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Study on the Impact of Green Transformation on Corporate Performance in the Chengdu-Chongqing Region under the Dual Carbon Context

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Abstract

Against the backdrop of the "dual carbon" strategy, corporate green transformation has become a crucial pathway for driving high-quality development and regional sustainable growth. This study examines Tongwei Co., Ltd., a representative enterprise in the Chengdu-Chongqing region, using both traditional financial metrics and green non-financial indicators to analyze the impact of its green transformation on corporate performance. Findings reveal that Tongwei has achieved synergistic development of green production models and business operations by integrating resources from its dual core businesses-photovoltaic new energy and smart aquaculture-through technological innovation and clean energy applications. This process has enhanced the company's short-term solvency, profitability, and asset operational efficiency. Concurrently, R&D investment has increased, patent output has grown steadily, the proportion of clean energy usage has risen, and carbon emission intensity has decreased. These outcomes demonstrate that green transformation positively impacts both financial and non-financial performance. The findings provide valuable experience and policy references for enterprises in the Chengdu-Chongqing region advancing their green transformation efforts.

Keywords

Carbon Peaking and Carbon Neutrality Goals; Tongwei Co., Ltd.; Green Transition; Corporate Performance.

1. Introduction

In recent years, global climate change has intensified, with greenhouse gas emissions continuing to climb. According to data from the World Energy Statistical Yearbook, global carbon dioxide emissions have increased by nearly 45% over the past two decades, reaching a historic high of 34.36 billion tons in 2021. Against the backdrop of global efforts to combat climate change, China formally announced its "dual carbon" goals in 2020: achieving peak carbon emissions before 2030 and carbon neutrality before 2060. This strategy represents both China's solemn commitment to global climate governance and an inevitable choice for driving green, low-carbon transformation and high-quality economic and social development. Under the dual carbon goals, enterprises-as the primary entities responsible for energy consumption and carbon emissions-must accelerate their transformation and upgrading. Green transformation not only concerns environmental protection and social responsibility but also directly impacts corporate performance and market competitiveness [1]. For businesses,

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embracing green transformation means allocating more resources to energy efficiency, clean production, and technological innovation. While this may increase operational costs in the short term, it ultimately enhances resource utilization, mitigates carbon emission risks, and builds core competitiveness for sustainable development [2].

As a core region for economic development in western China and a national-level "dual-city economic circle," the Chengdu-Chongqing region holds a unique position in advancing green and low-carbon development. On one hand, the region possesses a robust foundation in traditional manufacturing and energy industries, facing significant pressure to reduce carbon emissions. On the other hand, emerging sectors such as new energy and photovoltaics are developing rapidly, offering immense potential for green transformation[3]. Among the numerous enterprises in the Chengdu-Chongqing region, Tongwei Co., Ltd. stands as a highly representative example. As a leading enterprise headquartered in Chengdu, Tongwei holds a leading position in both the photovoltaic new energy and green agriculture sectors. In recent years, the company has actively responded to the "dual carbon" goals by continuously increasing investments in green energy industries like high-purity polysilicon and solar cells, driving green production and clean energy adoption. Simultaneously, Tongwei has achieved notable results in supply chain coordination, energy conservation and emission reduction, and green technological innovation, providing a practical model for the green transformation of enterprises in the region and across the nation.

Based on this, this paper takes Tongwei Co., Ltd. as its research subject, focusing on analyzing the impact of green transformation on corporate performance. By integrating traditional financial metrics with non-financial indicators, it reflects the effectiveness of Tongwei's green transformation[4]. This approach not only provides valuable experience and insights for strategic choices during the transformation and upgrading process of enterprises in the Chengdu-Chongqing region but also raises public awareness of green development, thereby fostering an atmosphere conducive to green and sustainable development.

