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Patent analysis of intelligent Manufacturing industry in Henan Province

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----------ABSTRACT----------
Incopat patent database as the data source, from the year of patent application, the applicant type, technical route, research and development group, and the region where the applicant is located in henan province intelligent manufacturing patent information to conduct a comprehensive analysis of patent map, reveals the development trend of intelligent manufacturing industry in henan province, the main inventor, technology direction, and so on and so forth, and then find intelligent manufacturing problems and gap in henan province.
Keywords: *Henan province; Intelligent manufacturing*

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I. INTRODUCTION

Intelligent manufacturing is the core of today's high-end manufacturing industry, the foundation and frontier of today's manufacturing industry development, and has become an important indicator of the fierce competition and national technological strength of advanced industrial countries. In recent years, China's intelligent manufacturing technology and its industrialization development is rapid, and has obtained a more significant effect, but the basic research ability is relatively insufficient, high-end manufacturing equipment external dependency is higher, its self-sufficiency rate of key technology in the lower problem is still not well solved, and intelligent manufacturing, on the whole, in henan province is in exploring the start stage, there is gap compared with advanced regions. This paper aims to analyze and summarize the development experience of China's intelligent manufacturing technology from the perspective of patent analysis, provide Suggestions related to intellectual property rights for industrial technology upgrading, and provide reference data for decision-making for the development of intelligent manufacturing in Henan Province and the establishment of technical research objectives.

II. PATENT RETRIEVAL

The patent literature data in this paper are from the INCopat database. The deadline of data search is February 20, 2020. In the process of retrieval, keywords and classification number are mainly used for retrieval, and the key technology adopts the "total score" mode. During the retrieval process, the key words and related classification Numbers of a certain technology are obtained by referring to literature, and the retrieval formula is modified repeatedly according to the search results. After that, manual browsing and manual denoising of the retrieval results are carried out to balance the precision rate and the recall rate.

According to statistics, the number of patent applications in Henan province accounted for a very small proportion of the total number of national applications. For example, in the field of industrial robots, 545 applications were filed in Guangdong province, 480 in Jiangsu Province, 355 in Zhejiang Province and 228 in Shanghai. The total number of applications in the four provinces was 1,608, accounting for 49.8% of the total applications in the field of robots. The other 30 provincial-level administrative regions accounted for 50.2%.

III. PATENT ANALYSIS

3.1 Annual Patent application status of China's intelligent Manufacturing Technology

Intelligent manufacturing technology includes intelligent manufacturing equipment technology and intelligent manufacturing integration technology. The annual application volume of intelligent manufacturing technology in China is shown in Figure 1.

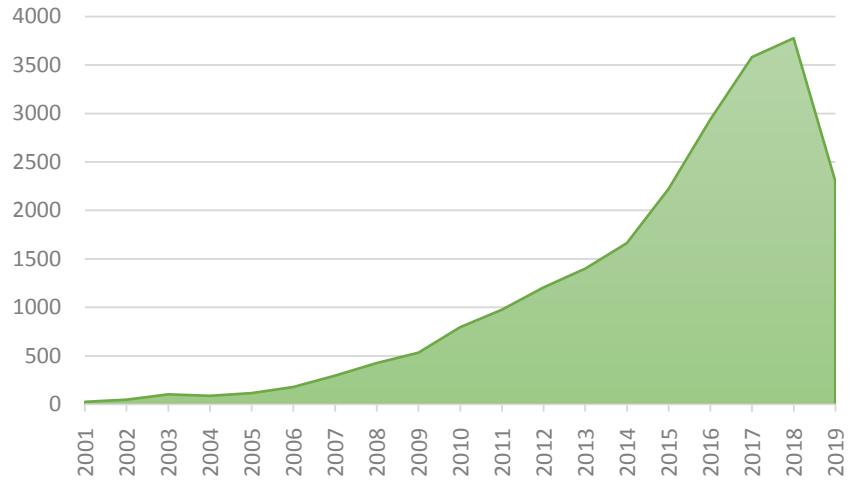

Figure 1 Annual application trend in China

In recent years, China's economic development has shifted from a stage of rapid growth to a stage of high-quality development. The real economy, represented by the manufacturing industry, is the core strength of China's high-quality economic development. In 2015, the State Council issued made in China 2025. In 2015, the number of patent applications exceeded 2,000. After that, the state issued about 15 important documents, and industrial policies drove manufacturing to "intelligent manufacturing".

