

# Strategies for High-value Patent Selection based on Patent Technology Intelligence Analysis

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**Abstract:** Utilizing four dimensions of high-value patent selection: technology value, legal value, market value, and strategic value, the paper undertakes a value analysis of more than 500 valid and under-review patents from a specific company. The results of the company are then juxtaposed with those of its industry, revealing that it excels in overall patent score, technology value, and legal value, surpassing industry averages significantly. However, its market value and strategic value only marginally outperform industry averages. Drawing from this comprehensive evaluation across the four dimensions, the article identifies 200 high-value patents and offers recommendations for patent selection, with a particular emphasis on 20 core patents. Additionally, it furnishes targeted advice for high-value patent cultivation and operation, alongside strategic planning for collaborative research and development with emerging industries.

**Keywords:** High-value Patent Selection; Patent Value Analysis; Patent Management and Operation.

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## 1. Introduction

In the realm of the knowledge economy's advancement, the significance of intellectual property within corporate competition is increasingly conspicuous. Patents have emerged as a pivotal factor in establishing competitive edges for enterprises and energizing innovation. Particularly, high-value patents have evolved into crucial intangible assets for companies, significantly influencing technological innovation within enterprises [1]. In the *Intellectual Property Rights (IPRs) Protection and Application Plan during the 14th Five-Year Plan Period*, China explicitly incorporates valid invention patents in the following five scenarios into the statistical scope of high-value invention patents [2]: (1) invention patents of strategic emerging industries; (2) invention patents with patent rights of the same family overseas; (3) invention patents that have been maintained for more than 10 years; (4) invention patents with higher pledge financing amounts; and (5) invention patents that have won the National Science and Technology Award or China Patent Award. It also elucidates that China's efforts in patenting are transitioning from an emphasis on quantity towards a concentration on quality.

Currently, the selection dimensions of high-value patents primarily encompass technology value, legal value, market value, strategic value and economic value [3]. Technology value forms the foundation of high-value patents, embracing factors like technological advancement, maturity, independence, substitutability, and application prospects. Legal value pertains to the safeguarding of a patent's exclusive rights throughout its life cycle and within the confines of claim protection. It acts as a protective shield enabling patents to actualize their technological worth, comprising elements such as patent stability, strength of protection, non-circumvention, and adjudication in cases of infringement. Market value signifies the ability of patents to be utilized in the current or anticipated future market scenarios, thereby facilitating the enterprise's attainment of a dominant position, competitive edge, and substantial profits. It stands at the core of patent value, with evaluation metrics

containing market share, size, future market projections and policy landscape. Patent strategy involves the purposeful accumulation of patents, or the strategic preparation of patents related to core patents with portfolio or strategic worth to effectively constrain competitors and secure the enterprise's competitive advantage in market operations. The strategic use of patents is typically categorized into the following four types: offense, defense, influence-enhancing or as the bargaining chips, so the strategic value of patents mainly encapsulates offensive value, defensive value and influence value. Economic value represents the ultimate realization of patent value, denoting the cash flow of patent transformation, including transfer charges, licensing revenues, compensation awarded in infringement cases, the amount pledged or valued as equity, etc. [4-6].

Within the framework of these five dimensions, technology value serves as the groundwork, legal value acts as the assurance, market value stands as the essence, strategic value functions as the objective, and economic value represents the manifestation [7-9]. In summary, high-value patents are characterized by specific technical depth, robust and consistent legal safeguards, broad applicability in existing or potential market, strategic significance in layout planning, as well as economic value in patent activities.

Given the challenges in acquiring data pertaining to the economic value of patents and to uphold the study's scientific rigor, this paper selects a company marked by early establishment, numerous patent applications, and a leading industry position as the object. The research method involves a comprehensive evaluation, comparing the patent value status of this company with that of the pipeline industry across overall, technology, legal, market, and strategic dimensions. Based on this, the study aims to identify high-value patents and offer a refined patent management and operational strategy for this specific company [10, 11].

This study employs various dimensions to assess the patent value of the company and juxtapose it against the industry average. This comparative examination facilitates a clearer delineation of the company's strengths and weaknesses in terms of patent value. Furthermore, the paper provides

recommendations for identifying high-value patents, with a particular emphasis on the significance of 20 core patents. This strategic focus allows the company to allocate resources effectively to protect and leverage these pivotal technological patents. Drawing from the analysis outcomes, the paper presents tailored suggestions for cultivating and operating high-value patents, furnishing the company with strategic insights for patent management planning.