2. Tongwei Co., Ltd. Green Transformation Case Study

2.1. Tongwei Group Profile

Tongwei Co., Ltd. (referred to as "Tongwei") was established on December 8, 1995, and listed on the Shanghai Stock Exchange on March 2, 2004 (Stock Code: 600438). Headquartered in Chengdu, Tongwei is one of the leading enterprises in the Chengdu-Chongqing region. Initially focused on aquatic feed production, the company has evolved over the years into a diversified listed enterprise encompassing feed manufacturing, agricultural industrialization, and photovoltaic new energy sectors. As a major domestic supplier of aquatic feed and a key player in the global photovoltaic industry chain, Tongwei Co., Ltd. has embraced the "dual carbon" strategy by adopting "green food and clean energy" as its long-term development goals. The company actively promotes green transformation and sustainable development.

2.2. Green Transition Measures of Tongwei Co., Ltd.

Tongwei's green transformation has primarily progressed through three stages: First, in industrial entry and resource integration, the company entered the new energy sector through capital operations, gradually building a circular economy industrial chain centered on polysilicon production and comprehensive utilization. This green transformation extends beyond clean energy production to emphasize comprehensive utilization of "three wastes" (wastewater, waste gas, and waste residue) at the end of the industrial chain. While exploring key technologies like exhaust gas recovery and gas separation, the company has driven improvements in energy efficiency and pollution reduction, accumulating early experience in corporate green transformation. Second, in terms of industrial model innovation, Tongwei Co.,

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Ltd. has fully leveraged its technological strengths to drive the deep integration of agriculture and new energy. By relying on emerging technologies such as informatization and intelligent systems, the company has proposed and implemented innovative models including “facility-based aquaculture,” “smart aquaculture,” and “integrated photovoltaic-aquaculture systems.” These initiatives have achieved an organic combination of clean energy development and modern aquaculture practices. This model not only enhances the efficiency of land and energy utilization but also establishes a replicable and scalable industrial paradigm. Simultaneously, the company has integrated upstream and downstream resources in the photovoltaic industry chain through mergers and acquisitions, gradually achieving synergistic development between its agriculture and new energy segments. This has established a dual-core business strategy centered on “green food and green energy.” Third, in terms of strategic deepening and coordinated development, Tongwei Co., Ltd. continues to adhere to a dual-core business strategy in agriculture and photovoltaic new energy, steadily consolidating its competitive edge in core sectors such as high-purity polysilicon, solar cells, and aquatic feed. On one hand, the company reduces energy consumption and carbon emissions through technological R&D and green manufacturing, driving large-scale adoption of clean energy. On the other hand, by building a world-class healthy and safe food supply system alongside a world-class clean energy supply system, it further highlights the complementary effects and sustainable development advantages of its dual-core business model [5]. Following the implementation of the aforementioned series of green transition initiatives, Tongwei Co., Ltd. has successfully achieved a strategic transformation from a single feed business to dual-core synergistic development. The company has progressively established a development framework centered on its dual mainstays of agriculture and photovoltaic new energy. This shift has not only yielded breakthroughs in its business model but also delivered significant outcomes in financial performance, industrial competitiveness, and corporate social responsibility [6][7].

2.3. Tongwei's Green Transformation Achievements

In advancing the synergistic development of its dual core businesses in agriculture and new energy, Tongwei Co., Ltd. actively practices green and low-carbon principles. While enhancing corporate competitiveness, the company has also achieved remarkable results in economic performance, industry standing, and environmental value. First, in terms of economic and financial performance. The synergistic development of dual core businesses has established a relatively stable model for revenue and profit growth. In recent years, with the continuous expansion of the photovoltaic industry chain, high-purity polysilicon and solar cell operations have emerged as new pillars of performance. The company's operating revenue has risen year after year, with profitability significantly enhanced. Concurrently, the agricultural feed business maintains a leading position domestically, providing stable cash flow and mitigating the impact of single-industry fluctuations on corporate operations. The overall financial structure has become healthier, and risk resilience has been substantially strengthened. Second, in terms of industrial standing. Tongwei has become a core player in the global photovoltaic industry chain, ranking among the world's top performers in key metrics such as high-purity polysilicon production capacity and solar cell shipments, thereby solidifying its position as a world-class industry leader. Concurrently, the company maintains its market share leadership in aquatic feed, establishing a dual-engine growth model of “green food + clean energy” that drives the coordinated development of agriculture and the new energy sector. Third, in technological innovation and model breakthroughs. The company vigorously advances R&D efforts, establishing platforms such as the Polysilicon Research Institute and Smart Fisheries Laboratory to continuously enhance independent innovation capabilities. In terms of industrial models, Tongwei pioneered the “integrated aquaculture and photovoltaic” model. Its cumulative grid-connected power station capacity has exceeded 4GW, reducing carbon emissions by over 2 million tons annually and effectively promoting the deep integration of

