

# The Effect of Prudent Financial Strategy on Corporate Innovation: A Case Study of LONGi Green Energy

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**Abstract.** Under China's "dual carbon" targets and the policy framework for building a new renewable energy-dominated power system, the photovoltaic (PV) industry faces profound transformation in financial strategy models amid growing global economic uncertainties and intensifying market competition. This study conducts a systematic analysis of LONGi Green Energy's prudent financial strategy system and its empowering mechanism for technological innovation capabilities. The findings demonstrate that this financial strategy has not only significantly enhanced the company's R&D investment scale and efficiency in commercializing technological achievements, but also generated multi-dimensional impacts: it has strengthened corporate resilience in complex environments, enabling sustained technological development during market fluctuations; optimized capital allocation to provide stable financial support for long-term innovation; established best practices that elevate financial management standards across the industry; and created an integrated finance-innovation development model that offers valuable references for high-quality growth in the new energy sector. Collectively, these impacts have contributed to perfecting the PV industry's innovation ecosystem and advancing energy structure transformation, with the company's disciplined financial approach serving as a replicable template that balances stability with innovation-driven growth, ultimately promoting both corporate competitiveness and sustainable industry development while providing important insights for the global energy transition.

**Keywords:** Financial strategy, capital structure, innovation, LONGi Green Energy.

## 1. Introduction

In the context of increasing global economic uncertainty and fierce industry competition, how enterprises can balance financial stability and technological innovation has become a key issue in strategic management. The internal driving force for the growth of China's PV industry output has shifted from factor-driven to technology-driven innovation [1]. Technological innovation requires continuous high investment in research and development, while overly relying on aggressive financial strategies may increase enterprise risks and even lead to a liquidity crunch. As a global leader in PV industry, LONGi Green Energy has continuously achieved technological breakthroughs through a prudent financial strategy. This article takes Longi Green Energy as a case and mainly adopts the single-case longitudinal analysis method, aiming to reveal the enabling role of a stable financial strategy on technological innovation, and provide a reference for enterprises to balance risks and enhance technological innovation during periods of economic fluctuations.

## 2. Company Overview

LONGi Green Energy was founded in 2000. It has developed a comprehensive product portfolio including monocrystalline silicon wafers, battery modules, distributed PV solutions, ground PV solutions, hydrogen energy equipment and other business segments. By integrating green electricity with green hydrogen, LONGi Green Energy provides holistic zero-carbon solutions to support the global sustainable development.

### 3. Motivation for Implementing Prudent Financial Strategy

#### 3.1. Macro Environment

In 2020, the sudden outbreak of the COVID-19 pandemic significantly affected overseas investment, financing and operational activities of technology-driven enterprises like LONGi Green Energy. They have to implement strategic realignments and adopt relatively conservative and prudent financial strategy [2]. In the first half of 2021, the policy framework of achieving carbon peaking and carbon neutrality ("dual carbon" goals) were put forward [3]. Together with the initiative "to build a new power system with renewable energy as the main body", the PV industry has attracted growing attention alongside consistent expansion in global installation capacity [4].

#### 3.2. Market Competition

Along with the advancement of "carbon neutral" goal, the global PV industry is expected to maintain growth momentum. While companies are accelerating production capacity expansion, it will intensify industry consolidation and foster fiercer competition among PV enterprises [3]. At the same time, they face complex external business environment such as the imbalance between supply and demand, continuous downward pressure on industrial prices, and prominent international trade barriers. Therefore, it is crucial to implement prudent financial strategy to ensure sufficient liquidity during the periods of industry changes [5].

#### 3.3. Enterprise's Own Development

As a phased strategic model, prudent financial strategy can greatly reduce the investment cost and slow down the investment speed of existing products. It helps maintain a stable cash flow for the enterprise so that it can accumulate certain funds for future development [6].

