and professional talent teams, build a coordinated operation mechanism for intellectual property transformation, and clarify that R&D, intellectual property management, operation and investment, and financial and financial departments are involved in intellectual property transformation. Responsibilities, promoting coordination and linkage between departments, form a joint force in intellectual property transformation, and give full play to the important roles of technology, capital, market, law and other elements in intellectual property transformation. (3) Formulate rules and regulations for intellectual property transformation management. Establish a reasonable and standardized process system to realize the process, refinement and controllability of the process. At the same time, according to the goal of intellectual property transformation management, with the help of a variety of behavioral and standardized measurement methods and technologies, collect relevant information, set work standards, and have the ability to objectively evaluate the multi-level output status in the transformation process, and actively choose And deploy incremental and innovative improvements to achieve measurable improvements in organizational performance.

5 PATHS AND POLICY SUGGESTIONS FOR PROMOTING THE TRANSFORMATION OF NATIONAL DEFENSE INTELLECTUAL PROPERTY RIGHTS

5.1 Improve the legal system related to national defense intellectual property rights

（1）Improve the national defense intellectual property system that encourages inventions and creations

The current distribution of property rights and interests of national defense intellectual property rights is unreasonable, which violates the legal principle of the private property of intellectual property, and the innovators cannot obtain corresponding rights and interest protection. On the premise of not violating national interests, the functions of national defense intellectual property rights are divided into the right of confidentiality, the right of expropriation, the right of possession, the right of use, the right of usufruct, the right of disposal, and the right of transfer, etc., and clearly stipulate the ownership of national defense patents to the unit and the inventor. , the state enjoys the right of confidentiality and the right to use . Reasonably determine the income distribution ratio of the country, the army, the unit and the inventor, and fully protect the rights and benefits due to the inventor. In this

way, the intangible transaction costs of national defense intellectual property transactions can be reduced, and the transformation and application of national defense knowledge can be promoted.

（2）Improve the intellectual property judicial system

Different intellectual property rights involve different technical issues. National defense intellectual property rights are mostly high-tech fields involving national strategic interests. They are highly specialized and complicated in cases. Approval team. At the same time, it is necessary to integrate and improve the existing intellectual property judicial resources, improve the trial efficiency, solve the problems of insufficient legal basis, insufficient universal scope and insufficient overall balance in intellectual property trials, and effectively protect the fairness of national defense intellectual property trial cases. To supervise, punish and reduce opportunistic behaviors and breaches of national defense intellectual property rights, reduce the transaction costs of national defense intellectual property rights, and improve the transaction efficiency of national defense intellectual property rights.

5.2 Improve the confidentiality and decryption mechanism and evaluation system of national defense intellectual property rights

（1）Improve the encryption and decryption mechanism of national defense intellectual property rights

Set up a special confidentiality and decryption agency to be responsible for the confidentiality and decryption of national defense intellectual property rights, organize experts in the field of science and technology and experts in the field of intellectual property to decrypt defense intellectual property rights that no longer need to be kept secret, and make national defense intellectual property rights with great industrial and economic value. Get the conversion application in time during the best transaction period. Considering that national defense intellectual property has stronger confidentiality and national interests than general intellectual property rights , but different types of national defense intellectual property have different confidentiality requirements , by refining the security level setting standards of national defense intellectual property rights, the security level setting can be achieved. There are laws to follow.

（2）Improve the evaluation system of national defense intellectual property rights

The evaluation of national defense intellectual property involves many aspects such as the market value, compensation value, and license value of national defense intellectual property, and its scientific and professional requirements are extremely high, which is related to the preservation and appreciation of state-owned assets. In view of the current lack of a unified national defense knowledge management organization in China, the transformation and application of national defense intellectual property rights involves both the military and local parties. The functions of relevant science and technology management departments should be integrated and adjusted at the government and military levels, and a unified and authoritative national defense intellectual property management organization should be established. The main body responsible for the evaluation of national defense intellectual property rights, rationally optimize the workflow of national defense intellectual property evaluation, and guide and supervise the evaluation of national defense intellectual property rights.

5.3 Establish and improve the military-civilian integrated defense intellectual property information platform and operating organization

（1）Improve the military-civilian integration defense intellectual property information platform

Information sharing is the fundamental function of the military-civilian integrated defense intellectual property information platform, which solves the problem of information asymmetry between national defense intellectual property rights among different innovation entities, and effectively reduces the cost of information acquisition in defense intellectual property transactions. The construction of the national defense intellectual property information platform involves multiple relevant departments of the government and the military. The relevant functional departments should be integrated and coordinated to collect, summarize and count regional national defense intellectual property information, and build a clearly classified , fast and accurate information platform.

