

The Motivations and Effectiveness of Vertical Mergers and Acquisitions in the Electronic Design Automation Industry— The Primarius Technologies Case

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Abstract. As a core supporting tool for integrated circuit design, Electronic Design Automation (EDA) faces high technical barriers and a highly concentrated market, long dominated by international giants. Domestic EDA software in my country still faces shortcomings in key technologies and toolchain integrity. Relying solely on independent research and development will not lead to short-term breakthroughs. Therefore, vertical mergers and acquisitions (M&A) have become a key avenue for domestic companies to enhance their technological capabilities and improve their product portfolios. This paper examines the motivations and effectiveness of vertical mergers and acquisitions, focusing on Primarius' 2023 acquisition of Magwel in Belgium. Using a case study approach, the study draws on company annual reports, financial data, and industry research materials to analyze the motivations from four perspectives and evaluate the effectiveness of vertical mergers and acquisitions across two dimensions: financial performance and non-financial outcomes. The results indicate that, while facing short-term pressure, vertical mergers and acquisitions have demonstrated positive benefits, including technological collaboration, customer resource expansion, and market optimization. These results provide valuable insights into M&A practices in high-tech industries and the development of the domestic EDA industry.

Keywords: EDA Industry, Vertical Mergers and Acquisitions, Motivation Analysis, Effectiveness Evaluation.

1. Introduction

Electronic Design Automation (EDA) is a core supporting tool for integrated circuit design. However, due to its high technical barriers and strong dependency, it has long been dominated by leading international companies. As international technological competition intensifies, the bottleneck problem facing domestic EDA has become increasingly prominent. In this context, domestic companies should accelerate independent research and development and industrial integration. Limited by technological capabilities, relying solely on independent research and development makes it difficult to quickly build a complete tool chain. Therefore, vertical mergers and acquisitions have become a key path for domestic EDA companies to achieve product expansion, technological collaboration, and market breakthroughs.

As a leading company in China's EDA industry, Primarius has maintained high R&D investment since its establishment. In 2023, its R&D expenditure accounted for more than 72% of its revenue, ranking among the top A-share listed semiconductor companies. At the same time, its compound revenue growth rate in the past five years was close to 50% [1]. This shows that it has strong momentum in technology iteration and market expansion and is representative. This study takes it as an example to analyze its strategic motivations and implementation results of expanding product lines and integrating technological resources through vertical mergers and acquisitions, and reveals the practical logic of vertical mergers and acquisitions in high-tech industries. This topic helps to enrich the research on mergers and acquisitions in technology-intensive industries and analyze the feasible path for the development of domestic EDA. It has important theoretical value and practical significance. At the same time, it can also provide a reference for government policy formulation and corporate strategic choices.

In recent years, the EDA industry has seen active mergers and acquisitions, with a trend toward vertical mergers and acquisitions gradually emerging. A senior researcher has pointed out that “frequent mergers and acquisitions in the semiconductor industry are an inevitable trend in its development process [2]. Other scholars have pointed out that “the three key words for mergers and acquisitions in 2024 are AI, cross-border, and policy [3]. However, relevant literature and research are relatively scarce. Therefore, this study, taking the vertical merger and acquisition of Primarius as the core case, attempts to fill the research gap in China in terms of M&A effectiveness evaluation and comparative analysis, which has certain practical value and theoretical significance.

This study adopts the case analysis method, combining public information, annual report data and industry research reports, and discusses the vertical merger and acquisition event of Primarius from the aspects of motivation analysis, integration path, effectiveness evaluation, etc., to refine problems and optimize strategies.

2. Introduction to the EDA Industry and the Vertical Merger and Acquisition of Primarius

2.1. EDA Industry Overview

As the core basic technology of the semiconductor industry chain, EDA can significantly improve chip R&D efficiency and reduce design complexity. Its technical level directly determines chip performance and the industry's innovation capabilities. In recent years, the EDA industry has become increasingly prosperous both domestically and internationally. The global EDA market has steadily grown to US\$17.8 billion from 2018 to 2024, a year-on-year increase of 6.1% [4]. The EDA market is basically dominated by Synopsys, Cadence, and Siemens EDA, accounting for approximately 80% of the market share [5]. In order to catch up with the international pace, many Chinese companies have also explored the EDA industry, including Empyrean Technology Co., Ltd. and Primarius. However, due to the overly single product range, many companies will adopt vertical mergers and acquisitions to form a systematic industry chain. Figure 1 shows the EDA industry chain.

