Research on Evaluation of High-end Equipment Manufacturing Achievements from the Perspective of Scientific and Technological Achievements Transformation

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Keywords: Transformation of scientific and technological achievements; High-end equipment manufacturing; Evaluation of scientific and technological achievements

Abstract: The 19th National Congress of the Communist Party of China proposed that China should adhere to the strategy of innovation-driven development and build an innovative country. China has become the second largest R&D investment country in the world. In 2017, R&D expenditure has reached 1.7 trillion. Improving the transformation efficiency of scientific and technological achievements and realizing industrial application are the key points of scientific and technological innovation, and can truly promote economic development and build an innovative country. Under the background of "Made in China 2025", the improvement of the conversion rate of scientific and technological achievements in high-end equipment manufacturing industry is particularly important. This paper intends to construct a gray fuzzy evaluation model of volatility by using a series of qualitative and quantitative analysis methods such as expert scoring method and literature collection method. The use of this model can make up for the deficiency of the evaluation industry in the evaluation of scientific and technological achievements in high-end equipment manufacturing. The innovation of this paper is reflected in two aspects: one is to develop a more complete evaluation system to more accurately evaluate scientific and technological achievements; the other is to use fuzzy mathematics theory and grey system theory to complement each other, so that the technology determined by real option method The value of the results is more accurate.

1. Research Purposes and Significance

1.1 Characteristics of Technological Achievements in High-end Equipment Manufacturing.

China's high-end equipment manufacturing knowledge-intensive industry is the core link of the entire industry chain, and its scientific and technological achievements are characterized by high technology, high added value, large growth space, and strong action. Defining the characteristics of its technical achievements will help the evaluation agencies to evaluate them more accurately, and will greatly promote the development of China's economy and drive the track of internal growth. It is precisely because of the distinctive characteristics of the high-end equipment manufacturing technology achievements that the driving factors driving the transformation of high-tech equipment manufacturing technology results are different from other technology fields.

1.2 A Scientific Evaluation Index System proposed and Evaluation Method for the Value of Technical Achievements.

Because the previous scientific and technological achievements evaluation index system and evaluation method can not be applied to the evaluation of the value of technological achievements of high-end equipment manufacturing enterprises, the existing evaluation system of independent high-tech equipment manufacturing enterprises' independent scientific and technological achievements still has an imperfect indicator system. Reasonable questions; existing assessment methods are not accurate enough for volatility considerations. In addition, the scientific value assessment of technological achievements will help to improve the efficiency of scientific and technological achievements transformation. Therefore, the scientific evaluation index system and

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evaluation methods for technical achievements will help promote the rapid development of China's high-end equipment manufacturing industry.

2. Research Status and Trends at Home and Abroad

2.1 Definition of Basic Concepts.

1) High-end equipment manufacturing industry. The high-end equipment manufacturing industry, also known as the advanced equipment manufacturing industry, refers to the industry that produces high-tech, high value-added advanced industrial facilities and equipment. High-end equipment mainly includes high-tech and high value-added equipment required for the transformation and upgrading of traditional industries and the development of strategic emerging industries. The high-end equipment manufacturing industry is a strategic emerging industry that is guided by high and new technology, is at the core of the value chain and the core of the industrial chain, and determines the comprehensive competitiveness of the entire industrial chain. It is the backbone of the modern industrial system and the engine that promotes industrial transformation and upgrading. Vigorously cultivating and developing high-end equipment manufacturing industry is an inevitable requirement for upgrading China's industrial core competitiveness, and is a strategic choice to seize the commanding heights of future economic and technological development. It is an important strategy for accelerating the transformation of economic development mode and realizing the transition from a manufacturing power to a strong country significance.