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agriculture and new energy. This model not only enhances comprehensive land utilization but also delivers multiple values in ecological, economic, and social benefits, establishing itself as a green development model with significant industry-wide applicability. Fourth, in environmental protection and social responsibility. Tongwei adheres to a “green, clean, and sustainable” development philosophy, continuously promoting clean energy utilization while reducing fossil fuel consumption and carbon emissions intensity, effectively contributing to the achievement of the nation's dual carbon goals. In the agricultural aquaculture sector, the company promotes intelligent and ecological farming methods to reduce the pressure on aquatic environments from feed and farming processes, thereby fostering sustainable fisheries development. Simultaneously, the company actively fulfills its social responsibilities by driving local economic growth, creating employment opportunities, and facilitating industrial upgrading, demonstrating a strong commitment to social contribution [8].

3. Analysis of the Impact of Tongwei Co., Ltd.'s Green Transition on Performance

To comprehensively evaluate the impact of green transformation on Tongwei Co., Ltd.'s performance, this study will analyze two dimensions: First, traditional financial metrics such as profitability, solvency, operational efficiency, and growth potential will be selected to directly reflect the company's financial performance and evolving trends during the transformation process. Second, it examines non-financial metrics by integrating environmental factors into the value creation evaluation framework. This approach explores the comprehensive impact of green transformation on corporate financial performance from a value-added perspective, enabling a deeper assessment of Tongwei Co., Ltd.'s operational status post-transition. Consequently, it yields more comprehensive and objective conclusions [9].

3.1. Financial Performance Analysis in the Traditional Model

3.1.1. Analysis of the Impact of Green Transition on Solvency

First is the analysis of short-term debt repayment capability. To better assess the trend in short-term solvency before and after Tongwei Co., Ltd.'s transformation, this paper primarily selected two financial indicators-the current ratio and quick ratio-for analysis.

Table 1. Short -Term Solvency Indicators of Tongwei Co., Ltd. for 2020-2024

	2020	2021	2022	2023	2024
Current ratio	1.14	1.01	2.08	1.61	1.17
Quick ratio	1.02	0.81	1.77	1.41	0.95

Data source: Annual reports, same below.

As shown in Table 1, Tongwei Co., Ltd.'s current ratio and quick ratio exhibited a fluctuating pattern of “decline-improvement-renewed pressure” between 2020 and 2024. The current ratio stood at 1.14 in 2020 but declined to 1.01 in 2021, indicating significant short-term debt repayment pressure. It rose to 2.08 in 2022, reflecting a marked improvement in the ability of current assets to cover current liabilities. However, it fell again to 1.61 and 1.17 in 2023 and 2024, respectively. The quick ratio stood at 1.02 in 2020, dropping to 0.81 in 2021, revealing insufficient capacity to settle debts with quick assets during the period. It improved to 1.77 in 2022, indicating a marked liquidity enhancement, but declined again to 0.95 in 2024. This reflects a resurgence in short-term debt repayment pressure as the company expanded on a large scale and increased capital occupation.