### 4. Prudent Financial Strategy of LONGi Green Energy

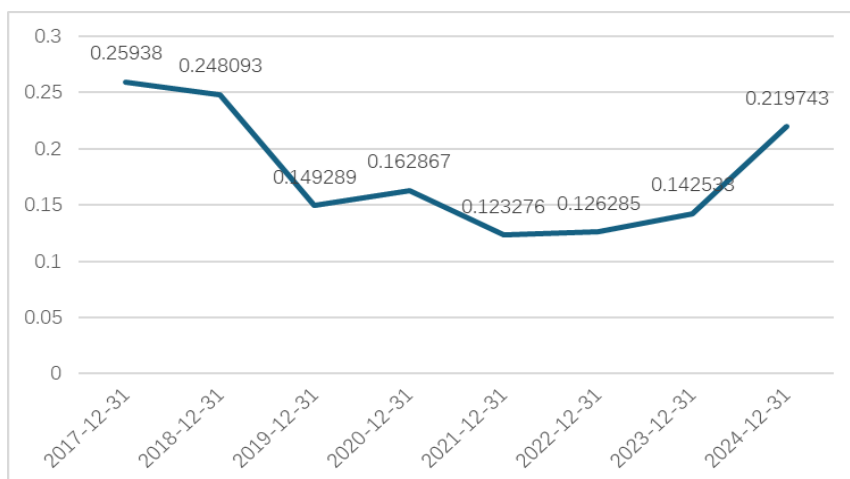
#### 4.1. Conservative Financing Strategy

As shown in Table 1, financial expenses account for the expenses incurred by enterprises to raise funds required for production and operation [7]. Since 2022, the financial expenses of LONGi Green Energy are negative, indicating that the deposit interest income can cover the current interest expenses and other financial expenses, and there is sufficient cash reserve [8].

**Table 1.** Financial expenses of LONGi Green Energy from 2017 to 2024 (Unit: CNY 100 million)  
(Data from CSMAR database)

| Years              | 2017 | 2018 | 2019 | 2020 | 2021 | 2022   | 2023   | 2024  |
|--------------------|------|------|------|------|------|--------|--------|-------|
| Financial Expenses | 1.98 | 2.67 | 2.50 | 3.78 | 9.06 | -18.41 | -18.32 | -2.37 |

Meanwhile, Fig 1 shows that the ratio of interest-bearing debt to tangible assets has generally declined since 2017, reflecting optimized asset structure. On January 5, 2022, the company publicly issued 70 million convertible bonds, which locked in low-cost funds without diluting equity and bound long-term investors through conversion clauses. This effectively reduces long-term debt risks and facilitates short-term financing activities [9].



**Fig. 1** LONGi Green Energy's Ratio of Interest-Bearing Debt to Tangible Assets (2017-2024)  
(Data from CSMAR database)

Negative financial expenses, lower debt ratios, and convertible bonds create a "low-interest, deleveraging, flexible financing" cycle for LONGi Green Energy.

#### 4.2. Efficient Working Capital Strategy

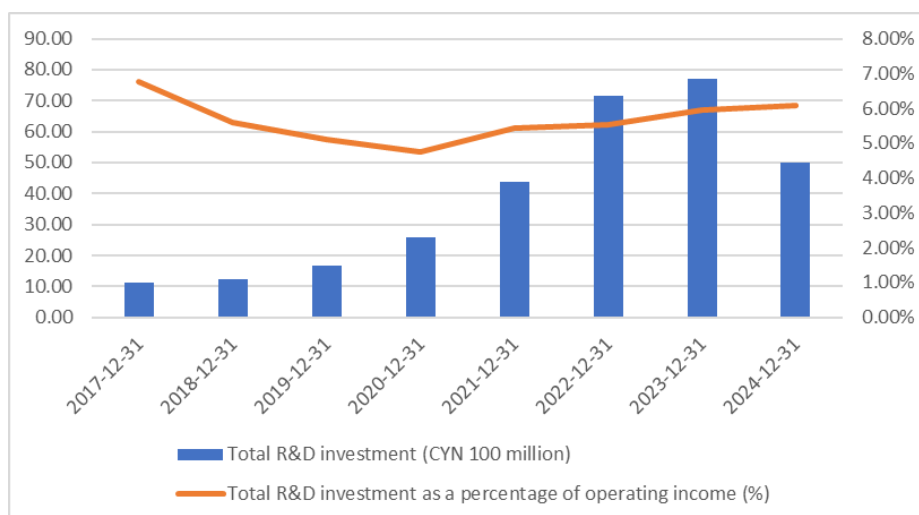
Table 2 illustrates that LONGi Green Energy's net profit cash content has consistently remained above 1, a healthy level. In 2022, it peaked at 1.65. This clearly reflects the high cash content of the company's profits, with most accounting profits converted into actual cash inflows. In the PV industry, which is in a growth phase, maintaining a net profit cash content above 1 is remarkable and is primarily attributed to the company's exceptional working capital management capabilities [10].