The high-end equipment manufacturing industry refers to the high-end field of equipment manufacturing industry. The "high-end" is mainly manifested in three aspects: first, high technical content, characterized by knowledge and technology intensive, reflecting the inheritance of multi-disciplinary and multi-disciplinary high-tech technologies; Second, it is at the high end of the value chain and has the characteristics of high added value. Third, the industrial chain occupies the core part, and its development level determines the overall competitiveness of the industrial chain. From the perspective of industry, high-end manufacturing refers to the emerging industries with high technology content, high added value and strong competitiveness. From the perspective of the industry chain, high-end manufacturing is in a certain industrial chain. High-end links.

Industry	Key development direction
Aviation equipment manufacturing	Large aircraft development, series of regional aircraft, general aircraft and helicopters, aerospace engine important airborne systems, aviation equipment
Satellite manufacturing and application industry	Space transportation system, application satellite system, satellite ground system, satellite application system
Rail transit equipment manufacturing	EMUs and passenger trains, heavy-duty and fast freight trains, urban rail transit equipment, engineering and road maintenance machinery equipment, signal and integrated monitoring and operation management systems, key core components
Marine engineering equipment manufacturing marine mineral resources development equipment	marine renewable energy and chemical resource development equipment, and other marine resource development equipment (semi-submersible drilling platform technology, jack-up drilling platform technology, deepwater drilling ship technology, ocean drilling ship technology), offshore wind power equipment technology, seawater desalination equipment technology)
Intelligent manufacturing equipment industry	Key intelligent basic common technology, core intelligent measurement and control devices and components, major intelligent manufacturing integrated equipment, key application demonstration and promotion areas (CNC systems, intelligent control systems, automation equipment, industrial robots, sensors, power electronics)

 Table 1
 High-end equipment manufacturing industry and key development directions

In general, high-end equipment manufacturing can be divided into five major areas: aviation

equipment manufacturing, satellite manufacturing and application, rail transit equipment manufacturing, marine engineering equipment manufacturing, and intelligent manufacturing equipment. Since the State Council proposed in 2011 that the high-end equipment manufacturing industry is defined as seven strategic emerging industries, the Ministry of Industry issued the "Twelfth Five-Year Development Plan for High-end Equipment Manufacturing Industry" in 2012, which specifies the high-end equipment manufacturing in China. Five key areas of development and development direction. See Table 1 for details.

2) Analysis of the characteristics of high-end equipment manufacturing technology achievements. The high-end equipment manufacturing industry has made remarkable progress in terms of product manufacturing, equipment introduction, etc., as well as independent research and development of new products and their own technical equipment. However, there are still some problems in its development. For example, China's industrial structure level is significantly lower than that of the current developed countries; management models are still relatively traditional, computers are not universally applied in the application of high-end equipment manufacturing technology, and computerization has not yet been realized in production management; High-end equipment manufacturing technology. The application of high-end equipment manufacturing technology in China is very extensive. The application of high-end equipment manufacturing technology in agriculture has already involved the processing, storage and transportation of agricultural products; the application of high-end equipment manufacturing products in engineering is also very large, and the identification system of this technology has a high target for the work. Perceptuality, able to identify the characteristics of sand, stone and other materials, greatly reducing the risk of work and improving the construction quality of the project; high-end equipment manufacturing technology also has a wide range of applications in the food packaging industry and research and development of new energy.

a) Heavy practicality

Pay more attention to practicality. The rapid development of China's economy in recent decades has driven the high-end equipment manufacturing technology to gradually move toward maturity. In the process of rapid development of the technology, it is important to blindly introduce and expand technology, while ignoring the actual needs of the Chinese market. This unrealistic development is a waste of national resources and meaningless. In the future, the development of high-end equipment manufacturing industry should comprehensively consider the needs of the economy and society, and develop corresponding automation technologies to expand production according to the actual needs of different product production, so as to effectively improve the efficiency of enterprises. We must also pay attention to establishing a correct development direction, so as to ensure that the high-end equipment manufacturing industry is moving toward a green, digital, and intelligent development goal.