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Table 2. Structure of Selected Current Liabilities for Tongwei Co., Ltd., 2020–2024

Unit: billion yuan	2020	2021	2022	2023	2024
Non-current liabilities due within one year	22.12	24.87	25.34	11.42	10.72
Short-term borrowing	23.49	13.75	0.88	2.14	1.88
Total Liabilities	327.19	465.30	724.31	904.00	913.04
Combined proportion of the two items	13.94%	8.30%	3.62%	1.50%	1.38%

Further analysis of Tongwei Co., Ltd.'s current liabilities structure in Table 2 reveals that while the company's short-term debt has decreased annually, its overall debt level has continued to rise. Non-current liabilities due within one year gradually declined from RMB 2.212 billion in 2020 to RMB 1.072 billion in 2024, while short-term borrowings decreased from RMB 2.349 billion to RMB 188 million. In contrast, the company's total liabilities have risen from RMB 32.719 billion in 2020 to RMB 91.304 billion in 2024, exhibiting an overall upward trend. This indicates a declining reliance on short-term debt coupled with a rapid increase in total liabilities, reflecting the company's strategy of "reducing short-term debt while extending debt maturities" to support long-term investment needs in the new energy industry chain. Tongwei's short-term debt repayment capacity has experienced phased fluctuations due to its green transition: while optimizing its financing structure has alleviated short-term debt pressure, capital tied up by expansion has simultaneously strained liquidity.

Second is the analysis of long-term debt repayment capability. To better assess changes in Tongwei Co., Ltd.'s long-term debt-paying capacity before and after its green transition, this paper primarily analyzes three indicators: debt-to-asset ratio, equity multiplier, and equity ratio.

Table 3. Long-Term Debt Repayment Capacity Indicators of Tongwei Co., Ltd. for 2020-2024

Unit: %	2020	2021	2022	2023	2024
Asset-liability ratio	50.91	52.80	49.57	55.08	70.44
Equity multiplier	203.71	211.86	198.29	222.62	338.29
Ownership ratio	103.71	111.86	98.29	122.62	238.29

In terms of long-term debt-paying capacity, Tongwei Co., Ltd.'s debt-to-asset ratio remained around 50% from 2020 to 2022, indicating a relatively stable capital structure. However, it began to rise rapidly starting in 2023, reaching 70.44% in 2024, reflecting a significant increase in the company's reliance on debt. Equity multiplier and debt-to-equity ratio also rose concurrently, indicating that the company significantly increased financial leverage by expanding debt financing to support industrial chain expansion during its green transition. The green transition has a predominantly negative impact on long-term solvency: while it helps enhance market share and long-term competitiveness, excessive reliance on debt financing substantially increases financial risk.

Overall, Tongwei's green transition has exerted a dual impact on its debt-servicing capacity: on one hand, short-term debt pressures have eased through optimized short-term debt structures and reduced short-term borrowings; on the other hand, to support strategic investments in photovoltaic new energy and integrated photovoltaic-farming projects, the company's long-term debt has surged significantly, elevating financial leverage and long-term debt-servicing risks. Therefore, while the green transition enhances the company's future profit potential, it also imposes higher demands on its financial structure and debt-servicing capacity. The company must maintain a focus on optimizing its capital structure and managing cash flow to ensure sustainable development.

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3.1.2. Analysis of the Impact of Green Transition on Profitability

To better analyze the trend in Tongwei Co., Ltd.'s profitability before and after its transformation, this paper primarily selected three financial indicators for analysis: return on equity (ROE), gross profit margin, and net profit margin.

Table 4. Profitability Indicators of Tongwei Co., Ltd. for 2020-2024

Unit: %	2020	2021	2022	2023	2024
Return on Equity (Weighted)	16.13	24.24	52.36	22.59	-12.77
Gross profit margin	17.09	27.68	38.17	26.44	6.39
net profit margin	8.16	12.93	18.06	9.76	-7.65

