

Analysis on the Current Situation of Intellectual Property Development of State Grid Shandong Electric Power Company

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Abstract. In the process of exploring new energy in the global power industry, the contradiction between the rapid economic development and the supply capacity of the power industry has become more and more prominent. The power companies need to build an intellectual property management system that conforms to the rules of market economy, strengthen the guidance of intellectual property work, as well as standardize the management of intellectual property. At the same time, it is necessary to further improve the level of creation, application, management and protection of intellectual property rights, so as to enhance the independent innovation ability of power enterprises [1-2].

In this study, the State Grid Shandong Electric Power Company and its subordinate units were taken as research objects, and the intellectual property situation of the State Grid Shandong Electric Power Company at home and abroad, such as academic papers, patents and scientific and technological achievements, was analyzed in detail by using the PatSnap patent analysis tool and Scopus database[3].

Keywords: Shandong; Electric Power Company; Patent analysis; present situation; Intellectual Property

1. Analysis the patent status of Shandong Electric Power based on PatSnap

1.1 Number of patent applications and authorizations

Based on the PatSnap patent analysis tool, the patent situation of Shandong Electric Power Company and its subordinate units in the past ten years (2012-2021) was searched and analyzed. As shown in Fig.1, the total number of patent applications from 2012 to 2021 is 37,949, and the period from 2015 to 2017 is a period of high output and high growth rate of patents. The number of applications, growth rate and authorization rate reached the peak in 2016, with 9754 applications, of which 8,267 were authorized, with an authorization rate of 85%. Since 2017, the number of patent applications has decreased year by year [4]. From 2018 to 2021, the number of patent applications was only 1/3 of the peak value in 2016. The authorization rate has also been significantly reduced, which has been lower than 53% in the past three years, and even lower than 20% in 2021. It can be seen that since 2017, the number of patent applications and authorizations of Shandong Electric Power Company have declined significantly [5].

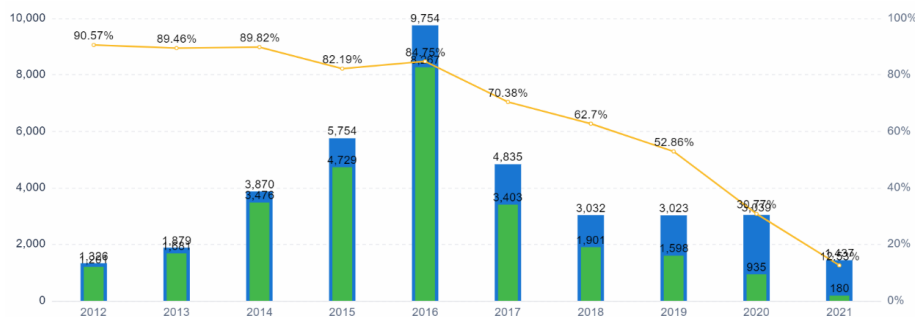


Fig. 1, Number of patent applications, authorized amount and authorized rate of Shandong Electric Power Company from 2012 to 2021

1.2 Legal status of patents

It can be seen from Fig. 2 that most of the patents of Shandong Electric Power Company are invalid, and the number of invalid patents is about 17,700, accounting for about 46.6%; while the number of effective patents is 14,300, accounting for about 37.6%.

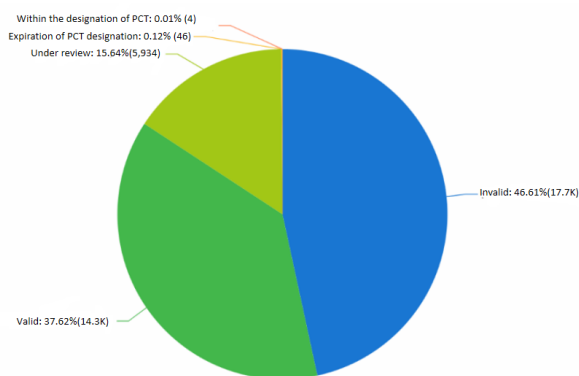


Fig. 2, Legal status of patents of Shandong Electric Power Company

1.3 Patent map and patent field map

The patent layout can be clearly seen from the patent map in Fig. 3, and the peak represents the focus area of related technologies, while the low point means the technical blind spot, which is the potential opportunity or the field to be explored.