(2) Launch a pilot program of a centralized management and operation platform for national defense intellectual property rights

Build a "public welfare + commodity" national defense intellectual property management and operation platform, carry out defense intellectual property management, evaluation, investment and financing , promote the transformation and application of national defense intellectual property , and vigorously release and stimulate the vitality of scientific research subjects . Guide to attract financial capital and social capital, innovate the investment method of science and technology funds, and comprehensively use seed funds, angel investment, venture capital and industrial incubation funds to improve the transformation efficiency.

5.4 Improve the military-civilian integration training mode for national defense intellectual property talents

In view of the current problems in the training of national defense intellectual property talents, it is necessary to vigorously rely on military educational resources and national education resources, improve the military-civilian integration training mode of national defense intellectual property talents, and carry out diversified and multi-level training. Military academies should make full use of their own disciplines and faculty advantages build a scientific practical teaching system, and strive to cultivate high-end practical talents such as patent analysts, patent appraisers, and patent attorneys, aiming at the characteristics of military academies with high scientific and technological literacy and broad vision. As an important force in national scientific and technological innovation, local colleges and universities have a relatively complete intellectual property talent training system, set up national defense intellectual property majors , covering defense patent writing, evaluation and other courses, and cultivate national defense intellectual property undergraduate , master and doctoral professionals. Professional education for the cultivation of national defense intellectual property talents is provided among national defense students to meet the practical needs of the transformation of national defense intellectual property rights for application-oriented talents.

6 CONCLUSIONS AND RECOMMENDATIONS

Designing a scientific transformation mechanism is an important condition for realizing the transformation effect of national defense intellectual property rights. The transformation of national defense intellectual property rights is a systematic project, and it is also an activity with the characteristics of completeness and continuity in the process. To change the value generation and realization stage that only focused on the transformation of national defense intellectual property rights in the past, the marketable stage of the early stage should be changed. The value assessment of transformation and later period is included in the overall review of operating activities.

Based on systems engineering ideas and methods, this paper comprehensively integrates intellectual property evaluation, capability maturity, policy, economics, law and other related theoretical disciplines, and adopts a comprehensive integrated analysis method that combines qualitative and quantitative analysis. degree model. According to the field of defense and aerospace science and technology According to the calculation results of the intellectual property transformation capacity of 6 typical units during the "Twelfth Five-Year Plan" period, the evaluation model can more objectively reflect the actual situation of intellectual property transformation of research institutes, institutes and companies, and also verifies the rationality of the model design. From the perspective of future application value, this model not only enriches the theoretical system of intellectual property evaluation, but also has direct guiding significance and practical operation value for intellectual property transformation, and also provides reference for the evaluation of intellectual property transformation capabilities in various industries and fields.

In the follow-up, the author will further carry out the following research in the continuous exploration, practice and understanding: First, improve the intellectual property transformation capability maturity model. First of all, the transformation of intellectual property rights itself is a relatively macro abstract thing, and its quantification and evaluation still need to be further divided according to the types of evaluation objects; secondly, it is also a new attempt to use the maturity model for the evaluation of intellectual property transformation of innovative subjects. Strictly following the paradigms of other maturity levels, or applying them to various types of innovative entities, still requires a lot of practical application. Second, on the basis of in-depth research, a specification for the evaluation and use of intellectual property transformation capabilities of innovative entities based on capability maturity is formed, including data collection standards, expert selection standards, evaluation process standards, and results review and publication standards.

Transformation of national defense intellectual property is itself a mechanism system, including the generation mechanism of national defense intellectual property, the value generation mechanism of national defense intellectual property, and the realization and transmission mechanism of national defense intellectual property value. In particular, it is necessary to cultivate more national defense intellectual property intermediary service agencies, give full play to their professional advantages, and gradually form a good market-oriented transformation model . The essence of the transformation of national defense intellectual property rights is the process of value creation and value sharing. Value creation is to maximize the economic and social value of national defense intellectual property rights. Value sharing is the premise and driving force of value creation. Only reasonable value sharing can mobilize all parties. The enthusiasm of the main body to attract more factors to be transferred to the value creation activities of national defense intellectual property. The core problem of the transformation of national defense intellectual property rights under the background of military-civilian integration is to break the blocking factors of value creation and value sharing, especially by improving the construction of relevant laws and regulations, breaking the mechanism barriers and smoothing the value sharing channels.

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