**Table 2.** LONGi Green Energy's Net Profit Cash Content from 2017 to 2024  
(Data from CSMAR database)

| Years                   | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|-------------------------|------|------|------|------|------|------|------|
| Net Profit Cash Content | 0.35 | 0.46 | 1.47 | 1.27 | 1.36 | 1.65 | 0.76 |

#### 4.3. Prudent Investment Strategy

In terms of investment, LONGi Green Energy adheres to the principle of "no expansion without leadership," choosing to allocate funds to R&D. As shown in Fig 2, R&D investment has increased year by year since 2017, reaching CNY 7.721 billion in 2023, accounting for 5.96% of revenue. The substantial R&D investment has provided strong support for patent development.



**Fig. 2** LONGi Green Energy's Total R&D Investment and R&D Investment as a Percentage of Revenue from 2017 to 2024 (Data from the annual reports of Longji Green Energy)

As shown in Table 3, by 2024, LONGi Green Energy had obtained 3,342 authorized patents, with the number of patents increasing year by year since 2017.

**Table 3.** LONGi Green Energy's Cumulative Patent Count from 2017 to 2024 (Data from the annual reports of Longji Green Energy)

| Years                                | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|--------------------------------------|------|------|------|------|------|------|------|------|
| Cumulative number of patents (items) | 260  | 526  | 702  | 1001 | 1387 | 2132 | 2879 | 3342 |
| Increase from previous year (items)  | 50   | 266  | 176  | 299  | 386  | 745  | 747  | 463  |

#### 4.4. Comprehensive Risk Control Strategy

LONGi Green Energy's vertical integration spans from silicon wafer cutting to PV module manufacturing and power plant operations, reducing costs through complete industrial chain synergies [11]. The closed-loop industrial chain allows upstream products to be largely self-consumed, while downstream raw materials are supplied internally, saving transaction costs and avoiding supply chain disruption risks [12].

In regions with expensive land prices, Building Integrated Photovoltaics (BIPV) is the optimal solution to address high land costs, LONGi Green Energy seized this urgent demand by acquiring related enterprises to enter the midstream and downstream segments of the PV industry [13]. Mergers and integrations enabled low-cost expansion without increasing overall capacity or disrupting industry supply-demand dynamics, while also reducing the risks associated with independent R&D [14].

According to rough statistics on 2021 investment projects, over CNY 10 billion in new cross-industry capital has been invested in PV module manufacturing [15]. Amid an oversupply environment, LONGi Green Energy opted for conservative acquisitions, reducing R&D risks while avoiding overcapacity and product surplus caused by excessive manufacturing. This strategy also mitigates the impact of investment bubbles from new rounds of manufacturing overcapacity.

Since 2006, LONGi Green Energy has heavily invested in monocrystalline silicon, which aligns with long-term policy trends and captures premium market pricing, reducing the impact of industry fluctuations. The company signed a Cooperation Agreement with Tongwei to ensure stable polysilicon supply for monocrystalline silicon production [16].

## 5. The Effect of Prudent Financial Strategy on Technological Innovation

### 5.1. Sustainable R&D Investment

As shown in Table 4, LONGi Green Energy's operating cash flow is relatively large and stable compared to others, especially in 2020 (CNY 11.075 billion) and 2021 (CNY 12.323 billion), surpassing other companies in the same period. This is attributed to the implementation of a conservative financial strategy. According to financing constraint theory, when internal cash flow is insufficient and external financing is unavailable, companies are forced to abandon high-quality investment projects [17]. Stable cash flow ensures R&D funding continuity, avoiding disruptions in technological innovation due to financial fluctuations. In 2022, LONGi Green Energy's operating cash flow peaked at CNY 24.370 billion, with R&D investment reaching CNY 7.141 billion (5.54% of revenue). At the same time, patent growth surged increasing by 745 items year-on-year.