b) Pay attention to environmental protection

Towards the development of green development. China is a country with a large population and faces the problem of shortage of resources. To reduce the threat to resources shortage, we must focus on saving resources. The high-end equipment manufacturing technology industry is a high-resource-consuming industry. Although it has brought convenience to human production to a certain extent and created wealth for enterprises and countries, the industry has caused great pollution to the environment. The development of automation technology at the expense of the environment is meaningless. Therefore, in the future, the development of high-end equipment manufacturing industry must put the "low-carbon environmental protection" national policy at the forefront, and use the least resource consumption to obtain the maximum benefit is the development direction of the industry. For example: We can develop new high-end equipment manufacturing technology, and appropriately introduce advanced technologies from other countries that meet our actual needs, carry out corresponding transformation of machinery, develop high-level technology research and development, and form high-end with outstanding advantages. Equipment manufacturing technology. The green development of the industry can reduce the consumption of national energy and reduce environmental pollution while ensuring economic benefits.

c) Focus on efficiency

Develop low-cost, high-efficiency automation technology. At present, the high potential and high efficiency of high-end equipment manufacturing technology has been recognized by more and more industries, and the amount of funds invested in this technology is very large, which is not conducive to the future development of the technology. In order to ensure the sustained and stable development of the technology industry, it must develop in a direction of less investment and quicker results. According to China's national conditions, we should learn from the experience of foreign advanced high-end equipment manufacturing technology and absorb the essence of experience, so as to avoid unnecessary capital investment and reduce production costs. All advanced manufacturing companies have a large part of common equipment. High-end equipment manufacturing technology can use these equipments during development, improve and adjust them on the basis of them, and introduce advanced technologies appropriately instead of abandoning the old general-purpose equipment. Repurchase again. In this way, it can provide a new way of development and application for the development and application of China's advanced manufacturing automation technology with less investment, quick effect and high efficiency.

d) Focus on reducing product volume

Reduce the size of high-end equipment manufacturing products. The existing high-end equipment manufacturing products are generally large in size, and most of their applications are in the agricultural, industrial, construction and other industries. These industries are not very demanding on the volume requirements of high-end equipment manufacturing products. However, in order to make great progress in high-end equipment manufacturing technology, it is necessary to meet the needs of the military, medical and information fields. These areas have strict requirements on the volume of automation products, and only some micro-automation products can be produced to meet the needs of these industries. In the future, the research and development of high-end equipment manufacturing products must overcome the technical difficulties, and minimize the size of the products in order to make them develop to a higher level in the future.

In the future, the development of high-end equipment manufacturing technology should take into account the needs of the economy and society. According to the actual needs of different product production, we will develop corresponding automation technology to expand production and attach importance to the practicality of technology. The development of high-end equipment manufacturing industry must also The national policy of "low carbon and environmental protection" is at the forefront, with the least resource consumption to obtain the maximum benefit, and strive to develop in a green direction; it is also necessary to realize the development of low-cost and high-efficiency automation technology; In the future, the research and development of high-end equipment manufacturing products must overcome the technical difficulties, and minimize the size of the product in order to make it a new level in the future development.

3) Evaluation of the value of technical achievements

The evaluation of scientific and technological achievements is an important part of scientific research management. Objective and accurate evaluation of scientific and technological achievements, strengthen the close integration of science and technology and economy, and encourage researchers to improve the level of scientific research. At present, the relevant scholars' research on the evaluation methods of scientific and technological achievements is mainly the application and improvement of classical evaluation methods, including peer review method, Delphi method, index system evaluation method, correlation analysis method, comprehensive evaluation method, analytic hierarchy process, fuzzy Comprehensive evaluation of scientific and technological achievements in the model H1. Yang Sibo et al. (2005) adopted Delphi method, analytic hierarchy process and linearity. The weighted comprehensive evaluation method forms the evaluation model and its evaluation index system. Wang et al. (2009) fully considers the expert weight factors, applies the reliability coefficient in the education and psychometric theory to establish the expert weight, and uses the CRIrnC method and

