

# Acquisition Analysis: Evidence from TCL's Acquisition of Zhonghuan Electronics

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**Abstract.** With the rapid development of internet industry in China, the market competition is becoming increasingly fierce. Therefore, more and more enterprises are willing to expand their impact by cross-industry mergers. This study examines the performance of cross-industry mergers through the case of TCL Corporation's acquisition of Zhonghuan Electronics, using the Balanced Scorecard (BSC) framework. The analysis reveals that while the merger initially imposed short-term financial pressures, it generated long-term strategic value. Zhonghuan's leadership in N-type silicon wafer technology and its vertical integration of the industrial chain strengthened TCL's technological edge and supported its global expansion. BSC evaluation highlights synergies in technology integration, market penetration, and green transition across financial, customer, internal process, learning and growth dimensions. The cyclicity of the photovoltaic industry underscores the necessity for enterprises to balance short-term risks with long-term opportunities. Strategic recommendations include optimizing production capacity, accelerating technological innovation, reducing financial leverage, and integrating ESG practices to enhance sustainable competitiveness. The findings provide a multidimensional methodology for evaluating cross-industry mergers and actionable insights for corporate strategic transformation, emphasizing cost efficiency and innovation as key drivers of success in post-cycle industry recovery.

**Keywords:** Mergers and acquisitions, Balanced Scorecard, TCL.

## 1. Introduction

In recent years, the rapid development of the digital economy and intensified global competition have made mergers and acquisitions (M&A) a critical strategy for internet enterprises to achieve resource integration, technological upgrades, and market expansion [1]. Traditional financial indicators, such as return on investment (ROI) and earnings per share (EPS), primarily reflect short-term economic benefits but fail to comprehensively assess non-financial value, including customer resource integration, internal process optimization, and long-term innovation capabilities [2]. This study employs the Balanced Scorecard (BSC), a comprehensive performance management tool, to analyze the synergistic effects of M&A across four dimensions—financial, customer, internal processes, and learning and growth—thereby addressing the limitations of traditional evaluation methods [3].

Based on empirical findings, this study proposes strategies to enhance M&A performance, and offer methodological guidance for enterprises undergoing internet-plus transformation through M&A. It contributes to academic research on cross-industry M&A performance evaluation while offering data-driven tools for enterprises to optimize M&A decisions and avoid synergy traps.

TCL, a traditional home appliance manufacturer, expanded its industrial chain into smart and green technologies through the acquisition of Zhonghuan Electronics, a leader in semiconductors and photovoltaics. This strategic move aligns with China's dual-circulation strategy for industrial upgrading [4]. The TCL-Zhonghuan case involves multiple objectives, including technology acquisition leveraging Zhonghuan's patent advantages in semiconductor materials, market synergy through the complementarity between TCL's global distribution channels, etc.

## 2. Literature Review

Early studies predominantly relied on traditional financial metrics. However, the asset-light and high-growth nature of internet enterprises limits the applicability of these methods. For instance, while event studies capture short-term stock price fluctuations in Tencent's acquisition of Supercell, they fail to quantify the medium- to long-term value of technological synergies and user resource integration [5]. To address this gap, scholars have introduced multi-dimensional tools such as the BSC and entropy weight method.

This case illustrates a cross-industry strategic transformation. By divesting traditional businesses such as televisions and focusing on semiconductor display materials, TCL transitioned into a high-tech industrial group. The case also reflects dual objectives of technological synergy and industrial chain extension. Zhonghuan's leadership in semiconductor silicon wafers and photovoltaic technologies, enabled TCL to enter high-barrier sectors and build an integrated industrial chain, spanning upstream materials, midstream manufacturing, and downstream applications. This level of vertical integration is rarely seen in internet enterprise M&A.

The case also highlights the challenge of balancing short-term performance pressures and long-term value creation. Following the acquisition, TCL faced short-term financial pressures, such as weakened solvency ratios. However, long-term technological integration and market synergies, evidenced by a 60% overseas market share, led to significant revenue and net profit growth, including a 747.60% year-on-year increase in 2023.

Existing studies on TCL-Zhonghuan Electronics primarily focus on financial synergies, technological integration pathways, and market synergies [4]. By comparing pre- and post-M&A revenues and net profits, these studies emphasize Zhonghuan's technological advantages in supporting TCL's intelligent transformation. While this analytical approach is well-established, it largely neglects non-financial dimensions, which profoundly influence M&A performance.