3.2 Analysis of patent applicants and regions

By February 20, 2020, 15,696 patent applications related to intelligent manufacturing equipment technology in China have been analyzed, and the top 12 patents have been ranked. Zhejiang University, Huazhong University of Science and Technology, South China University of Technology, Dalian University of Technology, Shanghai Jiao Tong University and Beijing University of Technology are the six universities with the largest number of patent applications, and they have a leading position in the field of intelligent manufacturing equipment. Founded on December 29, 2002, State Grid Corporation of China is committed to building a comprehensive service platform for the electrical equipment industry, enhancing the core competitiveness of the equipment manufacturing industry, and promoting the domestic electrical equipment industry towards the middle and high-end. Established on August 8, 2008, Beijing Hypersynchronous servo Co., Ltd. mainly produces core functional components of intelligent servo systems and intelligent equipment, such as industrial robots and ultra-precision machine tools, etc., opening a new chapter in intelligent manufacturing. Intelligent manufacturing cannot only rely on scientific research institutions and universities. Patents of universities and scientific research institutions sometimes cannot adapt to the actual situation and cost of production, and most enterprises in China do not have their own core technologies. Therefore, it is suggested that universities and excellent enterprises should combine production, learning and research to achieve collaborative innovation and win-win cooperation.

3.3 Analysis of patent applicants and regions in Henan Province

In the field of intelligent manufacturing equipment Technology in henan province, henan university of Science and Technology patent filings 16 pieces, Luoyang Bearing Science & Technology Co., Ltd., patent applications, nine of the Yellow River institute of Science and Technology, Luoyang institute of Technology, such as pieces of eight, using incopat enjoy value degree (patent value evaluation system) the average score of henan province patent, patent used to evaluate the quality, value and enjoy with advanced Technology, technical stability, the scope of protection for reference, objective and fair. By comparing Henan province (preliminary exploration stage) with Jiangsu Province (relatively developed stage), the average patent score of Henan province is 5.82, accounting for 48.87% of 6 and above, jiangsu Province is 5.52, and 56.46% of 6 and above. There is not much difference between the two provinces, and the patent quality of Henan Province is relatively

good. At the same time, the number of patents with a score of 6 or above in the two provinces increased sharply in 2015. In 2015, the State Council issued "Made in China 2025", which proved that policy support had a significant effect on the improvement of patent quality.

3.4 Patent analysis of intelligent manufacturing integration Technology

Among the top 20 countries in the world, 15 applicants are from Japan, with an absolute advantage, while 3 are from the United States, one is from Germany, and Dassault Systemes is from France. Dassault Systems is committed to the development of CAD software, market share in the forefront of the market. Japan has a huge advantage in automation, and Germany's Siemens is also the champion of "Industry 4.0". Through horizontal comparison, the number of applications in China is not at the same level with that in foreign countries, and universities are the main ones. However, only with huge industrial demand and investment can there be mature software. Only with the cooperation of universities and enterprises and national policy support, can China have a place in industrial software.

3.5 Big Data Patent technology analysis of Henan Province

Manual indexing of the patents of Chinese companies Inspur and Huawei. We find that inspur and Huawei both have a lot of research and development in data storage and data processing. Inspur still has r&d investment in data mining, security, collection and integration, but Huawei is not as good as Inspur in these three aspects.

Big data in henan province 114 patents, including zhengzhou clouds information technology co., LTD., 76, and a value of 5.96, also has advantages on storage and processing, followed by safety, in the mining and collection 3 pieces, if want to avoid competition from huawei, wave, can strengthen research and development in terms of data mining and acquisition.

Zhengzhou Yutong Bus Co., LTD. (Automobile) was selected according to the list of intelligent manufacturing benchmarking enterprises in Henan province. Gree Electric Appliances (Zhengzhou) Co., LTD. (Electronic Information); Zhengzhou Miss Food Co., LTD. (Food); Citic Heavy Industry Machinery Co., LTD. (Equipment Manufacturing); Dofludo New Energy Technology Co., LTD. (New Energy); Henan Jingrui Pharmaceutical Co., Ltd. selected 100 patents of these companies for manual indexing based on comprehensive consideration of citation times and Shared value as reference standards. As can be seen from Table 5, these 6 enterprises only focus on r&d of equipment and products. In terms of production line, Gree Electric Appliances has 6 pieces and Missing Food 3 pieces, while Yutong bus products have 99 pieces of patents and only 1 piece of equipment patents. In r & D, logistics and supply chain, workshop, factory and other aspects of the patent zero.

IV. COUNTERMEASURES AND SUGGESTIONS

4.1 Countermeasures to promote the development of intelligent manufacturing equipment technology in Henan Province

From the analysis of intelligent technology application trends of manufacture equipment, in recent years, henan has been following the national policy, actively developing manufacturing industry, in the comprehensive development, but in the field of nc machine tools, industrial robots, controller, intelligent system only accounts for the filings respectively 3.12%, 1.74%, 2.78%, 2.56%, suggested that henan enterprises focus on the patent application of university and scientific research units, can be roughly grasp the development industry as a whole. The government should guide the cooperation between universities and research institutions and enterprises, improve the research and development level of enterprises, apply artificial intelligence algorithm and cloud computing to CNC machine tools, master core technologies, and take the lead in technology research and development. With Zhengzhou University, Henan University of Science and Technology as the representative, but also to give full play to the characteristics and advantages of other universities and vocational colleges, improve the practical training system and teaching resources, focus on training talent with research and development, management ability.