the ideal point method to construct. Based on the comprehensive weighted comprehensive evaluation model of scientific and technological achievements based on compound weights, Zhang Lijun et al. (2011) proposed a fuzzy comprehensive evaluation method for scientific and technological achievements considering expert weights based on the analysis of existing methods for measuring authoritative and credibility of experts. Yuan Ruiqi et al. (2013) from the index system and evaluation method of scientific and technological achievements evaluation. Study proposed evaluation method of scientific and technological achievements Applied Technology Based on DEA. Fu Qiang et al. (2011) divided the technological innovation process into two sections to measure the efficiency of five high-tech industries. Ye Rui et al. (2012) used the DEA model to measure the high-tech industry in 29 provinces based on the initial input and intermediate reinvestment. The efficiency of achievement transformation, Zhao Hui et al. (2016) proposed improvement suggestions based on the grey correlation analysis method and fuzzy comprehensive evaluation to evaluate the transformation effect of scientific and technological achievements in China.

The method of assessing the value of foreign technological achievements is based on the evaluation method of intangible assets. Osman (1986) proposed that the value of technology should be determined based on the expected benefits of technology assets for its owners, and the method of determining the price of technology is introduced. Gerald (1989) proposed a technical valuation method that uses profit sharing in technology transactions. Gordon (2007) advocates the use of future excess returns for the evaluation of technology assets. Hao Shilong (2014) studied the auction method and applied it reasonably to the online trading system of technology, and realized the reasonable pricing of technology through online auction. Yan Maohua (2014) compared the value of the selected project and the traditional net present value method from the evaluation project value and the risk of measuring the project. The empirical verification of the option model in the evaluation of intellectual property value The advantage in decision making. Chang Aicheng (2015) and others believe that various evaluation methods have different strengths and weaknesses. There are certain limitations in using them alone. It is recommended to combine evaluation methods and comprehensively analyze the value of technical achievements.

2.2 The role of value assessment of technological achievements in the transformation of scientific and technological achievements

Bidault (1989) found that there is a large gap in the value of technological achievements in different technology life cycles. Chen Zuxin (1995) pointed out that the lack of institutional mechanisms, insufficient supply and demand, unopened ideological concepts, inflexible scientific and technological talents, imperfect management and inadequate policies and regulations are the main reasons for the success of the transformation of scientific and technological achievements. Wang Huatong (2003) used the principal component analysis method to divide the factors affecting the transformation of scientific and technological achievements into internal factors of enterprise leaders' ideological concepts, enterprise management's work ability, and enterprise's industrial carrying capacity, and the input and scientific and technological achievements. Interrelated external factors such as technical height. Reitzig (2003) believes that the degree of advancement, the scope of application, the possibility of being replaced by other technologies, the manufacturing process, the cost, the affiliated enterprise, and the industry characteristics of a technological achievement will affect the value of the technological achievements in the transaction transfer. The output level of technical achievements and profitability represent the potential and possibility that the technological achievements will bring economic benefits to the purchaser in the future. The high risk of production of technological achievements and the uncertainty of transformation will affect the value of technological achievements. Gouranga Gopal Das (2007) explored the role of regional information level in the transformation of scientific and technological achievements by establishing a CGE model, pointing out that the regional human resource level, macro management level and industrial structure will have a very large impact on the conversion rate of scientific and technological achievements. Liu Jiashu and Yan Lirong (2010) used Tobit regression method to find that the institutional factors that have the greatest impact on conversion are government capital investment, new product research