## 2. Data Description

In this paper, the patents applied by this company are searched by CLC numbers, key words, etc., and the related pipeline systems, devices and equipment are searched as the topics. The search consists of three stages: preliminary search, comprehensive search, and supplementary search. The preliminary search involves utilizing the CNABS and VEN databases to expand Chinese and English keywords and statistical classification numbers. Separate searches are conducted in Chinese and foreign databases to prevent data omissions due to the distinctions among databases. In the comprehensive search stage, the commercial patent database is used. This database, a collaborative effort between patent office examiners and a doctoral team from Tsinghua University, serves as a fully localized global patent intelligence search and analysis platform. It contains over 160 million patent technologies from 123 countries, organizations, and regions worldwide, with patent documents translated into high-quality Chinese and English versions updated weekly for users to access the latest patent information. Moreover, the database is highly recommended for its authority and

credibility in patent search and analysis. A thorough and precise search of this technical subject matter across foreign and Chinese databases is conducted in this stage. Following the comprehensive search, the principal applicants of patents within the pipeline industry are enumerated. By considering relevant enterprises and applicants of interest to these enterprises, the “applicants” become the focus of the supplementary search to ensure comprehensive and exhaustive search data of significant applicants. After consolidating patent families and excluding patents without scores, it is founded that the company holds over 500 valid and under-review patents, while the pipeline industry to which it belongs boasts more than 27,000 valid and under-review patents.

## 3. Patent Value Analysis

Leveraging the chosen commercial patent database, this study analyzes enterprise patents across four key dimensions: technology value, legal value, market value, and strategic value. The paper employs over 60 patent indicator-based parameters affecting the aforementioned dimensions, normalizes these parameters, establishes a subjective evaluation matrix, determines indicator weights through the Analytic Hierarchy Process (AHP), conducts consistency checks on the analysis results, and ultimately derives the patent evaluation values in these four dimensions. Based on the database-calculated patent evaluation values, statistical analyses of the evaluation results are performed and depicted in Figure 1.

Evaluation Dimensions		A Particular Company		The Same Industry	
Patent Score	Score Range (Point)	Number of Patents	Percentage (%)	Number of Patents	Percentage (%)
	≤60	0	0	0	0
	60-70	114	21.51%	14600	52.90%
	70-80	416	78.49%	12966	46.98%
	80-90	0	0	33	0.12%
	90-100	0	0	0	0
Technology Dimension	Score Range	Number of Patents	Percentage (%)	Number of Patents	Percentage (%)
	≤60	0	0	0	0
	60-70	0	0	0	0
	70-80	17	3.21%	5893	21.35%
	80-90	480	90.57%	20772	75.26%
	90-100	33	6.23%	934	3.38%
Legal Dimension	Score Range	Number of Patents	Percentage (%)	Number of Patents	Percentage (%)
	≤60	0	0	0	0
	60-70	138	26.04%	13925	50.45%
	70-80	390	73.58%	13510	48.95%
	80-90	2	0.38%	159	0.58%
	90-100	0	0	5	0.02%
Market Dimension	Score Range	Number of Patents	Percentage (%)	Number of Patents	Percentage (%)
	≤60	1	0.19%	308	1.12%
	60-70	302	56.99%	23218	84.13%
	70-80	226	42.64%	4050	14.67%
	80-80	1	0.19%	23	0.08%
	90-100	0	0	0	0
Strategy Dimension	Score Range	Number of Patents	Percentage (%)	Number of Patents	Percentage (%)
	≤60	313	59.06%	21343	77.33%
	60-70	215	40.57%	6232	22.58%
	70-80	2	0.38%	23	0.08%
	80-90	0	0	1	0
	90-100	0	0	0	0

Figure 1. Patent Value Status of the Company and Its Industry

As can be seen from Figure 1, the company owns 114 patents falling within the “60-70” patent score range,

constituting 21.51% of the total, whereas the patents in this score range within the company's industry represent 52.9%. Within the "70-80" score range, the company holds 416 patents, making up 78.49%, while the industry's patents in this range account for 46.98%. There are no patents from the company in the "60 and below" and "80-100" score ranges, while its industry only has 33 patents in the "80-90" score range and none in the "60 and below" and "90-100" ranges. This distribution indicates that the company's patents predominantly fall within the "70-80" range, while those of its industry are concentrated in the "60-70" range, suggesting that the company's overall patent value significantly surpasses the industry average.