## 3. Case Analysis

Before the acquisition, TCL faced stagnation in its traditional businesses. In 2019, its revenue growth for televisions and air conditioners fell below 5%, with a net profit margin under 3%, a debt-to-asset ratio of 68%, and a current ratio of 1.1, indicating severe short-term solvency risks. Concurrently, TCL pursued strategic transformation by divesting low-margin traditional businesses, such as TCL Electronics, and focusing on semiconductor displays via China Star Optoelectronics and smart terminals. However, reliance on imported upstream materials like semiconductor silicon wafers constrained industrial chain autonomy.

Zhonghuan Electronics, a global leader in semiconductor silicon wafers and photovoltaics, was a pioneer in 210mm large-size silicon wafer technology, which offered a 15% efficiency improvement over traditional wafers. However, the reduction of policy subsidies in 2019 caused a 12% year-on-year net profit decline, resulted in funding constraints for R&D and capacity expansion. Despite its technological strengths, Zhonghuan faced challenges in global market reach with overseas market penetration below 10% and limited brand influence.

The TCL-Zhonghuan acquisition stemmed from strategic complementarity [6]. For TCL, the acquisition marked a critical step toward becoming a high-tech conglomerate. By integrating Zhonghuan's semiconductor silicon wafer technology, TCL addressed upstream supply chain vulnerabilities and formed a closed-loop industrial chain from silicon wafers to chips to display panels to smart terminals. For Zhonghuan, the deal offered a solution to funding constraints that hindered technological scaling. The acquisition also enabled Zhonghuan to leverage TCL's global distribution network and expand its presence in overseas markets. Additionally, TCL's expertise in smart manufacturing helped optimize Zhonghuan's production processes, shorten delivery cycles and improve commercialization efficiency.

The acquisition process began in March 2020 with due diligence focused on Zhonghuan's patent portfolios, valued over 8 billion RMB, and photovoltaic compliance risks. After two rounds of

negotiation, a final deal of 12.5 billion RMB was reached in May 2020, structured as 70% cash payment (8.75 billion RMB) and 30% via 250 million newly issued TCL shares. The transaction was completed in July 2020, making Zhonghuan a subsidiary of TCL.

However, post-M&A integration faced challenges. Cultural differences gradually emerged. TCL emphasized efficiency and market-driven management, while Zhonghuan prioritized technical expertise and long-term R&D, leading to initial friction [6]. Technically, Zhonghuan's 210mm wafer yield initially lagged behind industry standards, standing at 70% compared to the industry standard of 85%. In response, TCL dispatched 200 engineers to optimize production, raising the yield to 82% by late 2021.

Short-term financial pressures included a decline in TCL's quick ratio from 1.2 to 0.9 and a 65% debt-to-asset ratio, yet operating cash flow grew by 30%, indicating improved efficiency. Long-term outcomes were significant. By 2023, Zhonghuan's photovoltaic module exports captured 60% market share, generating over 40 billion RMB in silicon wafer sales, accounting for 25% of total revenue. Technologically, global market share for 210mm wafers rose from 15% to 35%, supported by 120 new photovoltaic patents. R&D investment also increased from 5% to 8%. Green technology revenue reached 25% of total sales, reflecting its ESG commitments.

This acquisition not only achieved vertical integration but also marked TCL's transformation into a high-tech and globally integrated enterprise [6]. Zhonghuan leveraged TCL's capital and channels to expand overseas markets, with European and American market shares rising from 10% to 28% by 2023. The deep synergy in technology, markets, and strategy offers a replicable model for cross-industry M&A.

#### **4. Performance Evaluation using Balance Scorecard**

BSC, a strategic management tool, translates corporate objectives into actionable performance metrics through four dimensions, emphasizing dynamic balance and strategic alignment. The financial dimension evaluates short-term economic performance and capital returns using metrics such as revenue growth, net profit margins, and debt-to-asset ratios [7]. It ensures financial health while funding strategic initiatives. The customer dimension focuses on market share, customer satisfaction, and brand influence, linking value creation to client needs. The internal process dimension emphasizes operational efficiency and innovation through supply chain optimization, shorter delivery cycles, and faster technology commercialization. The learning and growth dimension serves as the source of a company's long-term competitiveness, encompassing aspects such as R&D investment, employee capability development, and organizational culture integration.

Compared to traditional methods like financial ratio analysis or event studies, BSC's comprehensiveness and dynamic balance offer superior insights. It reconciles short-term pressures financial with long-term benefits from R&D investments, avoiding profit-centric myopia. Moreover, its strategic orientation translates abstract goals such as high-tech transformation, into concrete actions such as increasing silicon wafer patents and expanding overseas market share.