input, technology services and regional factors. Guo Qiang analyzed the internal factors of Li Yongda from the perspective of system, which are the characteristics of scientific and technological achievements, market demand, guidance ability, trust, learning ability, carrying capacity and technology intermediary service ability. The three external factors are intermediary service ability, Policy/institutional promotion and social and cultural shaping. Yang Ruiqi (2015) analyzed the impact on the value of technological achievements from five dimensions: scientific factors, technical factors, market factors, economic benefit factors and social influence factors. Wang Bin (2016) analyzes from the perspective of innovation chain, and believes that enterprises are the main body of the transformation of scientific and technological achievements. The market has a strong role in promoting the transformation of scientific and technological achievements. The input of resources is an important driving factor in the transformation of scientific and technological achievements. Policy support can make up for technology. The risk of innovation and transformation of results. Qu Yong (2017) and other based on the Hedonic Price model to empirically identify the influencing factors of the value of technological achievements. Economic benefits are the decisive factor in the value of technological achievements. Yang Shuili (2018) analyzes the factors influencing the value of technological achievements from the perspective of input-output. Among them, economic value and technical value are important factors affecting the value of scientific and technological achievements, while scientific and technological value, R&D investment, transformation input and social value are relatively second.

2.3 Significanceby Analyzing the Characteristics of High-end Equipment.

manufacturing industry, we find the characteristics of scientific and technological achievements related to high-end equipment manufacturing industry, construct a scientific and effective evaluation system of scientific and technological indicators, and evaluate the scientific and technological achievements related to high-end equipment manufacturing industry through a combination of qualitative and quantitative methods. According to the setting principle of the index system, combined with the technological development characteristics of the high-end equipment manufacturing technology achievements, the high-end equipment manufacturing technology achievement value evaluation index system is set. The indicator system mainly examines the technical value, economic value, team value and system risk of the technical achievements. The basic idea of the value evaluation of high-end equipment manufacturing industry based on fuzzy comprehensive evaluation method is to determine the set of factors (indicator system), evaluation (level) and weight of each factor (levels) by determining the value of the evaluated technical achievements. Organize the evaluation of the evaluation (level) of the value of relevant technical achievements by the participating experts, and obtain the corresponding membership degree vector. On this basis, the fuzzy evaluation matrix is constructed, and the fuzzy evaluation matrix and the fuzzy calculation of the factor weight vector are realized by MATLAB software programming. Finally, the fuzzy comprehensive evaluation result is obtained, which is the evaluation of the value of related technical achievements.

3. Basic Model of Value Evaluation of High-end Equipment Manufacturing Technology Achievements

3.1 Evaluation steps for designing the value of technical achievements In High-End Equipment Manufacturing.

1) Real Option Identification

The real option theory is the expansion and application of financial options to the physical assets with option characteristics. Therefore, before applying the real option theory and selecting the real option model, it is necessary to identify the real option of the high-end equipment manufacturing technology and judge whether it meets the real option object. Characteristics. 1 expect to get high returns in the future; 2 limited loss; 3 value uncertainty; 4 technology receptors will only use this right when the technical results bring the expected profit to be greater than the investment

expenditure, otherwise the technical results will be temporarily put stand up. Therefore, the technical achievements of high-end equipment manufacturing can be regarded as a call option.

Through analysis, we find that the characteristics of the high-end equipment manufacturing technology achievements are consistent with the characteristics of the real option target assets, so the real option theory can be applied to the evaluation of the value of high-end equipment manufacturing technology results. Its options can be viewed as American call options.