In terms of technology value, the company possesses a total of 480 patents as shown in Figure 1, with a notable concentration in the "80-90" score range, amounting to 90.57%. Additionally, there are 3.21% and 6.23% of patents in the "70-80" and "90-100" score ranges respectively, with no patents scoring below 70 points. This distribution suggests that the company's patented technology holds significant value and underscores its robust innovation and research capabilities. Comparatively, the industry's patents are distributed with 75.26% falling in the "80-90" score range and 3.38% in the "90-100" score range. The industry's lower

proportion of patents in the high-score range compared to the company further implies that the company's technology value in patents is ahead of the industry average.

With regard to legal value, the company has total of 390 patents, predominantly clustered in the "70-80" score range, representing 73.58% of the total, which are followed by 138 patents in the "60-70" score range, accounting for 26.04%. There are 2 patents falling in the "80-90" score range. Explicitly, the company engaged in a patent infringement lawsuit against a private enterprise in Zhengzhou concerning these two patents, resulting in a successful outcome (refer to Table 1). In comparison, within the same industry, the distribution of patents includes 50.45% in the "60-70" score range, 48.95% in the "70-80" score range, and a small proportion in the "80-100" score range. The data indicates that the legal stability of the company's patents is generally moderate, with patents primarily concentrated in the mid-score range and a limited number in the high-score range, highlighting the necessity to bolster the legal protection of patents. Nonetheless, the company exhibits a remarkably higher proportion of patents in the "70-80" score range compared to the industry, signifying that the legal value of the company's patents exceeds the industry average, albeit with a deficiency in patents of high legal value.

**Table 1.** Two Invention Patents Won by the Company in Legal Proceedings

Serial No.	Title	Application Date	Grant Date	Court	Date of Filing	Date of Adjudication	Year of filing	Title of Case
1	XXX System and Its Production Method	2014-09-01	2017-02-15	Beijing Intellectual Property Court	2015-10-14	2016/5/27	2015	Company A Sues Company B for Patent Ownership Dispute
2	XXX Structure and Its Production Method	2014-08-15	2017-08-04	Beijing Intellectual Property Court	2015-10-14	2016/6/20	2015	Company A Sues Company B for Patent Ownership Dispute

In connection with market value, the company holds a total of 302 patents, with patent scores primarily concentrated in the "60-70" score range, representing 56.98% of the total; The company possesses 226 patents in the "70-80" score range, accounting for 42.64%. There is one patent with a score below 60 points and one with a score falling within the range of "80-90". In contrast, within the industry, the patent score distribution of market value is mainly in the "60-70" score range, constituting 84.13%. Patents in the "70-80" score range account for 14.67%, with a very narrow group falling in the "60 and below" and "80-90" score ranges. Based on the data analysis alone, it is apparent that both the overall market value of the company and its industry is not expressly high. This outcome can be attributed to the prevalent practice in most of the commercial patent database software in China, where a significant weight coefficient is given to the existence of market transactions and transaction amounts in the evaluation of market value. However, because the company and other industry players being predominantly owned by the same group company, and with limited patent trading and technology transfer activities in the industry, the market is not fully competitive. Consequently, the genuine market value of each patent remains inadequately reflected. Despite these restrictions, it is evident that the company's proportion of patents in the "70-80" score range transcends that of its industry. This suggests that the company possesses stronger recognition and transformation potential in the patent market. Moving forward, greater emphasis should be placed on patent

utilization and technology achievement transformation to bolster the market value of patents.

With reference to strategic value, the company maintains 313 patents with a score of 60 and below, constituting 59.06%, whereas the industry's share in this score range reaches 77.33%. Additionally, the company possesses 215 patents in the "60-70" score range, representing 40.57%, outpacing the industry average of 22.58%. This discrepancy highlights that the strategic value of the company's patents exceeds that of the industry average. The analysis indicates that the strategic value of patents within the industry is not particularly remarkable, signaling ample room for enhancement in strategic planning. This circumstance can be ascribed to the company operating within traditional industries, with relatively recent patent foray into patents related to new energy technology and artificial intelligence technology application scenarios. The company primarily focuses on business activities in China, with limited expansion into overseas markets. Moreover, the rapid evolution of PCT applications implies that a majority of authorized patents remain within conventional technology domains. In the future, the strategic value of patents within this industry is anticipated to progressively increase year by year.