**Table 4.** Comparison of Operating Cash Flow (CFO) Among Companies from 2017 to 2024  
(Unit: CNY 100 million) (Data from iFinD)

|      | LONGi Green Energy | Tongwei Shares | China Resources<br>Microelectronics Limited | GigaDevice |
|------|--------------------|----------------|---------------------------------------------|------------|
| 2017 | 12.42              | 29.16          | 16.67                                       | 1.98       |
| 2018 | 11.73              | 31.00          | 14.82                                       | 6.20       |
| 2019 | 81.58              | 23.57          | 5.76                                        | 9.67       |
| 2020 | 110.75             | 30.25          | 18.32                                       | 10.60      |
| 2021 | 123.23             | 76.18          | 34.54                                       | 22.62      |
| 2022 | 243.70             | 438.18         | 30.58                                       | 9.50       |
| 2023 | 81.17              | 306.79         | 17.38                                       | 11.87      |
| 2024 | -47.25             | 11.44          | 20.36                                       | 20.32      |

## 5.2. Transformation of Technological Innovation Achievements

**Table 5.** Sales expense ratio and R&D expense ratio of Longji Green Energy from 2017 to 2024 (Sales expense ratio data from CSMAR; R&D expense ratio from LONGi Green Energy's annual reports.)

|                         | 2017  | 2018  | 2019  | 2020  | 2021  | 2022  | 2023  | 2024  |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Sales Expense Ratio (%) | 4.06% | 4.63% | 4.04% | 1.97% | 2.21% | 2.54% | 2.06% | 3.52% |
| R&D expense ratio(%)    | 6.77% | 5.60% | 5.10% | 4.75% | 5.43% | 5.54% | 5.96% | 6.07% |

Table 5 shows that LONGi Green Energy's sales expense ratio exhibited a clear "U-shaped" trend from 2017 to 2024, remaining within a low range of 2%-5%. Three distinct phases are evident.

### 5.2.1. Technology reserve period (2017-2018)

In this stage, the sales expense ratio was 4.06%-4.63%, with R&D expense ratio at 6.77%-5.60%, prioritizing PERC technology reserves. PERC crystalline silicon solar cells currently have the highest market share among solar cell types, with obvious cost-performance advantages [13]. LONGi Green Energy tilted more resources to technology accumulation, completing technology reserves without affecting financial health.

### 5.2.2. Technology breakthrough period (2019-2021)

As technological innovation entered the harvest period, the effects of the conservative financial strategy became particularly evident in the sales expense ratio. The sales expense ratio dropped significantly from 4.04% in 2019 to 2.21% in 2021, a decrease of nearly 50%, reaching the lowest point of 1.97% in 2020. With 5% R&D expense ratio, LONGi achieved "technology replacing marketing", boosting sales efficiency.