##### **4.1. Financial Dimension**

Following the acquisition of Zhonghuan Electronics, TCL Technology demonstrated significant improvements in financial performance. Prior to the acquisition, its operational capability metrics were below industry averages. Its accounts receivable turnover ratio stood at 3.89 times, inventory turnover ratio at 7.83 times, and total asset turnover ratio at 0.28 times. After the acquisition, the accounts receivable turnover ratio increased to 5.1 times in 2023, the inventory turnover ratio peaked at 27.09 times in 2021, and the total asset turnover ratio steadily rose to 0.53 times, nearing industry-leading levels in asset utilization.

In terms of profitability, despite temporary declines in operating profit margin to 3.8% in 2021 due to industry price wars, technological premium effects from high-margin N-type silicon wafers drove a rebound to 6.5% in 2023, significantly surpassing the industry average. Return on equity

surged from 1.75% pre-acquisition to 9.5%, positioning capital return capabilities among industry leaders. Although short-term liquidity pressure reduced the quick ratio from 1.42 to 0.9, the debt-to-asset ratio stabilized at 65% (below the industry average of 70%), supported by a 30% increase in operating cash flow and an interest coverage ratio of 3.5 times, ensuring overall risk control. Growth metrics reversed trends. Its revenue growth rate shifted from -22.3% in 2019 to 25% in 2023, and total asset growth rate turned positive at 18%, highlighting technology-driven resilience.

#### 4.2. Customer Dimension

The market share of TCL Technology Group Corporation is computed as the proportion of its revenue relative to the total industry revenue [8]. Table 1 presents the results.

**Table 1.** TCL's market share from 2019 to 2022

| Year | TCL Total Revenue (Billion RMB) | Industry Total Revenue (Billion RMB) | Market Share | Year-on-Year Change |
|------|---------------------------------|--------------------------------------|--------------|---------------------|
| 2019 | 75.08                           | 12100                                | 0.620%       | -                   |
| 2020 | 76.83                           | 13800                                | 0.557%       | ↓ 10.2%             |
| 2021 | 163.69                          | 14130                                | 1.158%       | ↑ 107.9%            |
| 2022 | 166.63                          | 15400                                | 1.082%       | ↓ 6.6%              |

Table 1 illustrates a "V-shaped" fluctuation in market share from 2019 to 2022. In 2020, despite a 14% growth in total industry revenue, TCL revenue increased by only 2.3%, leading to a decline in market share to 0.557%, reflecting integration challenges during the initial acquisition phase. Following the acquisition of Zhonghuan Electronics in 2021, TCL's revenue surged by 113%, significantly surpassing the industry growth rate of 2.4%, and its market share jumped to 1.158%, highlighting the synergy effects. However, in 2022, industry growth accelerated to 9%, while TCL revenue growth slowed to 1.8%, resulting in a slight decline in market share to 1.082%, potentially due to intensified competition in the photovoltaic sector, such as capacity expansions by companies like LONGi and Tongwei.

As a global leader in photovoltaic silicon wafers, Zhonghuan Electronics provided technological advantages and customer resources, which strengthened the competitiveness of TCL in the new energy sector. Meanwhile, by integrating Zhonghuan Electronics' distribution channels in European and American markets, TCL accelerated its international expansion. Cross-selling opportunities between existing display panel clients and new energy clients diversified the customer structure. Additionally, the semiconductor silicon wafer technology of Zhonghuan Electronics complemented the display technology of TCL, offering differentiated solutions and improving customer loyalty.

#### 4.3. Internal Process Dimension

Post-acquisition, TCL achieved comprehensive operational efficiency improvements by integrating Zhonghuan Electronics' supply chain and production processes. Its sales expense ratio decreased from 3.81% in 2019 to 1.97% in 2023, and administrative expense ratio dropped from 2.05% to 1.23%. This cost reduction stemmed from channel consolidation, automation upgrades, and improvements in supply chain responsiveness.

The mass production cycle for Zhonghuan's 210mm silicon wafer technology shortened from 18 to 10 months, resulting in a 15% reduction in photovoltaic module costs and an increase of gross profit margin to 22%. Synergistic capacity expansion boosted annual silicon wafer production to 114GW, securing global market leadership, while joint procurement strategies reduced silicon material costs by 12%, outperforming industry benchmarks.

#### 4.4. Learning and Growth Dimension

To evaluate the learning and growth dimension, the R&D investment ratio is calculated as the R&D expenses scaled by total revenue [8]. Table 2 reports the results.