Different types of enterprises or companies exhibit varying demands for high-value patents. Startups, for instance, typically originate from innovative technology, making the technology value a cornerstone of their patents. The technology value serves as a reflection of the innovation and

competitiveness embedded within their products. Moreover, startups often rely on patents to abstract investments and secure partnerships, underscoring the critical significance of the market value associated with their patents [12]; Manufacturing enterprises may pay more attention to the legal value of patents to ensure that their production processes and products are not affected by infringement risks [13]; The research and development cost of new drugs is high and the cycle is long. Pharmaceutical companies attach great importance to patents with high technology value and market potential. The strategic layout of patents is also crucial for protecting market share and preventing competitors from entering [14]; Financial companies are more focused on the strategic value of patents, such as protecting the uniqueness of their financial products and services through patents [15]. In the oil & gas industry, which is known for its technology-intensive and innovation-driven nature, owning patents with

cutting-edge technology can lead to substantial enhancements in production efficiency and cost reduction. Accordingly, the technology value of patents holds significant importance within this industry [16]. In alignment with the global development trends within the oil & gas industry, relevant companies need to contemplate the international positioning of patents such as filing PCT applications and acquiring patent rights overseas to bolster the expansion of their global operations. Oil & gas companies also need to be attentive to the layout of patents in burgeoning technologies like digitalization, automation and artificial intelligence to adapt to the transformation and upgrading of the energy industry. Hence, strategic value stands out as the focal point that oil & gas companies should endeavor to enhance in the future.

#### 4. High-value Patent Selection

**Table 2.** List of Core Patents of the Company

Serial No.	Title	Legal Status	Patent Score	Technology Value	Legal Value	Market Value	Strategic Value
1	XXX Dispersion Method	Authorized	79.4	89.9	80.4	69.8	77.6
2	XXX Agent and Its Preparation Method	Authorized	78.8	96.5	80.7	73.4	64.5
3	XXX Viscosity-reducing and Coagulation-reducing Compositions	Authorized	76.5	93.1	77.2	71.8	63.9
4	Method and Device for Preventing XX from Thawing and Sedimentation in Permafrost Region by XXX	Authorized	75.9	88.2	75.2	81	59
5	Method and System for XX-based Defect Detection	Authorized	75.7	84.5	73.5	68.7	76.2
6	Method and System for Monitoring XX in Frozen Soil Region	Authorized	75.4	91	76.1	71.8	62.7
7	Method and System for Monitoring and Early Warning of XX Landslide and Method for Constructing the System	Authorized	75.4	92	75.1	72.3	62.2
8	Methods for Determining the Impact of Land-based XX Spills on Water Bodies	Authorized	75.4	91	76.6	73.1	60.7
9	Method and Device for On-line Detection of Dust in XXX	Authorized	75.3	90.3	76.5	71	63.5
10	XXX Agent and Its Preparation Method	Authorized	75.3	90.9	76.6	73.1	60.7
11	Method and Device for XXX Sampling and Decompression	Authorized	75.2	90.8	76.8	71.7	61.6
12	Comprehensive Evaluation Method of XXX Scheme	Authorized	75.2	90.9	76.2	73.1	60.7
13	Method and System for Monitoring XXX Relative Displacement in Goaf Subsidence Area	Authorized	75.2	90.6	75.9	71.7	62.6
14	Method and System for Monitoring XXX in Frozen Soil Area and Method for Constructing the System	Authorized	75.2	90.7	75.6	71.8	62.6
15	Automatic XXX Data Acquisition System Based on Wireless Sensor Networks	Authorized	75.1	90.5	76.1	69.8	63.9
16	XXX Composition and Its Preparation Method	Authorized	75	89.9	76.9	72.9	60.4
17	XXX Monitoring Method in Frozen Soil Area	Authorized	75	90.3	75.3	71.7	62.5
18	Method for Preparing Defect-containing XXX Repair Prepreg	Authorized	74.9	90	76.2	71.1	62.4
19	XXX Reinforcing Material System and Reinforcing Method	Authorized	74.9	90	75.9	70.8	63
20	Method for Preparing XXX Polymer Microcapsule Powder	Authorized	74.9	89.7	76.5	70.9	62.6

Based on the aforementioned analysis outcomes, it can be inferred that the company's overall patent value eclipses the industry average, signaling a significant potential for transformation and utilization. Specifically, the company's

patents exhibit a high level of technology value, while the legal and market values are comparatively less pronounced. The strategic value necessitates improvement, highlighting the imperative to enhance the selection of high-value patents,

implement targeted promotion and cultivation strategies, and refine the patent layout to intensify the company's patent portfolio.

