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Technology Acquisition and the Reshaping of Market Power in Cross-Border Mergers and Acquisitions: A Case Study of Ushio Inc.'s Acquisition of OSRAM's Semiconductor Specialty Light Source Business

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Abstract: Against the background of structural adjustment in the global semiconductor industry and a highly oligopolistic specialty light source market, this study selects the case of Japanese Ushio Inc.'s acquisition of ams OSRAM's Entertainment and Industry Lamps (ENI) business in March 2026 and analyzes whether cross-border mergers and acquisitions (M&A) can improve the acquirer's market power and competitive barriers through integration in three dimensions: capacity layout, technology patents, and customer resources. The study shows that this acquisition has achieved strategic success: after the acquisition, the combined market share of the top three firms in the industry increased from about 50% to 62%; Ushio Inc. filled technical gaps in medium- and low-power infrared heating lamps, established research, development, and manufacturing bases in Japan and Germany, and achieved full coverage of semiconductor light source products across three process links: lithography, cleaning, and heating. This study extracts the industrial development logic that horizontal M&A strengthens scale effects and reinforces industry barriers, ultimately raising concentration, and discusses the scope and boundaries for extending this logic to segmented fields of upstream supply chains with high barriers. The study argues that, in technology-intensive upstream supply chain markets characterized by high entry barriers, long verification cycles, and strong customer lock-in, horizontal M&A is both a means for enterprises to expand scale and an important way to consolidate or even strengthen the existing monopoly structure.

Keywords: Cross-border mergers and acquisitions; Technology acquisition; Market power; Semiconductor specialty light sources; Ushio Inc.; OSRAM

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1. Introduction

Semiconductor specialty light sources play a key role in major processes such as wafer lithography, cleaning,

and heat treatment, and occupy an irreplaceable position in the global semiconductor industry chain. In 2026, the total global procurement value of light sources supporting wafer fabs exceeded USD 10 billion. The industry is highly concentrated, and the five enterprises of Ushio Inc., Hamamatsu Photonics, OSRAM, Iwasaki Electric, and TRUMPF together accounted for 77% of industry revenue, making it a typical oligopolistic industry. At the same time, the U.S. CHIPS and Science Act and the European Chips Act have promoted the reshoring of semiconductor manufacturing capacity to the United States and Europe. The expansion boom of third-generation semiconductors, including silicon carbide (SiC) and gallium nitride (GaN), and technological innovations in advanced packaging, including chip-on-wafer-on-substrate (CoWoS) and Chiplet, have jointly driven demand growth in the upstream light source market. Meanwhile, the continued implementation of the EU RoHS 3.0 rules and domestic plans to phase out mercury-containing products have put pressure on the long-term demand for traditional high-pressure mercury lamps.

In July 2025, Japan's Ushio Inc. signed an acquisition agreement with ams OSRAM to acquire the latter's Entertainment and Industry Lamps (ENI) business for EUR 114 million. The transaction was formally closed on March 2, 2026 [1–3]. This acquisition occurred at a critical moment of profound change in the global semiconductor industry. The target, ams OSRAM, was facing a relatively high debt burden and urgently needed to divest its low-margin traditional lamps business in order to concentrate on high-end products such as semiconductor sensors. The acquirer, Ushio Inc., released the medium- and long-term strategy Revive Vision 2030 in 2024 and planned to make up for the absence of European capacity layout, insufficient patent reserves, and disadvantages in customer channels through mergers and acquisitions (M&A) integration, thereby consolidating its leading position in global semiconductor light sources [4].

This study selects this typical case to answer the following question: in the highly oligopolistic semiconductor specialty light source market, can cross-border M&A strengthen the acquirer's market power and competitive barriers through three dimensions, namely capacity, technology, and customers? Around this question, this study begins with the case background, the behavioral logic of participating entities, and the analysis of acquisition effects, attempts to extract the internal industrial laws, and discusses the generalizability and applicable scope of this acquisition experience.