Fig. 4 is a patent field map, which shows the patent keywords of the main companies in the technical field. The keywords were calculated by using the latest 5,000 patents. The number of squares in the figure represents the patent coverage of each company, and each grid represents the same number of patents. It can be seen that the keywords and the number of patents of Shandong Electric Power Company are mainly concentrated in: substation, transformer, transmission line, power system, power equipment, controller, distribution network, sensor, support frame and power construction.

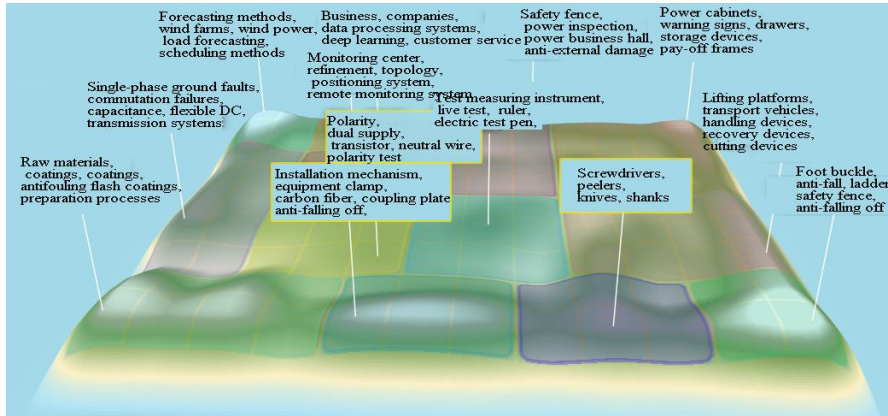


Fig. 3, Patent map of Shandong Electric Power Company

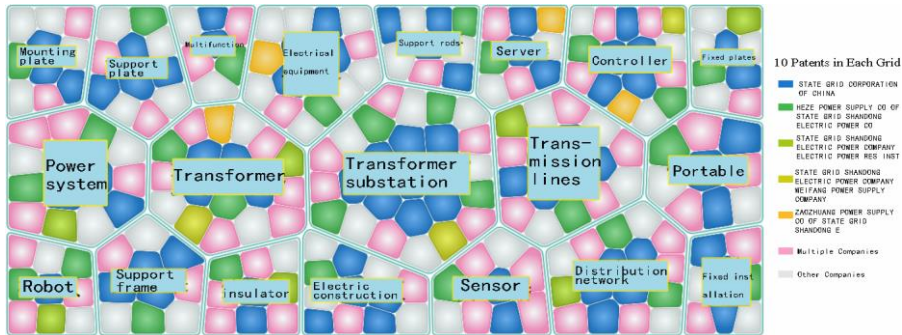


Fig. 4, Patent field map of Shandong Electric Power Company

2. Analysis of intellectual property status of Shandong Electric Power based on foreign databases

2.1 Patent map and patent field map

By analyzing the invention patents of Shandong Electric Power Company abroad through Scopus database, a total of 3,407 patents were retrieved, mainly concentrated in the U.S. Patent and Trademark Office (1,248), the World Intellectual Property Organization (999) and the Japanese Patent Office (774). Fig. 5 shows the distribution of the company's overseas patents from 2012 to 2020. From 2013 to 2016, the number of overseas patents was the largest. In these four years, the number of patents was more than 200, decreasing year by year, while the number of overseas patents of the company increased steadily in the past three years.