Table 4 shows that Tongwei Co., Ltd.'s profitability metrics fluctuated significantly during the 2020-2024 period. From 2020 to 2022, the company's return on equity (ROE), gross profit margin, and net profit margin all showed a rapid upward trend, peaking in 2022 at 52.36%, 38.17%, and 18.06%, respectively. This demonstrates that the green transformation strategy significantly enhanced the company's profitability in the short term. This growth was primarily driven by the rapid expansion of the photovoltaic new energy sector and the “integrated photovoltaic-fishing” projects, coupled with enhanced operational profits from synergies between the dual core businesses. Increased revenue contributions from green energy and smart aquaculture further bolstered overall profitability.However, key indicators declined in 2023 and 2024, with return on equity and net profit margin turning negative in 2024. This reflects the challenges enterprises face during sustained green transition investments, including rising costs, industry cyclical fluctuations, and market price pressures. This indicates that while green transformation contributes to building long-term core competitiveness, it increases operational volatility risks in the short term. This is especially true in the new energy sector, where profitability may experience significant fluctuations due to the substantial impact of policies, raw material costs, and market prices.

3.1.3. Analysis of the Impact of Green Transition on Operational Capabilities

Table 5. Tongwei Co., Ltd. Operating Capability Indicators, 2020–2024

	2020	2021	2022	2023	2024
Inventory Turnover Ratio (times)	14.13	10.86	10.55	9.76	10.26
Accounts Receivable Turnover Ratio (Times)	32.24	31.87	38.41	24.21	13.44
Total asset turnover (times)	0.80	0.83	1.22	0.90	0.51

Tongwei Co., Ltd. exhibited fluctuating asset operation metrics between 2020 and 2024, closely tied to the green transformation of its two core business segments: feed and photovoltaics. As shown in the table, the company's inventory turnover rate, accounts receivable turnover rate, and total asset turnover rate all reached their peak in 2022, at 10.55 times, 38.41 times, and 1.22 times respectively, indicating strong operational efficiency. The favorable inventory turnover rate indicates Tongwei's robust production processes and capacity to swiftly convert inventory into marketable finished goods. The higher accounts receivable turnover rate reflects strong product sales and collection capabilities, enabling timely monetization of products and conversion into profits, thereby achieving a sound production-sales cycle. However, entering 2023–2024, various asset operation indicators showed varying degrees of decline. Among them, the accounts receivable turnover rate decreased from 38.41 times to 13.44 times, while the total asset turnover rate fell from 1.22 times to 0.51 times. This fluctuation primarily stemmed from intensified industry competition and shifting market conditions during the green transition. On one hand, the photovoltaic industry experienced rapid capacity expansion

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following its high-speed development, intensifying market competition and slowing product sales momentum. On the other hand, to expand market share, the company moderately relaxed credit terms in its sales policies, leading to a decline in accounts receivable turnover. Under these circumstances, Tongwei Co., Ltd. should further enhance asset turnover by optimizing capacity allocation, strengthening customer credit management, and improving inventory management levels. This will ensure the financial performance gains from the green transition remain sustainable and stable.

3.1.4. Analysis of the Impact of Green Transition on Development Capacity

Table 6. Tongwei Co., Ltd. Development Capability Indicators for 2020–2024

Unit: %	2020	2021	2022	2023	2024
Operating profit growth rate	50.92	129.87	269.34	-43.67	-137.76
Operating Income Growth Rate	17.69	43.64	119.69	-2.33	-33.87
Net profit growth rate	36.95	127.50	217.25	-47.25	-151.85
Total asset growth rate	37.23	37.35	65.25	12.91	19.20

Tongwei Co., Ltd. experienced rapid growth in revenue, operating profit, and net profit from 2020 to 2022, indicating the company was in an expansion phase during this five-year period. It achieved significant operational growth during the initial stages of its green transition. Concurrently, total assets grew by 65.25%, reflecting the company's asset accumulation through new production bases and expanded capacity amid the photovoltaic industry's rapid development. This enabled swift production capacity expansion and rapid asset scale growth. However, entering 2023–2024, all growth rate indicators experienced a significant decline, with the company's asset expansion pace noticeably slowing down, marking the transition into a relatively stable operational phase. In summary, financial risks and short-term debt repayment pressures warrant continued attention. Future efforts should focus on optimizing asset allocation structures and strengthening cash flow management to effectively mitigate potential financial risks. Regarding asset quality, the company maintains overall stability with ample liquidity. As market conditions gradually improve, profitability is expected to steadily increase in subsequent years.