2. Literature review

2.1. Cross-border M&A and enterprise market power

The theoretical connection between cross-border M&A and market power has long been a focus continuously explored by relevant scholars. The basic judgment of industrial organization theory is that industry concentration can serve as a relatively good proxy indicator of market power. Cross-border M&A can have a major impact on enterprise market power because it changes the structure of market competition. Horizontal M&A, in particular, reduces the number of competitors and increases industry concentration, thereby strengthening the acquirer's market control capability.

The impact of cross-border M&A on market power is multifaceted. First, it directly changes the competitive structure, may concentrate an industry or form a wide range of monopolies, and promotes industrial intensification and market concentration. Second, it raises industry entry barriers. By controlling market share and lifting access thresholds, cross-border M&A may cause structural changes in market competition. Third, it strengthens the bargaining position of the acquirer. By enlarging enterprise scale, it can strengthen bargaining power with upstream suppliers and reduce variable costs in production. In terms of theoretical

context, Hymer's theory of monopolistic advantage points out that multinational corporations can obtain and maintain monopolistic advantages through outward direct investment in imperfectly competitive markets [5]. The industrial organization school also regards M&A as a main means for enterprises to obtain and maintain market power. Antitrust economics, from the perspective of competition policy, holds that horizontal M&A can substantially weaken market competition because it eliminates important competitors.

2.2. Technology-acquisition M&A and the competitive effects of horizontal M&A

Achieving technological innovation and market expansion through M&A has become an important strategic choice for technology-intensive enterprises. Studies have found that, in overseas M&A aimed at technology acquisition, there is an inverted U-shaped relationship between the technological similarity of the two parties and post-acquisition innovation performance, and M&A for the purpose of technology acquisition has a significant positive correlation with enterprise innovation performance [6]. However, the effect of M&A in improving innovation performance depends largely on the acquirer's technological absorptive capacity. After overseas technology M&A, enterprises must organically combine external technological resources with internal absorptive capacity in order to truly develop ambidextrous capabilities [7–10]. M&A itself does not automatically improve technological capability; only the acquirer's capability of digestion and integration can determine the effectiveness of technology acquisition.

The competitive effect of horizontal M&A is a major issue in antitrust economics. The U.S. Merger Guidelines state that horizontal M&A can substantially weaken competition by creating or strengthening market dominance [11]. In terms of its competitive effects, there are two different theoretical expectations in the academic community. Market power theory holds that horizontal M&A can increase concentration and market share, thereby bringing stronger market advantages to enterprises. Efficiency theory holds that horizontal M&A can reduce total social costs and improve social welfare [12]. The applicability of the two theories depends on industry characteristics and the specific conditions of the acquisition. Nocke and Schutz used the aggregative games approach to show that the Herfindahl-Hirschman Index (HHI) can effectively measure welfare distortions caused by market power [13]. Siebert and Gugler found that research joint ventures can achieve technological efficiency comparable to that of M&A without generating anticompetitive market power effects [14]. Neel *et al.*, taking competitors in the technology, media, and telecommunications (TMT) industry as research objects, find that horizontal integration in the TMT industry does not have a major impact on the entire competitive environment [15]. These studies show that the competitive effects of horizontal M&A have obvious industry differences and should be considered carefully in specific industrial environments.

3. Research design

3.1. Basis for case selection

This case is typical, traceable, and highly valuable. In terms of typicality, the case belongs to the segmented market of semiconductor specialty light sources, which has high gross margins and high barriers. Before the acquisition, the top five enterprises in the industry accounted for 77% of revenue, indicating a typical oligopolistic market structure. In this structure, the deeper reason for mutual integration among oligopolistic enterprises is to absorb capacity, customers, and technology patents from competitors in order to obtain a position that is more difficult to overturn. In terms of traceability, information on this acquisition transaction has been publicly disclosed in listed-company announcements, industry research reports, and other documents, and

both parties to the transaction are industry leaders, so financial data, business structures, and strategic intentions are relatively easy to trace. In terms of high value, this case presents a complete industrial logic chain. After the acquisition, the market share of the top three enterprises in the industry rose from about 50% to 62%, providing important theoretical reference value for understanding how M&A reshapes the competitive pattern in similar markets.