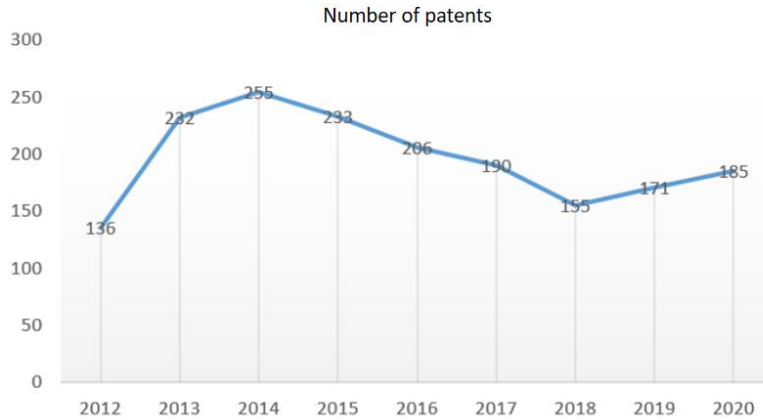


Fig. 5, Distribution of overseas invention patents of Shandong Electric Power Company from 2012 to 2020

3. Analysis of problems in intellectual property development and management of Shandong electric power enterprises

3.1 Patents and papers emphasize quantity over quality, and the value of papers and patents is low

In recent years, the patent authorization rate, patent value and citation rate of Shandong Electric Power Company's papers and patents are low, lacking high-level, high-quality and high-value intellectual property rights. The main reasons were analyzed as follows: first, there are problems in the patent examination mechanism, and the patent examination focuses on quantity rather than quality; Second, the patent management chain is not perfect, only focusing on the patent application itself, lacking relevant patent search and strategic analysis in the early stage of the application, and failing to achieve the optimal layout of patents and the optimal right coverage; Third, the patent application training failed to keep up effectively, and the quality of patent writing is generally not high. From the perspective of patent capacity in the key technology field of power enterprises, there is still a certain gap in the quality of China's patent technology compared with Japan, the United States and other countries with high intellectual property level.

3.2 The proportion of foreign authorized patents of power enterprises is low and the scope of protection is narrow

Through research and analysis, it can be seen that the proportion of foreign papers and foreign authorized patents of Chinese power enterprises is far lower than that of developed countries such as Japan and the United States, and the quality level of papers and patents is relatively low. Compared with developed countries, the scope of patent protection of China's power enterprises is relatively narrow, resulting in the average number of patent claims lagging behind those of foreign developed countries, and the efficiency and value of patents are reduced, thus reducing the enthusiasm for technological innovation and seriously affecting the technological innovation and intellectual property management of power enterprises.

3.3 The intellectual property management strategy and management system are not perfect

Lack of sufficient knowledge of intellectual property management, intellectual property management has not been introduced into the company's strategic management concept, lack of intellectual property strategic planning, and it is difficult to form a strong protection system. In the process of establishing a comprehensive intellectual property management system, the company lacked overall and strategic awareness, and intellectual property management lacked comprehensiveness and standardization. First, there is no periodic control system, and there is no intermediate management process for patent achievements; Second, the fund management mode of science and technology projects needs to be improved. The fund management involves many units, the operation efficiency is low, and the expenditure restrictions are too many, which affects the efficiency of fund use; Third, the rights and responsibilities of project implementation and managers are not clear, and too many administrative management means and traditional management methods have too many constraints on project management, which makes the supervision and reward and punishment mechanism unable to function normally. With the increase in the number of intellectual property rights of State Grid Shandong Electric Power Company and the development of foreign cooperation projects, the existing system can no longer meet the demand.

3.4 The management organization is not perfect, and there is a lack of intellectual property management professionals

State Grid Shandong Electric Power Company and its affiliated enterprises have not set up a high-level and completely independent intellectual property management department. The company mainly guides the intellectual property management from the macro level, while the specific management work is mainly implemented by the affiliated enterprises, resulting in the high quality and low efficiency of its intellectual property management

The staff of the manager post of the intellectual property management institution shall be compound talents with professional technical knowledge and intellectual property knowledge of the industry to which the enterprise belongs, and with certain management ability and experience.