3.2. Nonfinancial Performance Analysis

When evaluating the effectiveness of Tongwei Co., Ltd.'s green transformation, relying solely on financial metrics fails to fully capture the comprehensive value created by the enterprise. Green transformation not only impacts profitability and capital structure but also exerts profound effects on non-financial dimensions such as enhanced innovation capabilities and improved environmental governance. Therefore, this study analyzes both innovation performance and environmental performance to more comprehensively reveal how Tongwei Co., Ltd.'s green transformation drives the company's overall performance.

3.2.1. Innovation Performance

First is the ratio of R&D investment. Tongwei Co., Ltd. maintained its R&D investment ratio above 2% throughout the 2020–2024 period, reaching a peak of 3.21% in 2021. Although it fluctuated slightly thereafter, it generally remained at a high level. Although R&D efficiency faced temporary challenges in 2020 due to the pandemic and external factors, the company's advancing green transformation strategy has refocused R&D efforts on enhancing photovoltaic cell efficiency, applying novel materials, and optimizing green manufacturing processes. This shift has improved the conversion rate and practical value of R&D outcomes. Overall, the stable maintenance and moderate increase in R&D intensity demonstrate Tongwei's commitment to sustaining innovation throughout its green transformation, thereby strengthening long-term growth momentum and market competitiveness.

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Table 7. R&D Investment Ratio of Tongwei Co., Ltd. (2020–2024)

Unit:%	2020	2021	2022	2023	2024
R&D investment ratio	2.34	3.21	3.09	2.86	2.91

Data Source: Tongwei Co., Ltd. ESG Report

Second is the number of patents. In terms of patent achievements, Tongwei Co., Ltd. experienced rapid growth in patent volume from 2020 to 2024, rising from 506 patents in 2020 to 1,959 patents in 2024. Notably, patent applications and grants surged significantly after 2022. This trend demonstrates the company's intensified technological innovation efforts during its green transformation, yielding substantial intellectual property outcomes. When combined with the previously mentioned R&D investment ratio, it becomes evident that sustained funding for research and development has provided robust support for patent output. The company's continuous innovation in areas such as photovoltaic cells, new materials, and smart manufacturing has enabled rapid patenting and industrialization of R&D achievements. The significant growth in patent numbers not only reflects Tongwei Co., Ltd.'s ongoing breakthroughs in technological innovation but also demonstrates the continuous strengthening of its core competitiveness in green development and clean energy. This provides a solid technological foundation for the company's long-term sustainable development.

Table 8. Tongwei Co., Ltd. Patent Counts, 2020–2024

Unit: Piece	2020	2021	2022	2023	2024
Number of Patents	506	391	1373	1613	1959

Data Source: Tongwei ESG Report

3.2.2. Environmental Performance

First is the proportion of clean electricity consumption. Tongwei Co., Ltd. has continuously enhanced its clean energy utilization during its green transformation. The proportion of clean electricity consumption has shown an overall upward trend from 2020 to 2024, rising from 48.05% in 2020 to 76.95% in 2024. Particularly during 2021–2022, the proportion of clean electricity consumption surged significantly, peaking at 81.73%. This demonstrates the company's remarkable achievements in actively advancing green manufacturing and expanding the application of photovoltaic clean energy. This shift not only reduces the company's reliance on traditional fossil fuels but also contributes to lowering carbon emissions and environmental pollution, reflecting its proactive stance in fulfilling the “dual carbon” strategy and social responsibilities. Although the proportion slightly declined from its peak in 2023 and 2024, it remains at a high overall level, indicating the sustainability of the company's achievements in optimizing its energy structure and utilizing clean energy. Concurrently, Tongwei Co., Ltd. has significantly enhanced power plant operational efficiency through digital technology, increasing clean electricity generation and thereby contributing to the realization of the nation's “dual carbon” goals.