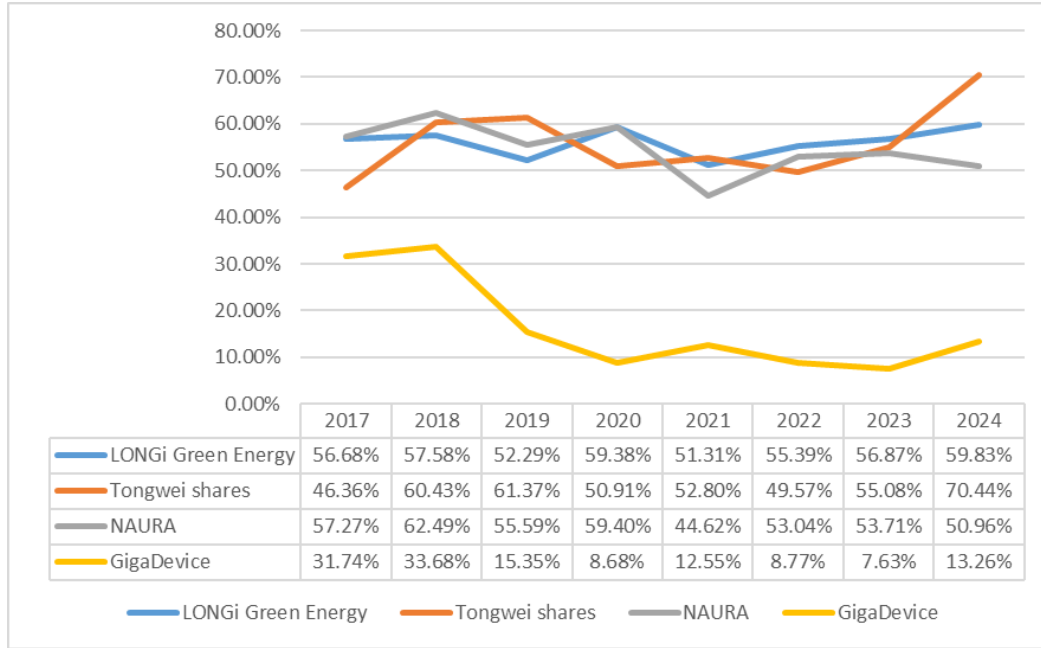
### 5.2.3. Technology iteration period (2022-2024)

In this stage, the conservative financial strategy flexibly adjusted sales expense investment. The sales expense ratio moderately rebounded from 2.54% in 2022 to 3.52% in 2024. This adjustment strictly corresponded to the industrialization needs of new technologies like BC batteries [18]. With the support of an increased R&D expense ratio reaching 6.07%, the increased sales expenses were mainly used for market cultivation of new technology products, reflecting a precise investment financial strategy. This measured expense growth both supported the transformation of technological innovation and avoided financial risks caused by excessive marketing investment.

## 5.3. Enhanced Risk Resilience

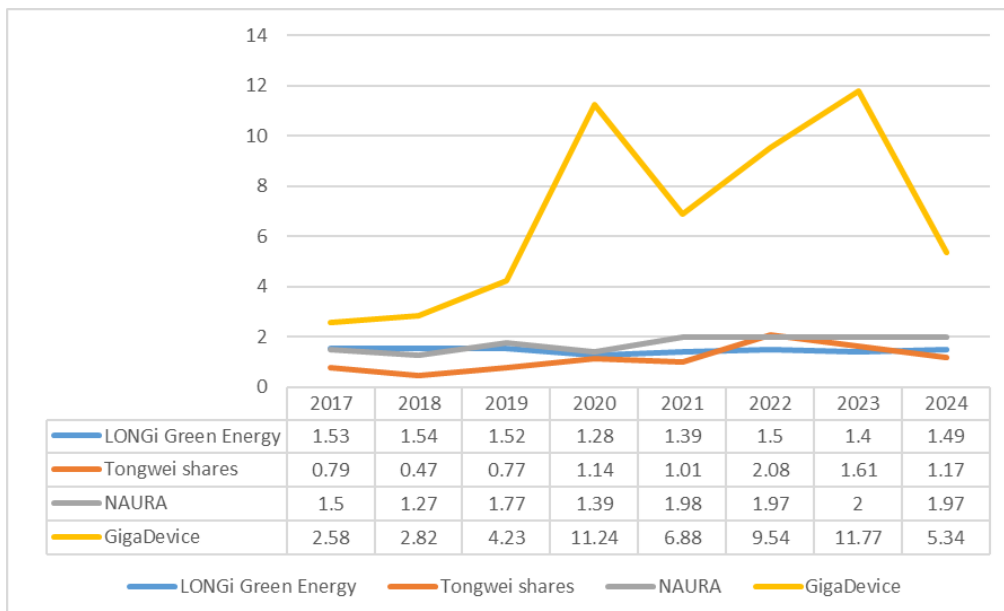
It can be seen from Fig.3 that in the capital-intensive PV manufacturing sector, LONGi Green Energy has consistently maintained its debt-to-asset ratio within an optimal range of 50%-60%. This prudent capital structure facilitates better corporate value maximization [17]. Specifically, during the

industry downturn in 2020, the ratio moderately increased to 59.38% to sustain operations, but was promptly readjusted to 51.31% in 2021. At the critical juncture of BC battery technology iteration in 2024, LONGi Green Energy's 59.83% debt ratio preserved ample financing flexibility compared to Tongwei's high ratio of 70.44% [18]. The PV industry exhibits periodic fluctuations due to combined effects from domestic and international trade environment changes and policy adjustments. Under such circumstances, financially stable enterprises like LONGi Green Energy can better mitigate capital chain crises caused by investor withdrawals, thereby ensuring stable operations [19].