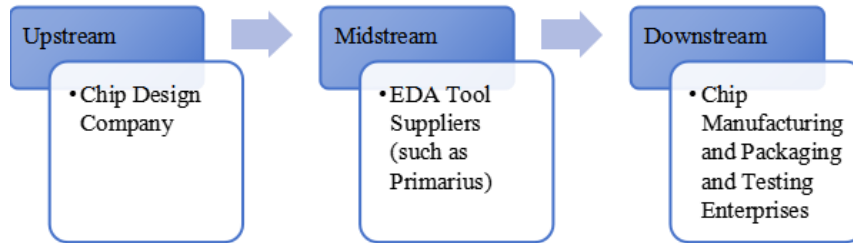


Fig. 1. EDA Industry Chain (Picture credit: Original).

2.2. Company Introduction

Primarius was established in 2010 and is a leading provider of analog/mixed-signal EDA tools in China. Table 1 shows the development history of Primarius.

Table 1. The development history of Primarius

2010-2011	Release the industry's first fully integrated yield-oriented design EDA tool, NanoYield
2012-2013	Release the universal parallel circuit simulator NanoSpice
2014-2015	Release the industry's first interactive analysis platform for devices and circuits, ME-Pro
2019	Acquire the Chinese EDA company Boda Microelectronics (the first EDA acquisition in China) Release the high-performance FastSPICE circuit simulator NanoSpice Pro
2021	Acquire South Korea's Entasys and became the first Chinese EDA stock on the STAR Market
2022	Launch the fully customized design platform NanoDesigner to create an application-driven EDA full-process
2024	Take the lead in establishing the Shanghai EDA/IP Innovation Center

Source: The development history of the official website of Primarius

2.3. Event Introduction

Primarius continues to expand its business in the EDA field through mergers and acquisitions. In August 2023, Primarius completed the transfer of 100% equity in Belgian EDA company Magwel, incorporating its core technologies such as high-precision physical verification, HBM electrostatic analysis platform, and power device design verification tool into its product system [6]. This acquisition not only strengthens the product line and technical strength, but also expands the development space [7].

3. Analysis of the Motives and Effectiveness of Vertical Mergers and Acquisitions of Primarius

3.1. Motivation

The EDA industry is currently highly competitive. Vertical mergers and acquisitions of companies with related technologies can help Primarius enter new and larger markets and reach a wider range of manufacturers and customers. Furthermore, companies like Magwel already have stable customer bases and established sales sources and channels. By directly acquiring these companies, Primarius can save time and costs, accelerate market integration, and expand its product breadth.

Technology Upgrade. The EDA industry is developing too fast. Although independent research and development are possible, the pace is too slow to keep up with the pace of industry development. Mergers and acquisitions of companies with advanced technology can directly use each other's technology and integrate the technology and teams of both parties to produce higher-level, more systematic products, making them more competitive in the market. According to the research of Cheng Sijia, vertical mergers and acquisitions can significantly promote technological innovation of high-tech enterprises and enhance the stability and security of the industrial chain and supply chain [8].

Integrate the Industrial Chain. Through mergers and acquisitions, Primarius can gain greater control over the entire production process. Vertical mergers and acquisitions reduce transaction costs and improve corporate performance, but their impact on the overall competitiveness of the industry is not significant, and there is no clear evidence of monopoly [9]. It is possible to take over the upstream and downstream businesses and integrate them into its own hands, so that the supply of raw materials and product sales are more secure. For example, by directly cooperating with upstream raw material suppliers to obtain high-quality and low-cost sources, or directly connecting with downstream sales customers to understand customer dynamics and needs promptly, promptly adjust plans and strategies, and improve efficiency.