2) Selection of real option evaluation model

Through the real option identification of the high-end equipment manufacturing technology achievements, the technical results can be regarded as the American call option and the comparative analysis of the pricing models commonly used in real options. It is found that the application conditions and applicable objects of the binary tree option pricing model are related to technology. The conditions and characteristics of the results are consistent, and its operation is simple and intuitive, and it is widely used. Therefore, this paper chooses the binary tree option pricing model to evaluate the option value of high-end equipment manufacturing technology achievements.

$$f = e^{-rfT} [Nf + (1 - N)f_d]$$
(1)

$$N = (e^{(rf-b)} - d)/(u - d)$$
(2)

f is the option price

u is the uplink multiplier, that is, the ratio of Su to S

d is the downward multiplier, that is, the ratio of Sd to S

N is risk neutral probability

3) Evaluation model operation

Through the analysis of the characteristics of the high-end equipment manufacturing technology achievements, combined with the determination of the first four parameters, the fuzzy evaluation matrix is constructed, and the fuzzy evaluation matrix and the fuzzy calculation of the factor weight vector are realized by MATLAB software programming, and finally the fuzzy comprehensive evaluation result is obtained. Evaluation of the value of related technical achievements.

3.2 Construction of High-End Equipment Manufacturing Technology Achievement Evaluation Index System

1) Design principles of the indicator system

a) Scientific principles

When designing the evaluation index system, it is necessary to have scientific theory to guide, so that the evaluation index system can be reasonable and rigorous in the basic concepts and logical structure, and cooperate with each other in interpretation function; with statistical analysis tools, a relatively reasonable and consistent A unified scoring standard required for actual development.

b) Comprehensive principle

In the selection of indicators, it should be able to reflect the characteristics of the high-end equipment manufacturing technology achievements, as well as the innovation ability, high-tech content, high-level talent reserve and other components to ensure the integrity, comprehensiveness, and different levels and perspectives. The comprehensiveness and credibility of the comprehensive evaluation; the objectives and key points of the high-end equipment manufacturing enterprises should be fully considered, so that the evaluation results can guide the application of high-end equipment manufacturing technology results.

c) Principle of operability

The meaning of the indicator system must be clear, which is conducive to the analysis and scoring, so that it is operational and horizontally comparable.

d) The principle of independence

In the process of establishing an indicator system, the degree of correlation between the indicators is minimized to avoid obvious inclusive relationships. The associated indicators should select one of the indicators to describe one aspect of the value analysis of the technical results, and the implicit correlation should be eliminated in an appropriate way.

e) Hierarchical principle

Hierarchy refers to the multiplicity of the indicator architecture itself. That is, an indicator can be determined by several sub-indicators to form a tree structure, which will facilitate the measurement of the value of technical achievements in various aspects and the determination of index weights.

f) Principle of combining qualitative and quantitative

In the rating process, the indicators reflecting the value of technical achievements can be divided into two categories: one is quantitative indicators, that is, based on statistics, calculations and research on the relevant results of technical achievements, the measured or estimated value of the indicator can be obtained; It is a qualitative indicator. Such indicators cannot be or are difficult to quantify. They can only be analyzed by experts or analysts and quantified. Only by combining these two types of indicators can we achieve the goal of scientific evaluation and achieve credible results.

g) Modular principle

In the transaction process, for the specific needs and different concerns of both parties, a part of the analysis system can be separated as a module, and only the internal analysis process of the module is performed, and part of the analysis results are obtained. This can be customer-oriented and maximize customer demand while minimizing costs.

2) Value Evaluation System for High-end Equipment Manufacturing Technology Achievements According to the setting principle of the index system, combined with the technical development characteristics of the high-end equipment manufacturing technology achievements, the high-end equipment manufacturing technology achievement value evaluation index system is set. The indicator system mainly examines the technical value, economic value, intellectual property value, team value and system risk of the technical achievements, and sets four first-level indicators such as technical value, economic value, team value and system risk; There are a number of secondary indicators, a total of 16 secondary indicators; each of the secondary indicators has a number of three indicators, a total of 56 three-level indicators. The specific indicators are set in Table 2.