Table 9. Proportion of Clean Power Consumption at Tongwei Co., Ltd. (2020–2024)

Unit: %	2020	2021	2022	2023	2024
Clean electricity consumption share	48.05	75.51	81.73	77.65	76.95

Data Source: Tongwei Co., Ltd. ESG Report

Second is the carbon dioxide equivalent emissions per million yuan of revenue. Tongwei Co., Ltd. focuses not only on increasing the proportion of clean energy usage during its green transformation but also emphasizes demonstrating environmental performance by reducing

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carbon emission intensity. Measured by carbon dioxide equivalent emissions per million yuan of revenue, the company has achieved a significant shift from "high base to low intensity." The sharp decline from 6,727.71 in 2020 to 2021, followed by a steady downward trend in subsequent years, demonstrates the systematic achievements in energy structure optimization, technological upgrades, and carbon emission management mechanisms as the company deepens its green process transformation and utilization of photovoltaic clean energy. By integrating green transformation with operational development, Tongwei Co., Ltd. has achieved a leap in carbon emission efficiency, establishing a transformative model that balances economic and environmental benefits.

Table 10. Carbon Dioxide Equivalent Emissions per Million Yuan of Revenue for Tongwei Co., Ltd., 2020–2024

Unit: tCO2-eq	2020	2021	2022	2023	2024
Carbon dioxide equivalent emissions per million yuan of revenue	6727.71	103.23	77.15	70.34	65.23

Data Source: Tongwei Co., Ltd. ESG Report

4. Research Findings and Implications

This paper focuses on the green transformation and development of enterprises in the Chengdu-Chongqing region against the backdrop of the "dual carbon" goals. Selecting Tongwei Co., Ltd. as a representative case study, it systematically analyzes the impact of Tongwei's green transformation on corporate performance. Research findings indicate that during its green transition, Tongwei has seen improved short-term debt repayment capacity, though long-term debt levels warrant continued attention. Profitability and asset operational efficiency exhibit cyclical fluctuations while maintaining strong overall competitiveness. Regarding non-financial performance, both innovation capabilities and environmental performance have achieved positive outcomes, demonstrating that green transformation significantly enhances comprehensive corporate performance. Based on these conclusions, the following implications are proposed [10].

First, establish a green development evaluation and assessment system for the Chengdu-Chongqing region. The green transformation of enterprises in the region, particularly in sectors such as new energy and modern agriculture, requires a scientific performance evaluation framework to guide corporate behavior. It is recommended to develop a green assessment system encompassing indicators like carbon emissions, energy structure optimization, and recycling efficiency. This quantitative evaluation will help enterprises identify areas for improvement, driving continuous optimization in green production and environmental management. Consequently, both economic and environmental benefits will be enhanced synergistically.

Second, refine incentive mechanisms for green transformation. Local governments and departments at all levels should develop differentiated policies for various sectors, offering policy support, financing facilities, and tax incentives to enterprises actively advancing green transformation. Simultaneously, appropriate warnings or improvement directives should be issued to non-compliant enterprises, thereby motivating them to embrace green transformation. Through integrating production resources in photovoltaic new energy and smart aquaculture, Tongwei Co., Ltd. has achieved synergistic development of its dual core businesses by leveraging technological innovation and clean energy applications. This has effectively enhanced the company's green performance and sustainable development capabilities. Other enterprises in the Chengdu-Chongqing region can draw on this experience

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to optimize internal resource allocation and promote green technology adoption, thereby boosting the benefits of their own green transformation efforts.

Third, enhance corporate green information disclosure and social oversight. Enterprises should establish transparent green disclosure systems, regularly publishing key data on carbon emissions, clean energy usage, recycling, and environmental governance. Industry associations and third-party audit institutions can provide technical and supervisory support to standardize corporate environmental management. Transparent information not only helps the public and investors understand corporate green performance but also fosters a healthy competitive environment among regional enterprises, elevating overall green development standards.

