

Technological innovation and Competition

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With the development of emerging technologies, technologies are increasingly being used in the manufacturing industry. However, the competition authorities in other countries have focused on platform operators and how they impact the current competition law. There are few competition authorities discussing manufacturers' application. Therefore, this research specifically focuses on the application of emerging technologies in the manufacturing industry, and how it impacts the competition law.

This research selects three types of emerging technologies that are more commonly used in manufacturing industry, including Internet of Things, AR/VR technologies, and artificial intelligence. First, the IoT is divided into three major categories that are currently more mature and more relevant to the manufacturing industry. They are "Industrial Internet of Things", "Home Internet of Things", and "Automotive Internet of Things". As far as the overall Internet of Things is concerned, the Internet of Things is divided into three layers, namely the perception layer, the network layer, and the application layer. With these layers, IoT has five main characteristics, namely "sensing", "active engagement", "connectivity", "analyzing" and "integrating". Products of AR/VR technologies include helmets, glasses, application of reality technology and contents, So it has the feature of imaging and integration. The last one, features of artificial intelligence include: data ingestion, imitating human cognition, and futuristic, and eliminating dull and boring tasks. Its application areas are: "time series and prediction", "image processing", "audio processing", "natural language processing", "moving image processing".

According to the characteristics and application aspects of these three types of emerging technologies, we analyze the issues of the impact of competition. First, in the relevant market and market power evaluation part, these three types of technologies do not affect but we find out that in the home Internet of Things, competitiveness of home appliances and the central control system have mutual influence. However, the evaluation of market power is still based on the sales and market share of individual products. In addition, because Industrial Internet of Things and artificial intelligence are mostly used by the manufacturing industry to improve production lines, the use of Industrial Internet of Things and artificial intelligence in the manufacturing industry doesn't cause the relevant market of products. So do the

Automotive Internet of Things.

In the part of market participation, from the technology demand side, due to the large number of industrial IoT solution providers, it is difficult to establish market entry barriers by mastering technology patents or R&D expenditures. On the other hand, the industrial IoT solution service is not an oligopolistic market, which means that the market entry barriers that can't be established by its R&D expenditures.

Second, home IoT and the Automotive IoT are similar. To consumers, Home appliances, vehicles, and transportation equipment with the connection function or not is different, but individual manufacturers cannot prohibit others from adding this function, so the barriers to market participation won't be established. Finally, manufacturers who use artificial intelligence to optimize production can create limited market participation barriers through this technology. The reason is that such production optimization processes are mostly included in industrial IoT solutions. And the service market is not an oligopolistic market. Those who may establish barriers to market entry are algorithm developers, especially developers who have high-quality marking materials or highly specialized technical personnel. As developers restrict these production factors move, the barriers to market entry will be established.

In the part of restrictive competition, the characteristics and application aspects of the Industrial IoT and the Automotive IoT Vehicles are difficult to be used to strengthen or promote the restriction of competition. However, the home IoT may form an ecosystem. Besides, artificial intelligence has a greater impact on restricting competition than other technologies. For example, if artificial intelligence is used for pricing, There is the possibility of bringing market prices closer, or the industries may actually perform concerted action through the design of pricing algorithms. Another use is to capture prices and use it to strengthen the restriction on resale price.

As for the combined review of innovation business, the current international mergers and acquisitions are mainly divided into two categories, including to promote the transformation of the industry, and to strengthen the diversified operation of the industry. The former, such as traditional vehicle manufacturers merge business with electric vehicle technology and automatic driving technology. The latter, such as the social media players merge start-ups with reality technology. Under the purpose of these two types of M&A innovations, authority has to concern several issues, including the restriction of competition brought about by the combination of diversification, the difficulty of reaching the threshold of combined declaration, and the harm theory of business combination. Therefore, compared with the previous

judgment of merger, there are two major differences such as the effect of innovation impact and the effect of innovation incentives. The United States competition law authority have considered technological innovation as an important element in merger cases, which can be summarized into three types: continuous technological innovation, which will improve existing products and processes; technological innovation as a basis to gain market control Race of status; technological innovation is reasonably delayed commercially.

With the above-mentioned, the authority should focus on not only short-term issues, like price, but also dynamic analysis, which means focus on the fairness of the competition process. In addition, the so-called fairness doesn't refer to equal treatment, but to treat differently. However, the impact of individual industries on the competition law still depends on the specific circumstances. In the past, the competition law placed more emphasis on static analysis of integrated control to avoid lack of price competition among the integrated players. However, high-tech industries rely on continuous technological innovation to maintain their advantages. If we can accelerate technological innovation into market through merger, that is also an increase in consumer welfare. In addition, current technological innovation relies on the input of innovation. Taking artificial intelligence as an example, human resources and data are important innovation elements. There may be competition issues in the acquisition of innovation elements. Therefore, the competition issues of innovation may not only need to consider the results in the market, but also need to pay attention to restrictive competition of input in innovation process, including the acquisition of data and the contractual terms that restrict the movement of human resources.

Finally, though international organizations and competition law authorities in other countries have not focused on the impact with the manufacturing sector using emerging technology, we still recommends Fair Trade Commission: (1) continuously observe the development and application aspects of emerging technologies; (2) build the department of information technology, assisting in collecting evidence; (3) assist our companies in enhancing their international competitiveness.