3.2. Research method

This study adopts a single-case research method. In the study of M&A in oligopolistic markets, the design of a single case, compared with large-sample regression, can provide evidence for a more detailed process and offer a mechanism-level explanation. The data sources include the following types of materials: listed-company announcements and financial statements, industry research reports, and official news media reports. Because of the requirements of listed-company information disclosure rules and commercial confidentiality, Ushio Inc.'s official financial reports or announcements do not break down the detailed revenue composition and profit margin data of its semiconductor light source business. The relevant analysis in this study is therefore also derived from public industry data and the author's reasonable estimates.

3.3. Case introduction

On March 2, 2026, Japan's Ushio Inc. purchased ams OSRAM's Entertainment and Industry Lamps (ENI) business for EUR 114 million in cash. The target assets included a professional specialty light source production base in Berlin, Germany, a complete patent portfolio for industrial and semiconductor light sources, and about 500 research, development, and production employees. The operating revenue in fiscal year 2024 was approximately EUR 170 million [1,2].

Ushio Inc. was established in Tokyo, Japan, in 1964 and has about 6,000 employees worldwide. It holds an absolute monopoly position in two main segmented markets, namely 172 nm excimer cleaning lamps and lithography mercury lamps for mature processes, with market shares of 90% and 75%, respectively. In fiscal year 2025, the Industrial Process segment contributed 44% of the company's total revenue [4]. ams OSRAM was formed in 2020 through the merger of the Austrian sensor giant ams and the German lighting company OSRAM, and the ENI business is its traditional lamps business unit.

4. Case analysis

4.1. Case entities

For the two parties to the acquisition, the acquirer, Ushio Inc., obtained the target ams OSRAM's mature capacity, patents, and European customer channels at a price-to-sales ratio of 0.67. This saved time costs and also made it possible to bypass tariff and non-tariff barriers in the European market. However, within its own strategic framework, Ushio needed to balance the use of acquisition funds and its return on equity (ROE) target, while also bearing cross-cultural management costs and union coordination pressure arising from the integration of about 500 employees at the German plant. The target, ams OSRAM, rapidly recovered cash of EUR 114 million and reduced debt, thereby concentrating resources on developing its core semiconductor optoelectronic chip business with higher gross margins. However, during the sale, it had to ensure that the collaboration interfaces between the ENI business and other related product lines were not affected, and it also needed to respond to the compliance review conducted by the European Union. From the perspective of

downstream customers, Asian wafer foundries such as TSMC and European integrated device manufacturer (IDM) firms such as Infineon would benefit from more complete product lines and more stable delivery after Ushio's acquisition, helping to reduce the costs of multi-source procurement. However, after industry concentration increased, they might face pressure from rising procurement prices. In terms of the industry competitive pattern, Hamamatsu Photonics mainly focuses on scientific research and inspection light sources, Iwasaki Electric specializes in low-end ultraviolet (UV) curing, TRUMPF maintains a leading position in extreme ultraviolet (EUV) laser light sources, and Chinese light source enterprises represented by Zhongke Lu'an and Hualu Environmental Protection are catching up in mature processes, forming long-term substitution pressure. From the standpoint of policymakers, the incentives of the governments of the United States, Europe, and Japan lie in promoting the localization of the semiconductor industry chain and ensuring the supply security of key consumables, while their constraints are reflected in concerns that export controls on advanced-process light sources to China may invite supply-chain countermeasures.

4.2. Acquisition process, results, and result analysis

4.2.1. Acquisition process and results

In July 2025, Ushio Inc. and ams OSRAM signed the acquisition agreement. The transaction was conducted in cash and did not assume any responsibility for the target's debt. On March 2, 2026, the transaction was completed, with a time span of about eight months [1,2]. After the acquisition, Ushio Inc. established a global production system in which two major production bases in Japan and Germany operate in parallel. At the technical level, it completed the filling of product gaps in technology and processes for medium- and low-power infrared heating lamps. At the customer level, it obtained OSRAM's original leading European customer resources in power semiconductors, and the research and development cycle for new light source products supporting SiC and power devices could be shortened by about eighteen months. The combined market share of the top three enterprises in the industry increased from the previous 50% to the current 62%.