The analysis conducted in this study focuses on evaluating the patent scores, technology value, legal value, market value, and strategic value of the company's 530 patents, comparing them with industry benchmarks. Through this comparative analysis, 200 high-value patents with all the indicators above the industry averages have been identified. Among these, the top 20 patents based on overall scores are designated as core patents. The list of core patents, as calculated using the evaluation tool in this study, is detailed in Table 2. It's crucial to emphasize that the core patents listed in Table 2 are determined based on the outcomes of the patent value evaluation indicator system utilized within this research.

Core patents are patents that hold a critical position within a specific technological field, making exceptional contributions to technological progress, exerting substantial influence on other patents or technologies, and possessing significant economic value. These patents are distinguished by their advanced technology, scarcity within the field, difficulty in circumvention, and resistance to being surpassed over an extended duration. Core patents are instrumental in assisting enterprises in reducing costs, enhancing quality, and ultimately establishing a sustainable competitive advantage, whether through direct or indirect means [17]. Strategically organizing patents around core patents is essential for establishing a rational patent protection network and steering clear of disorganized patent applications. By fortifying its own intellectual property, the company can diminish competitors' strengths, impede their progress, or redirect their focus. Consequently, by identifying the company's core patents through a comparative analysis with industry's patents, this study aims to lay the groundwork for the company's future patent operational strategy.

## 5. Conclusion and Recommendations

In light of the comparison of the overall patent status between the company and the industry, this paper presents the following comprehensive suggestions:

**The first is to establish a perfect patent value evaluation model.** In response to the differences in the evaluation system of patent database service software in the market, it is advised that enterprises formulate a holistic patent value evaluation model. This model should conduct a comprehensive evaluation across four dimensions: technology value, market value, legal value, and patent text value. When selecting indicators for each dimension, the principle of "quantitative indicators as the mainstay and qualitative indicators as the supplement" should be adopted. In the context of the technology value dimension, indicators like the count of patent citations, the number of the same patent families, and the percentage of patents in strategic emerging sectors can be established. Concerning legal value, indicators such as patent validity, anticipated patent lifespan, and the authorization rate of invention patents can be considered. For market value evaluation, indicators like litigation history, patent transfer/licensing ratios, and accolades received can be included. Lastly, the evaluation of patent text value should be entrusted to seasoned patent attorneys collaborating with the company. Moreover, the allocation of weights to each dimension should be based on the specific needs of the enterprise for a comprehensive evaluation, with an emphasis on refining the evaluation indicators to uphold the accuracy,

objectivity, and operational simplicity of the evaluation results.

**The second is to continue to strengthen technological innovation and intellectual property protection.** Consistently boost investments in technological innovation and enforce intellectual property safeguards for core technologies. Specifically, within the realm of advanced technologies, the company should escalate its research endeavors to notably enhance the caliber and quantity of technology patents. This approach guarantees that the company sustains its technological supremacy within the industry.

**The third is to raise awareness of legal protection and build a risk prevention and control mechanism.** Augment comprehension and utilization of pertinent patent laws while proactively constructing a robust risk warning and prevention and control system. The primary emphasis should be on the filing and protection of high-value patents to guarantee that the valuable technological accomplishments of enterprises are duly safeguarded by legal means.

**The fourth is to flexibly adjust and optimize the patent layout in the market.** It is crucial to uphold flexibility and foresight in the market layout strategy. Considering the evolving market demands and industry trends, it is imperative for the company to promptly realign its patent layout, particularly focusing on application markets with significant potential for added value. This strategic adjustment will enable enterprises to seize market opportunities effectively and bolster their competitiveness.

**The fifth is to deepen strategic planning and strengthen the transformation and utilization of patents.** Developing a comprehensive strategic framework around core patents, promptly seeking relevant surrounding patents, and efficiently transforming and leveraging these high-value patents can elevate enterprises in competitive industries and notably augment their influence.

**The sixth is to actively explore cooperative research and development with strategic emerging industries.** Engaging in collaborative research and development within the fields of new energy and artificial intelligence technology can create expansive development opportunities. For instance, one viable strategy involves integrating the company's high-tech patents into the new energy sector, fostering technological innovation through avenues like patent licensing or collaborative technological initiatives. Leveraging internal strategic strengths, the company should actively pursue partnerships with industry peers to collectively pioneer new technological domains and venture into uncharted markets.

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