Primary	secondary	tertiary indicator
indicator	indicator	
Technical value	Innovative	1.Innovation points (a)
		2.Technical innovation difficulty
		3.Technological innovation complexity
	Advanced	1.Innovation level
		2.Scope of application
		3.Industry development trend
	stability	1.Reliability
		2.Reproducibility of technology
		3.Technical life
	Maturity	1.Degree of industrialization
		2.Degree of technical radiation
	Intellectual property	1.Patent authorization
		2.Standard situation
		3.Number of papers published, influence factors, and citation rate
		4.Monograph situation
		5.Number of patent applications
Benefit value	Economic benefit	1.Sales revenue after application conversion (ten thousand yuan)
		2. Applying transformed labor productivity
		3.Application cost and profit margin after conversion
		4. Apply the market share after conversion
	Social benefit	1. Promote the development of related industries
		2. Drive employment
		3. Transformation and upgrading of traditional industries
	Ecological	1.Energy efficiency
	Benefits	2. Benefits of emission reduction

Table 2 High-end equipment manufacturing technology achievement evaluation indicators

		3. The recycling level of waste resources
Team value		1. Professional and technical personnel professional background and
	Scale and structure	tracking learning ability
		2. The average age of professional and technical personnel
		3. Senior and middle-level professional and technical personnel and
		proportion
		4. Outstanding talent
		5. Relying on the base or laboratory
		6. Research infrastructure and experimental capabilities
		7. Proportion of funds for horizontal research projects undertaken and
		completed
	Tashnalagiaa	1. Invention patents granted in the past 3 years
	1 innovation	2. Published papers and monographs in the past 3 years
	ability	3. Research awards in the past 3 years
	aonity	4. Academic exchanges in the past 3 years
	Internal	1. Project Management System
	management	2. Performance appraisal system and incentives
		1. Number of outstanding talents introduced in the past 3 years
	sustainable	2. Talent cultivation in the past 3 years
devel	development	3. Team building and future development planning
		4. Innovation goals
	Technical risk	1. Possibility of generating potential social ethics
System risk		2. Potential technological development risks or hazards
		3. Dependence of supporting technology
		4. Technology alternatives
	Market risk	1. The difficulty of entering the market
		2. Competitor's competitiveness
		3. Number of skilled workers and proficiency
	Policy risk	1. Industrial policy fit
		2. Regional policy fit
	Legal Risk	1. Potential equity disputes
		2. Legal risk avoidability
		3. Patent infringement decidability
		4. Validity period (years)

3.3 Construction of Value Evaluation Model for High-end Equipment Manufacturing

Technology Achievements The basic idea of value evaluation of high-end equipment manufacturing technology based on fuzzy comprehensive evaluation method is to determine the set of factors (indicator system), evaluation (level) and weight of each factor (levels) by determining the value of the evaluated technical achievements. Organize the evaluation of the evaluation (level) of the value of relevant technical achievements by the participating experts, and obtain the corresponding membership degree vector. On this basis, the fuzzy evaluation matrix is constructed, and the fuzzy evaluation matrix and the fuzzy calculation of the factor weight vector are realized by MATLAB software programming. Finally, the fuzzy comprehensive evaluation result is obtained, which is the evaluation of the value of related technical achievements. The final evaluation score of the value of technical achievements in high-end equipment manufacturing industry is:

$$T = \sum_{i=1}^{m} T_i \cdot S_i \tag{3}$$

4. Methods of Effectiveness and Innovation

4.1 Innovation in Research Perspectives.

From the perspective of the transformation of scientific and technological achievements, it has broken through the traditional research paradigm and broadened the research dimension of the evaluation of the technological achievements of high-end equipment manufacturing.

4.2 Innovations Established by the Indicator System.

Fully consider the characteristics of technological achievements, the advancement of technological achievements, the value of patents, and the value of R&D teams in high-end equipment manufacturing, and design scientific evaluation results of scientific and technological achievements through reasonable evaluation methods such as expert scoring.

4.3 Features of Model Construction.

The traditional real option method was improved, and the impact of risk level on the evaluation of achievement value was fully considered. Based on this, the value of technical achievement was evaluated to make up for the lack of research on relevant content.

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