Policy Promotion. The Decision of the Central Committee of the Communist Party of China on Further Deepening Reform and Advancing Chinese Modernization, adopted at the Third Plenary Session of the 20th Central Committee, proposes improving the systems and mechanisms for promoting the deep integration of the real economy and the digital economy, accelerating the establishment of systems and mechanisms for the development of the digital economy, and fostering the high-quality development of the digital economy. It is necessary to strengthen the research and development of key core technologies in the field of digital economy and develop independent EDA software [10].

3.2. Effectiveness Analysis

Table 2. The operating income of Primarius from the first quarter of 2023 to the first quarter of 2024

Indicator Time	31.03.2023	30.06.2023	30.09.2023	31.12.2023	31.03.2024
Total operating revenue (yuan)	63.93 million	152 million	222 million	329 million	81.81 million
Year-on-year growth (%)	62.33	38.79	30.05	18.07	27.97
Rolling month-on-month growth (%)	-40.72	38.34	-21.27	53.51	-23.46

Data source: East Money

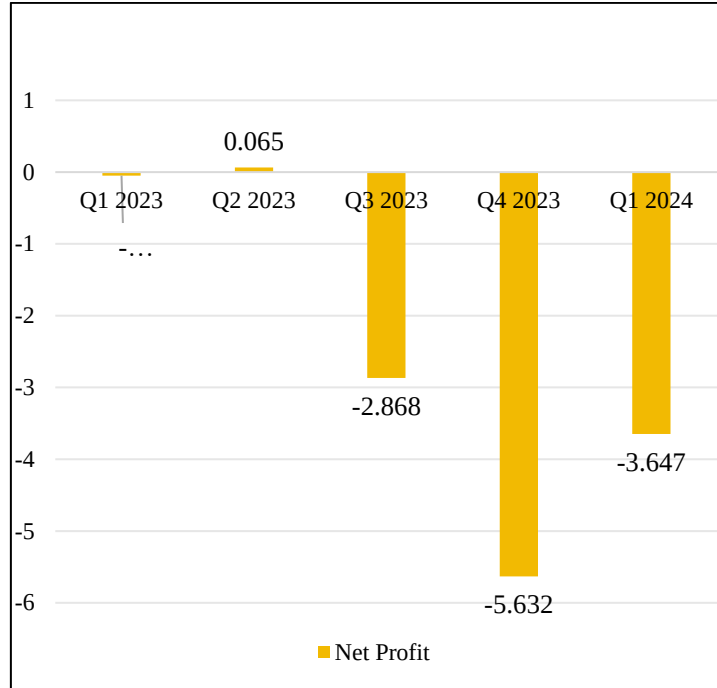


Fig. 2. Income statement for the first quarter of 2023 to the first quarter of 2024 (Picture credit: Original).

Net Profit Analysis. As shown in figure 2, the net profit fluctuations shown in the chart show significant fluctuations from the first quarter of 2023 to the first quarter of 2024. After a brief period of positive growth in the second quarter, the company quickly declined, reaching a loss of -563.2 million yuan in the fourth quarter, the lowest point for the year. The widening loss was primarily due to rising merger and acquisition integration costs and increased Research and Development (R&D) investment. The loss narrowed to -364.7 million yuan in the first quarter of 2024, demonstrating initial progress in cost control and synergy effects, but profitability still needs improvement.

Profit Analysis. Table 2 shows that Primarius's operating revenue showed an overall fluctuating upward trend from the first quarter of 2023 to the first quarter of 2024, reaching a peak of 329 million yuan in December 2023. While the year-on-year growth rate declined quarter by quarter from 62.33% to 18.07%, it remained positive. Month-on-month fluctuations were significant, with a particularly significant 38.34% increase from the first to second quarters of 2023 and a significant 53.51% increase in the fourth quarter, followed by a 23.46% quarter-on-quarter decline in the first quarter of 2024. This reflects the company's revenue seasonality, with significant impacts in specific quarters due to market demand or concentrated project deliveries. Overall, while the merger and acquisition had a short-term impact on revenue, in the long term, while limited in timeliness, it had a positive impact on the company's revenue volume and growth potential.

