Strategic Pathways for Shanghai Ruichen Environmental Protection Technology Co., Ltd.: A SWOT Analysis Approach in the Era of Carbon Neutrality

Zhehan Zhang*

Department of Business Administration, Nanjing University, Nanjing, China

* Corresponding Author Email: 13151315559@163.com

Abstract. Since the 18th National Congress of the Communist Party of China. The construction of ecological civilisation has become a very important part of national construction, and the goal of "two-carbon" was proposed in 2020. In this context, small and medium-sized environmental protection enterprises began to develop rapidly, the main body of the environmental protection market further expanded, and the state also issued policies to support the development of environmental protection enterprises from the market and capital. Shanghai Ruichen Environmental Protection Technology Co., Ltd. is a high-tech company in the field of energy conservation and environmental protection. The company's main business is the research and development, design, production and sales of high-efficiency energy-saving equipment, including high-efficiency energy-saving centrifugal fans, high-efficiency energy-saving centrifugal pumps and other energy-saving products. It is a large environmental protection and energy-saving enterprise. This paper aims to analyze the corresponding solutions that Ruichen Environmental Protection Company should take in today's market environment through a SWOT analysis of the internal advantages, disadvantages, external opportunities and risks.

Keywords: Carbon Neutrality, Ruichen Environmental Protection Company, SWOT analysis.

1. Introduction

With the concept of "dual carbon" gradually becoming the backdrop of the times, environmental protection companies are experiencing rapid development. As global climate change and environmental issues become increasingly prominent, there is a growing demand from businesses and society to reduce carbon emissions and lower carbon footprints. Additionally, governments and the international community are intensifying efforts in environmental protection and carbon neutrality, which is driving the growth and expansion of the environmental protection industry. Under the guidance of the "dual carbon" concept, environmental protection companies need to focus not only on technological innovations to reduce carbon emissions and the application of green energy but also on enhancing overall carbon efficiency to achieve a win-win situation between economic growth and carbon reduction. By promoting green production, circular economy, and sustainable development, environmental protection companies will have broader development opportunities in the new era. The introduction of the "dual carbon" concept poses challenges for environmental protection companies but also presents a historic opportunity. These companies should actively respond to national policy guidance, increase research and development investment, enhance technological capabilities, and drive industry upgrading and transformation. Furthermore, strengthening international cooperation, learning from advanced experiences, expanding international markets, and achieving sustainable development and global environmental cooperation are essential [1]. Shanghai Ruichen Environmental Protection Technology Co., Ltd. is a high-tech company in the field of energy conservation and environmental protection. The company's main business involves the research, design, production, and sale of high-efficiency energy-saving equipment. Its products include high-efficiency energy-saving centrifugal fans, high-efficiency energy-saving centrifugal pumps, and other energy-saving products. It is a large-scale environmental protection and energy-saving enterprise.

In this context, the author hopes to use SWOT analysis to find the most suitable and applicable strategy for Ruichen Environmental Protection.

2. SWOT Analysis

The SWOT analysis is conducted based on the literature on "environmental protection enterprise," "Ruichen Environmental Protection," and "SWOT analysis" obtained from CSMAR, National data, wind, and other databases. Additionally, insights from an interview and consultation with Mr. Cheng Yuan, the secretary of the chairman of Ruichen Environmental Protection Company, are incorporated. SWOT is a strategic tool to study the external and internal factors that facilitate or hinder the successful implementation of a project, where S, W, O, and T represent strengths, weaknesses, opportunities, and threats, respectively [2, 3]. After the concept of"Double carbon" was proposed, SWOT analysis was widely used in the field of environmental protection, for example, Zhou Ping and Ma Lei used SWOT analysis to explore the possibility of our environmental protection industry developing overseas markets under the "Belt and Road" background [4].

2.1. Strengths

2.1.1. Internal performance strengths

In order to establish a performance evaluation system suitable for the company's development strategy, Ruichen uses performance evaluation as the basis for the evaluation of performance bonuses and bonus payments to institutionalize and standardize the performance evaluation. The system follows the following five principles:(1) Consistency principle: Strengthen consistency of goals through layer-by-layer decomposition of the company's overall goals. (2) Stability principle: within an assessment year, the indicators and assessment standards of organizational performance assessment shall remain relatively stable. (3) Openness principle: the assessment process shall be open and institutionalized, and the formulation and process adjustment of indicators at all levels (including weights and evaluation criteria) shall be completed by communication and discussion on both sides. (4) Objective principle: speak with facts. Any evaluation of organizational performance should have clear evaluation criteria and objective facts, and the assessment should objectively reflect the actual situation. (5) Process principle: process management of performance appraisal is carried out to ensure the authenticity of performance results. This can ensure that the performance evaluation system is fair, impartial and open and contributes to the objectivity and responsibility of organizational performance management. Sexual, motivational, and result oriented.

The performance system sets clear performance evaluation indicators as follows:(1) Company Performance Indicators: Determined by the Chairman or General Manager and the Office Management Committee based on the company's overall development strategy. (2) Department/Center Performance Indicators: Derived from the company's performance indicators breakdown, reflecting the department's specific responsibilities and contributions, as well as key performance indicators derived from departmental functions. (3) Position Performance Indicators: Stemming from departmental performance indicators, reflecting the department's performance indicators across different positions and key performance indicators derived from job responsibilities. (4) Key Work Assessment: This involves determining the key tasks that each department/centre should complete during the assessment period and their outcomes. At the end of the assessment period, superiors score the results based on the set tasks' outcomes, serving as the department/centre's key work assessment results.