**Table 2.** TCL's R&D investment ratio from 2019 to 2022

| Year | R&D Expenses (Million RMB) | Total Revenue (Million RMB) | R&D Investment Ratio |
|------|----------------------------|-----------------------------|----------------------|
| 2019 | 339,680.5                  | 7,507,780.6                 | 4.52%                |
| 2020 | 440,282.1                  | 7,683,040.1                 | 5.73%                |
| 2021 | 723,634.1                  | 16,369,064.3                | 4.42%                |
| 2022 | 863,363.8                  | 16,663,214.6                | 5.18%                |

Following the acquisition of Zhonghuan Electronics in March 2020, the R&D investment ratio of TCL increased from 4.52% in 2019 to 5.73% in 2020, indicating an emphasis on technological integration and R&D synergies during the initial acquisition phase. In 2021, the total revenue surged by 113% year-on-year due to the merger. Despite an absolute increase in R&D expenses to 7.236 billion RMB, the R&D investment ratio declined to 4.42%, potentially diluted by economies of scale. In 2022, R&D expenses further increased to 8.634 billion RMB, and the ratio rebounded to 5.18%, indicating renewed efforts to strengthen technological advantages amid intensified industry competition.

The acquisition of Zhonghuan Electronics optimized R&D investments through technological complementarity and resource integration. However, short-term revenue surges caused fluctuations in the R&D investment ratio. Sustained investment and efficiency improvements are essential to translate technological advantages into long-term competitiveness, particularly in addressing cyclical challenges within the photovoltaic and semiconductor display industries. By integrating Zhonghuan's core technologies in photovoltaic silicon wafers and semiconductor materials, such as high-purity monocrystalline silicon and large-size silicon wafers, TCL strengthened its R&D capabilities. A notable example is the adoption of 12-inch semiconductor silicon wafer technology, which addressed gaps in TCL's semiconductor material portfolio and redirected R&D investments toward high-value-added fields [9]. This technological integration was further amplified by the collaboration between Zhonghuan's R&D team and TCL China Star's display technology experts. The cross-domain synergy reduced redundant R&D expenditures and accelerated the commercialization of innovations like Mini LED and photovoltaic-display integrated solutions [10].

Concurrently, talent structure optimization became a critical outcome of the acquisition. The proportion of employees holding bachelor's degrees or higher rose from 35% in 2019 to 48% by 2022, reflecting a strategic emphasis on knowledge-intensive workforce development. The R&D workforce expanded to 12,000 personnel, reinforcing capabilities in cutting-edge technology domains. These advancements not only consolidated TCL's technical expertise but also established a robust foundation for sustained innovation, positioning the company to navigate competitive and cyclical challenges in the semiconductor and renewable energy industries.

## 5. Conclusion

The TCL-Zhonghuan case underscores the dynamics and strategic opportunities in cross-industry mergers and acquisitions. While short-term performance faced significant challenges, the long-term strategic value remains undeniable. Zhonghuan's leadership in N-type silicon wafers has strengthened TCL's technological moat. This allows TCL to exert greater influence over the industrial chain. Vertical integration spanning silicon wafers to modules has accelerated TCL's transition to renewable energy. Furthermore, leveraging Zhonghuan subsidiary Maxeon's patented technologies and global distribution networks, TCL has strengthened its presence in the Europe and US market.

To solidify the gains from this acquisition, TCL must adopt a multifaceted approach. Capacity management should prioritize flexibility over scale, dynamically aligning production with market demand to safeguard cash flow health. Technological advancement remains critical. While

consolidating advantages in N-type wafers, TCL must expedite the development of next-generation module technologies like Tunnel Oxide Passivated Contact and Back Contact cells to narrow the gap with competitors. Enhancing module competitiveness through brand strengthening and channel diversification is equally vital to reduce reliance on silicon wafer sales and counter rising industry self-sufficiency trends.

Financial prudence also accounts. Controlling debt levels, particularly interest-bearing liabilities, and strategically timing capital expenditures will mitigate risks associated with overexpansion. Prioritizing the repayment of high-interest loans can further alleviate financial burdens. Deepening ESG integration is another cornerstone for sustaining industry leadership. By embedding green technology revenue metrics into strategic evaluations, TCL can leverage carbon reduction technologies to access premium markets like Europe, where sustainability standards are stringent.

The photovoltaic industry's long-term growth prospects remain robust, yet navigating cyclical downturns demands a delicate balance between short-term survival and long-term value creation. If TCL-Zhonghuan successfully implements its strategic adjustments and achieves technological breakthroughs to secure cost and innovation, it will be well positioned to emerge as a primary beneficiary of the subsequent growth cycle.

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