Net Profit Analysis: Analysis of Return on Net Assets (ROE). As can be seen from Table 3, net profit fell from -493,800 yuan in the fourth quarter of 2022 to a brief positive 648,700 yuan in the second quarter of 2023, before turning into a sharp loss of -28.68 million yuan and -56.32 million yuan in the third and fourth quarters, narrowing to -36.47 million yuan in the first quarter of 2024. Net assets fell from 2.17 billion yuan to 2.033 billion yuan. Calculated by the formula, ROE fell from near zero to -2.65% before recovering to -1.75%, reflecting both short-term pressure and recovery after the merger.

$$ROE = \frac{\text{Net Profit}}{\frac{(\text{Initial Net Assets} + \text{Ending Net Assets})}{2}} \times 100\% \quad (1)$$

Table 3. Net asset data of Primarius from the fourth quarter of 2022 to the first quarter of 2024

Indicator Time	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2024
Net profit (ten thousand yuan)		-49.38	64.87	-2868	-5632	-3647
Net assets (billion yuan)	21.7	21.69	21.55	21.33	21.12	20.33
ROE (%)		-0.02	-0.03	-1.33	-2.65	-1.75

Data source: East Money

3.3. Non-financial Aspects

In August 2023, Primarius completed the full acquisition of the Belgian EDA company Magwel, incorporating its high-precision simulation, electromagnetic field modeling, and parasitic extraction technologies. The company also integrated Magwel's tools such as the Electronic System Design Interface (ESDi) and the Precision Technology Modeler (PTM) into the domestic market. Cao conducted an empirical analysis of 8,373 mergers and acquisitions transactions involving 3,289 companies in North America and found that enterprise systems (ES) can reduce internal coordination costs and improve the efficiency of cross-departmental information flow, thereby increasing the probability of mergers and acquisitions, especially in industries with high collaboration needs. For the EDA industry chain, advanced information systems help break down the collaboration barriers between design, manufacturing, testing, and other links, thereby improving the success rate and integration efficiency of vertical mergers and acquisitions. Second, after all Magwel products were introduced to the domestic market for the first time, they helped Primarius expand its customer base in power semiconductors and automotive electronics. In a flexible market structure, the company significantly improved customer retention by increasing product diversity and technology coverage. Mergers and acquisitions not only provide companies with opportunities to integrate products and resources, but also provide important opportunities to strengthen customer relationships and market expansion. Related research points out that marketing integration decisions significantly improve customer retention and market coverage through intermediary target mechanisms, such as brand collaboration and channel unification. This effect is especially significant when marketing fit is high.

4. Conclusion

This study uses the vertical merger and acquisition of Magwel (Belgium) by Primarius as a core case study, analyzing the motivations and outcomes of the merger from multiple perspectives. In terms of motivations, this study systematically explores the four perspectives of market expansion, technological upgrading, industry chain integration, and policy promotion, combining the industry environment and the company's development stage. This study reveals the strategic significance of vertical mergers and acquisitions in the domestic EDA industry chain. Regarding the outcomes, this study examines both financial performance and non-financial outcomes. Financially, this study analyzes the impact of mergers and acquisitions on the company's short-term operating volatility and long-term growth potential, using metrics such as quarterly revenue, net profit, and return on equity. Non-financially, this study explores the positive impact of mergers and acquisitions on technological synergies, product line enhancement, customer base expansion, and industry leadership. Drawing on relevant academic research, this study demonstrates the role of vertical mergers and acquisitions in customer relationship maintenance, market expansion, and internal synergy. This study not only reveals the implementation logic of vertical mergers and acquisitions in high-tech industries but also provides a reference for the technological path selection of domestic EDA companies.

Based on the research results, this article proposes the following suggestions and prospects: First, with the support of national policies and capital, domestic EDA companies should continue to integrate upstream and downstream key technologies and resources through vertical mergers and

acquisitions, build a more complete tool chain and platform-based product system, and narrow the technological gap with international giants. Second, in the post-merger integration stage, attention should be paid to cross-cultural team management, information system docking, and R&D resource collaboration to reduce integration friction and release synergy effects as soon as possible. Third, on the market side, customer stickiness should be enhanced through brand collaboration and channel optimization, and a strategic layout should be made in combination with the development trends of emerging fields. In the future, as the domestic EDA ecosystem gradually matures, companies can explore global mergers and acquisitions and international market expansion to enhance their competitiveness in the global semiconductor industry chain and win a higher voice and core position in the global EDA industry landscape.

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