4.2 Countermeasures to promote the development of intelligent manufacturing integration technology in Henan Province

In the field of big data, sea of clouds of zhengzhou information technology co., LTD., the number of 66.7%, manufacturing enterprises is not the key to big data technology research and development strength, and big data technology and industrial solid fusion together, must rely on the power of the enterprise, or a combination of enterprise and technology companies or universities, so as to develop technology for production. In addition, Huawei and Inspur have solid patent reserves in data storage and integration and data processing, but few patent applications in data collection, data security and data mining.

It is very difficult to improve enterprises' R & D capability in a short period of time. In addition, most

enterprises in Henan have a weak foundation, so it is better to cultivate more third-party big data enterprises to provide services for enterprises and form long-term cooperative relations. Third party big data enterprises should take data collection, data mining and data security as entry points.

4.3 Patent early warning countermeasures

Manufacturing industry in Henan province is on the rise gradually, but some enterprises have weak awareness of intellectual property early warning and lack of talent resources related to patent early warning. It is suggested that each enterprise should establish a comprehensive and efficient patent early warning system based on its own positioning, which can provide preliminary early warning on the patent status of the enterprise by combining the patent data of the enterprise. If the preliminary early warning draws the conclusion of the patent crisis, then asks the professional patent analyst to carry on the evaluation. In this way, the enterprise does not have to pay a large cost to carry out patent warning, which can make the enterprise slowly strengthen the awareness of patent warning. Due to the lack of patent talent resources and the fact that the internal members of the enterprise know more about the technology and strategy of the enterprise, the enterprise should focus on training the excellent internal members into a compound patent talent.

REFERENCE

[1]. Zhang Yingfeng, ZHANG Dang, Ren Shan. Research status and trend of intelligent manufacturing and its key technologies [J]. Journal of mechanical science and technology,2019,38(03):329-338.

[2]. Equipment. The Ministry of Industry and Information Technology launched the 2015 Intelligent Manufacturing Pilot Demonstration Special Action [J]. Dual-use Technology and Products,2015(07):5-6.

[3]. Zhao Yanghua. Research on Countermeasures for Cultivating High-end Equipment Manufacturing Industry [J]. China Economic and Trade Guide, 2011(13): 18-20.

[4]. Guidelines for the Construction of National Intelligent Manufacturing Standard System (2018 edition)(continued)[J]. Machinery industry Standardization and Quality,2019(01):7-14.

[5]. Yubao Chen. Integrated intelligent manufacturing -- prospect and impetus [J].Engineering,2017,3(05): 36-52.

[6]. Development plan of intelligent manufacturing equipment industry during the 12th five-year plan period [J]. Modern technology ceramics,2012,33(04):12.

[7]. LingYan. In 2020 in henan province will build one hundred intelligent manufacturing benchmarking project [EB/OL]. https://www.henandaily.cn/content/fzhan/2018/0817/116679.html, 2018-08-17/2018-08-17

[8]. Xiao Jian. Successful Application of trading platform for Electrician Manufacturing in Power Enterprises [J]. North China Electric Power,2014(01):56-57.

[9]. Wang Yi. Building an advanced intelligent equipment manufacturing enterprise with intelligent servo control system as the core -- Interview with Xiang Jiupeng, general Manager of Beijing Super Synchronous Servo Co., LTD. [J]. Manufacturing Technology and Machine Tools,2016(05):18-19.

[10]. Academic Committee of The State Intellectual Property Administration. Industrial Patent Analysis Report (Volume 63) : Intelligent Manufacturing [M]. Beijing: Intellectual Property Publishing House, 2018:36.

[11]. Academic Committee of The State Intellectual Property Administration. Industrial Patent Analysis Report (Volume 63) : Intelligent Manufacturing [M]. Beijing: Intellectual Property Publishing House, 2018:57-60.

[12]. Mei Guihua, Zhang Wende. Research on the Construction of preliminary Early Warning Model of Enterprise Patent [J]. Intelligence Theory and Practice,2012, 35(10):64-66.

[13]. The Horse sky flag. Patent Analysis -- Methods, Chart interpretation and Intelligence Data mining [M]. Intellectual Property Publishing House: Beijing,2015:30-21.

[14]. Tang Haifeng. Countermeasures and Suggestions to Lead the development of intelligent Manufacturing in Henan province by Innovation [J]. Innovation and Technology,2017(08):4-6.

[15]. Liu Weidong. Value engineering,2015,34(05): 159-160. Patent warning analysis and system construction of enterprises in henan province [J].

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