In modern power enterprises, there are not a small number of professionals who have graduated from the law major. However, there are still relatively few high-level composite professionals who have the concept of intellectual property management and can apply intellectual property laws and regulations to implement their acquisition management, rights protection management, application management, daily management, strategic management, business management and even international business management.

3.5 The degree of transformation of intellectual property achievements needs to be improved

Through analysis, it is believed that the low degree of property rights of innovation achievements leads to a small number of independent intellectual property rights. At the same time, it is not good at using intellectual property protection means to protect its legitimate rights and interests, resulting in the loss of intangible assets such as intellectual property rights of the group. The specific performances are as follows: first, confidentiality measures need to be strengthened; Second, affected by the traditional planned economy, the number of patents ap-

plied for in the scientific research projects undertaken by power companies is relatively small; Third, they are not familiar with the legal system of intellectual property, and are not good at using intellectual property means to protect their legitimate interests when they are infringed by other enterprises and intellectual property disputes.

4. Construction of intellectual property management system in electric power enterprises

4.1 Establish an organizational system of mutual coordination and division of work and cooperation between the intellectual property department and other departments of the enterprise.

The intellectual property protection and management department and its responsibilities should be set up as a special working organization, equipped with full-time personnel who are familiar with relevant technologies and relevant intellectual property laws and regulations.

4.2 Enhance employees' legal awareness of intellectual property rights

It is necessary to take measures in four aspects of agreements, systems, mechanisms and laws to prevent the loss of intellectual property rights caused by personnel mobility. When employees enter the company, the enterprise shall provide them with intellectual property training, including intellectual property legal system, document management and confidentiality provisions, intellectual property invention, application, rights protection procedures and channels, etc. Through education and training, employees have gradually formed the awareness of consciously observing the legal system and protecting the intellectual property rights of enterprises. In addition, the company should regularly carry out publicity and education on intellectual property protection and popularize intellectual property knowledge. At the same time, some combination measures such as agreement constraint measures, system constraint measures, mechanism guidance measures and legal sanctions are used to prevent the loss of enterprise intellectual property due to personnel mobility.

4.3 Strengthen the management and protection of technical secrets

The enterprise shall standardize the business activities of technical personnel and the related activities of mobile personnel involved in the development of patented technology, formulate strict technical data contact procedures, so that everyone can only contact part of the core technology. In this way, no one can master the complete technology, so as to better protect the technical secrets. Pay attention to the protection of technical secrets in research projects and projects that have not yet achieved results. In service outsourcing, we also need to protect our own technical secrets through confidentiality agreements. According to the relationship between technical secrets and the company's business as well as the business policy, the degree of influence of relevant industry competition, whether it is the key to the success of the company's products in terms of technology and income and other factors, it is managed at different levels. Then, according to the level, determine the processing procedures for copying, public disclosure, internal disclosure, abandonment, storage and data transmission.

4.4 Establish a mechanism for early warning, monitoring and legal dispute settlement of intellectual property rights

The enterprise shall monitor patent infringement, application and trademark registration of others, and prevent the erosion and infringement of the enterprise's prior rights. Actions that infringe on the intellectual property rights of enterprises shall be handled by litigation and non litigation measures according to different circumstances.

5. Conclusion

It is necessary to formulate a clear intellectual property strategy and guidelines for electric power enterprises. The intellectual property strategy is a part of the overall strategy of the enterprise rather than an independent or isolated strategy. Based on the comprehensive and systematic consideration, and according to the characteristics of the power industry, the strategy of the strong attacking, the weak defending and the combination of attacking and defending is adopted to determine the focus of the intellectual property strategy, and timely adjust it according to the development of the situation. At the same time, it is necessary to formulate clear intellectual property management guidelines to ensure the effective implementation of the intellectual property strategy.

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