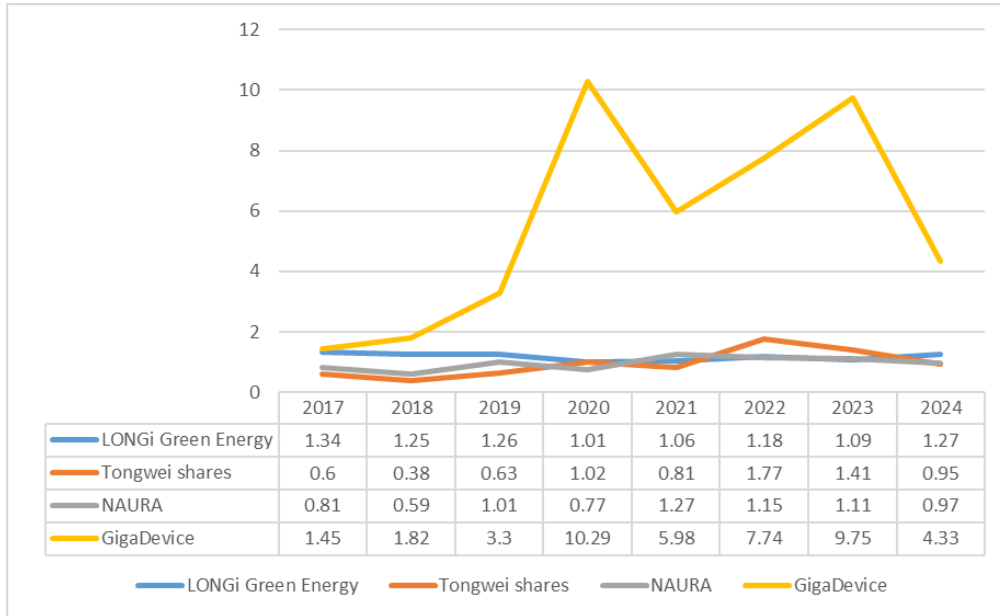
**Fig. 3** LONGi Green Energy's Debt-to-Asset Ratio Comparison from 2017 to 2024 (Data from iFinD.)

As shown in Fig 4, LONGi Green Energy maintained stable current ratios between 1.28-1.54 from 2017 to 2024, demonstrating superior performance compared to Tongwei's significant fluctuations (minimum 0.47, maximum 2.08) while avoiding GigaDevice's extreme highs (peaking at 11.77). Notably during the 2022 industry supply chain crisis, LONGi Green Energy's current ratio of 1.50 provided sufficient safeguards, whereas Tongwei's ratio increased to 2.08 at the cost of rapidly growing debt-to-asset ratios.