4.2.2. Result analysis

The strategic success of this acquisition resulted from the joint action of the following core factors. First, research and development synergy was good. Ushio has absolute advantages in lithography light sources and cleaning light sources, but it had technical shortcomings in fields such as medium- and low-power infrared heating lamps and general industrial UV modules, while OSRAM's ENI business had sixty years of patent assets in heat-treatment halogen lamps. The product lines of the two sides complement each other, and the research and development synergy is more significant than simple capacity expansion. Second, the transaction price was reasonable and the financial risk was small. The price-to-sales ratio of this acquisition transaction was about 0.67, far below the industry average range of 1.5 to 2.5. The cash acquisition and non-assumption of debt reduced financial risk and conformed to Ushio's financial target of improving ROE [4]. Third, the timing was appropriate. The transaction coincided with an industry upcycle in which global semiconductor equipment capital expenditure was growing substantially, and the European Chips Act promoted capacity expansion by European power semiconductor enterprises. After the acquisition, the synergy effect in customer channels was further strengthened. Fourth, the competitive pattern was optimized. The market share of the leading enterprises in the industry rose from about 50% to the current 62%, meaning that the market structure is transforming toward high concentration. According to the view of Nocke and Schutz, a change of 12 percentage points is

sufficient to indicate a substantial increase in market power [13]. Ushio not only obtained OSRAM's original European market share, but also eliminated a major competitor, thereby strengthening its price advantage and bargaining position.

5. Conclusion and implications

5.1. Research conclusions

Based on the above analysis, the following conclusions can be drawn:

First, Ushio Inc. successfully strengthened synergistic effects in three aspects through this acquisition: manufacturing capacity, technology patents, and global customer channels. Through this acquisition, Ushio formed two globalized production bases in its Japanese home market and in Berlin, Germany, in terms of capacity. In terms of technology, it made up for shortcomings in medium- and low-power infrared heating lamps, expanded the industrial layout of semiconductor light sources for processes such as lithography, cleaning, and heating, and achieved full coverage of the entire process flow. In terms of customers, Ushio obtained ams OSRAM's leading power semiconductor customer resources in Europe through the acquisition, and the research and development cycle was also greatly shortened.

Second, this case clearly reveals the economic logic by which, in an oligopolistic market, an oligopoly strengthens business scale effects through horizontal M&A, further raises industry barriers, and ultimately increases enterprise and industry concentration. In technology-intensive upstream supply chains characterized by high barriers, long verification cycles, and strong customer lock-in, horizontal M&A is both a way to expand scale and a method to stabilize or even strengthen an existing monopoly position. The strengthening of market power after M&A is not the result of a simple addition of market shares, but a comprehensive effect formed by eliminating competition, improving bargaining power, and raising industry entry barriers; that is, it strengthens the industry's dominance from multiple angles.

Third, under certain circumstances, the acquisition logic of this case has value for broader application. In industries that are highly concentrated in technology-intensive niche markets, horizontal M&A relies on scale effects in production, technological complementarity in patents, and shared customer channels to strongly reinforce the acquirer's market power. This logic is also applicable to segmented fields of technology-intensive upstream supply chains, such as semiconductor equipment components, precision ceramics, and specialty gases.

5.2. Policy and practical implications

This study can draw the following implications for market practice and market regulation:

For acquirers, when conducting horizontal M&A in technology-intensive oligopolistic markets, the following conditions should be noted: the product lines of the two parties to the acquisition should have characteristics in which complementarity is greater than overlap; when the acquisition application is proposed, the industry situation should be in an upward or stable period; and the acquirer itself should have strong technological digestion and production-line integration capabilities. Ushio has been deeply engaged in the field of precision optical light sources for more than sixty years and has mature production management experience and technological digestion capability, which became an important guarantee for the effect of acquisition integration.

For antitrust regulators, this case provides the view that greater caution should be exercised when horizontal M&A is conducted in upstream supply chain markets with high barriers and high technology

intensity. New entrants find it difficult to break the two- to five-year joint verification barrier of original equipment manufacturers, and once market power formed after M&A takes shape, it will have strong persistence. Just as antitrust review in other industries must take into account industry characteristics and the long-term structural consequences of M&A, the same is true for acquisitions in this type of industry.

Disclosure statement

The author declares no conflict of interest.

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