5. Summary

Against the backdrop of China's dual carbon goals, this paper focuses on Tongwei Co., Ltd., a representative enterprise in the Chengdu-Chongqing region, systematically analyzing the impact of its green transformation on corporate performance. The study reveals that Tongwei achieved a strategic shift from a traditional feed manufacturer to a green, low-carbon enterprise by integrating resources across its dual core businesses-photovoltaic new energy and smart aquaculture-while driving technological innovation and clean energy adoption. In terms of financial performance, the green transition has enhanced the company's profitability, operational efficiency, and growth potential in the short term, with all financial indicators reaching peak levels in 2022. However, the transition process has also brought challenges such as changes in debt structure, increased financial leverage, and profit volatility, reflecting the high demands of green transformation on capital requirements and management capabilities. Non-financial performance showed sustained growth in R&D investment, a significant increase in patent numbers, a substantial rise in clean energy usage, and a marked decrease in carbon emission intensity, demonstrating the positive outcomes of green transformation in innovation-driven development and environmental governance.

Overall, Tongwei Co., Ltd.'s green transformation practice indicates that while pursuing economic benefits, enterprises can achieve dual improvements in financial and non-financial performance through green technology application and industrial synergy, providing a reference path for regional green and low-carbon development. Moving forward, the company should further optimize its capital structure, strengthen cash flow management, and continuously advance green technological innovation and information disclosure to enhance the sustainability and resilience of its transformation. This study also offers theoretical references and practical insights for enterprises in the Chengdu-Chongqing region and across China to advance their green transformation efforts.

References

[1] Wei Yanyu, Liao Jilin. Research on Green Transformation and Upgrading of Traditional Manufacturing Enterprises Under New Economic Conditions [J]. Logistics Engineering and Management, 2019, 41(10): 140-142+85.

[2] Wei Lili, Yang Ying. Research on Green Finance Promoting Industrial Green Transformation Under the “Dual Carbon” Goals [J]. Gansu Finance, 2023, (03): 4-8. Wei Lili, Yang Ying. Research on Green Finance Promoting Industrial Green Transformation Under the “Dual Carbon” Goals [J]. Gansu Finance, 2023, (03): 4-8.

[3] Liu Bo, Xie Wei. Research on Green and Low-Carbon Energy Transition Pathways for the Chengdu-Chongqing Twin-City Economic Circle [J]. International Petroleum Economics, 2022, 30(05): 74-82.

[4] Hu Juanjuan. Exploring the Importance of Performance Evaluation in Corporate Financial Management [J]. Finance and Economics World, 2020, (22): 125-126.

ISSN: 2692-7608 DOI: 10.6981/FEM.202509_6(9).0011

[5] Yang Dong, Chai Huimin. A Review of the Driving Factors and Performance Impacts of Green Technological Innovation in Enterprises [J]. China Population, Resources and Environment, 2015, 25(S2): 132-136. Yang Dong, Chai Huimin. A Review of Research on the Driving Factors and Performance Impacts of Green Technological Innovation in Enterprises [J]. China Population, Resources and Environment, 2015, 25(S2): 132-136.

[6] Jiang Jinhé, Ma Lulu, Yu Xianrong. Evaluation and Driving Factors of China's Green Economic Transition [J]. Journal of Beijing University of Technology (Social Sciences Edition), 2022, 22(03): 123-141.

[7] Du Tongxin. The Catalytic Role of Green M&A in Corporate Transformation: A Case Study of Tongwei Co., Ltd. [J]. Shanxi Agricultural Economics, 2023, (12): 136-138. DOI:10.16675/j.cnki.cn14-1065/f.2023.12.037.

[8] Ma Z ,Ding C ,Wang X , et al.Carbon emission reduction development, digital economy, and green transformation of China's manufacturing industry[J].International Review of Financial Analysis,2025,102104149-104149.

[9] Cheng Y ,Pan L ,Tan H , et al.Effects of producer service industry co-agglomeration and manufacturing on the green and high-end transformation of manufacturing: An empirical study from Hunan Province.[J].PloS one,2024,19(9):e0297591.

[10] Sun L ,Zhou H ,Huang F .How the introduction of the “Dual Carbon” targets drives ESG disclosure in manufacturing enterprises?[J].International Review of Economics and Finance,2025,10110 4242-104242.