**Fig. 4** LONGi Green Energy's Current Ratio Comparison from 2017 to 2024 (Data from iFinD)

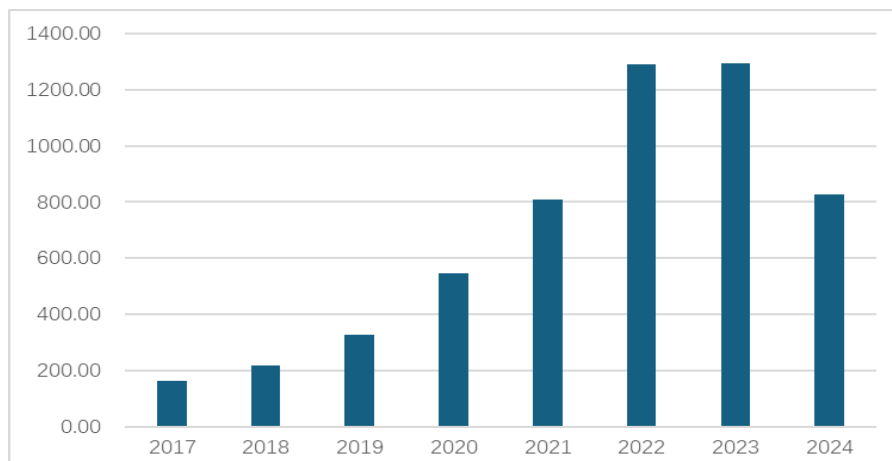
Fig 5 demonstrates that LONGi Green Energy's quick ratio consistently remained within the ideal range of 1.0-1.3, significantly higher than NAURA's warning threshold of 0.97. During the 2020 industry crisis, LONGi Green Energy maintained a quick ratio of 1.01, ensuring short-term debt repayment capability, while Tongwei's 1.02 ratio was achieved through emergency measures that reduced its debt ratio by 10 percentage points. Conservative strategies provided liquidity to sustain R&D (e.g., BC battery expansion) without relying on subsidies (21% of profits) like NAURA [18][20]. This exemplifies dual assurance in both technological investment and financial health, demonstrating industry-leading risk resilience.



**Fig. 5** LONGi Green Energy's Quick Ratio Comparison from 2017 to 2024 (Data from iFinD)

#### 5.4. Corporate Value And Market Position Enhancement

As illustrated in Fig 6, LONGi Green Energy's operating revenue increased from less than 20 billion yuan in 2017 to CNY 129.498 billion in 2023. This growth trajectory fully demonstrates the virtuous cycle between financial stability and corporate value creation. The implementation of a conservative financial strategy ensured sufficient funding for sustained R&D, enabling core technology advancements and enhanced product competitiveness that directly improved profitability and operating revenue. Concurrently, the reduced sales expense ratio improved operational efficiency, showing positive correlation with substantial revenue growth and strengthening the company's intrinsic value.



**Fig. 6** LONGi Green Energy's Operating Revenue from 2017 to 2024 (Unit: CNY 100 million) (Data from CSMAR database)

Wang Donglin (2020) analyzes data from 1,907 enterprise samples and notes that while the COVID-19 pandemic significantly impacted most companies, LONGi Green Energy managed to expand production, maintain steady operations, and generate substantial revenue. Compared to numerous enterprises that went bankrupt due to deteriorating market conditions and broken cash flows, LONGi Green Energy's conservative financial strategy played a pivotal role [19].

## 6. Conclusion

This study conducts an in-depth analysis of LONGi Green Energy's financial and technological conditions, revealing the enabling role of conservative financial strategies in technological innovation. The research finds that through establishing a quadruple mechanism comprising conservative financing strategy, efficient working capital management strategy, prudent investment strategy, and comprehensive risk control strategy, LONGi Green Energy successfully achieved sustained technological innovation under conditions of low financial risk. These advantages manifested in three key areas.: First, by maintaining stable cash flow within the industry, LONGi Green Energy secured sustainable R&D funding, leading to realized continuous growth in patent numbers and achieved technological breakthroughs in monocrystalline silicon and BC battery fields. Second, it enhanced risk resilience by maintaining appropriate debt-to-asset ratios, stable current ratios, and ideal quick ratios. Third, these efforts collectively improve the overall corporate value and strengthen its competitiveness in the market. This discovery breaks through the singular cognition of traditional financial theory, demonstrating that under specific conditions, prudent financial strategies can become enabling factors for technological innovation rather than constraints.

This research breaks the conventional financial mindset that associates conservative strategies with low risk and low cash flow. The findings provide replicable strategic models for similar innovation-driven enterprises, suggesting that management should establish balanced mechanisms between financial health and technological innovation. Particularly in the current context of increasing global economic uncertainty, this study holds significant guiding importance for enterprises' sustainable and healthy development. Future research could continue tracking the evolution of LONGi Green Energy's financial strategy as its BC battery technology industrializes, or extend the study to other innovative industries such as new energy vehicles and semiconductors to explore the feasibility of this financial strategy.

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