According to the analysis of self-determination theory, intrinsic needs are essential factors driving behaviour [5]. The theory emphasizes three basic psychological needs: autonomy, competence, and relatedness. Competence refers to the positive self-value experience individuals gain through demonstrating successful behaviour and abilities in various activities. By clearly and openly establishing and displaying performance indicators at all levels, Ruichen helps employees fully understand their job tasks and evaluation criteria to accomplish tasks better and enhance work performance. This approach also clarifies individual values and positions, enabling more efficient work engagement. Rui Chen Environmental Protection Company has implemented a compensation incentive mechanism. The approval process involves monthly performance evaluations for frontline

staff in the production centre, while other employees are assessed on a quarterly basis. In addition to the monthly/quarterly performance evaluations, an annual performance level and coefficient are determined based on the monthly/quarterly performance evaluation results. This serves as the basis for the distribution of year-end bonuses and annual honour incentives. Departmental annual performance evaluations are divided into five levels - A/B+/B/C/D, based on the department's annual performance score. For more details on level definitions and coefficient distribution, please refer to Table 1.

Table 1. Level Definitions and Coefficient Distribution Table

Level Definitions and Coefficient Distribution Table					
Definition	Outstanding	Excellent	Good	Average	Unsatisfactory
Annual Performance Score(X)	95≤X	85≤X<95	75≤X<85	60≤X<75	X<60
Department Annual Performance Level	A	B+	B	C	D
Department Performance Level Coefficient	1.4	1.2	1	0.8	0.6

Their performance calculation method is as follows: Monthly/quarterly performance bonus calculation method: Performance bonus = Individual performance bonus base * (Department performance level coefficient * a + Individual monthly/quarterly performance score * β/100) where: Department performance percentage is a, individual performance percentage is β. The performance score coefficient is determined based on the "Level Definitions and Coefficient Distribution Table" mentioned earlier. What's more, this is the calculation method for their annual performance scores, where the calculation method for individual performance of employees in different positions includes the proportion of individual performance and departmental performance as shown in Table2 [6].

Departmental Annual Performance: Sales and Service Center & Product Center: Annual Performance Score = First Quarter Performance Score * 20% + Second Quarter Performance Score * 25% + Third Quarter Performance Score * 25% + Fourth Quarter Performance Score * 30%. Other Departments: Annual Performance Score = Sum of Departmental Quarterly Performance Scores / 4

Individual Annual Performance: Sales and Service Center & Product Center Employees: Individual Annual Performance Score = Individual First Quarter Performance Score * 20% + Individual Second Quarter Performance Score * 25% + Individual Third Quarter Performance Score * 25% + Individual Fourth Quarter Performance Score * 30%

Other Employees: Individual Annual Performance Score = Average of Individual Monthly/Quarterly Performance Scores

Table 2. Department and Individual Performance Percentage Distribution Table

Department and Individual Performance Percentage Distribution Table			
	Applicable Assessment Method	Department Performance Percentage (a)	Individual Performance Percentage (β)
Frontline Employees (specifically production center operational staff)	Monthly Evaluation	0%	100%
Frontline Position Employees and Administrative Logistics Positions			
Functional Position Employees (including but not limited to HR, Finance, IT, Procurement, non-frontline production center staff)	Quarterly Evaluation)	20%	80%
Business Position Employees (including but not limited to Sales, Product, Technology, R&D staff)	Quarterly Evaluation	30%	70%
Note: Department performance percentage (a) and individual performance percentage (β) can be adjusted according to actual circumstances (e.g., appropriate adjustments can be made in case of continuous decline in performance).			

Individuals desire to receive respect from society or a group, and rewarding employees through various honors is an important form of spiritual motivation. Rui Chen Environmental Protection uses this approach to develop performance evaluation forms and calculation formulas tailored to employee performance, quantifying and visualizing their performance for easier measurement. This ensures a fair and transparent distribution of performance bonuses and can motivate employees to improve their work performance and results. By utilizing quantitative data, performance evaluations become more transparent, with employee performance determined by data to ensure fairness. This can enhance employee acceptance of the company's system, improve the company's credibility, and retain outstanding talents [7].

Furthermore, Rui Chen Environmental Protection also evaluates departmental performance using different methods for each department. Through individualized analysis and considering the unique characteristics of product and sales departments, the company has established a comprehensive and effective performance evaluation system [8]. This approach helps foster collective consciousness among employees, enhance teamwork, and optimize internal human relationships. In addition to necessary positive feedback, during and after the performance evaluation period, assessors will engage in performance discussions with the evaluated individuals, highlighting their work highlights and areas where performance could be improved (deductions), and providing suggestions for improvement.

By providing timely feedback and guidance, Rui Chen Environmental Protection ensures that employees have a thorough understanding of their work performance and achievements, while also offering opportunities for improvement and growth. This approach allows for timely correction of mistakes and enhancement of work capabilities.

2.1.2. Technological innovation strengths

Based on the author's interview with Mr. Cheng Yuan, the secretary to the chairman of Shanghai Ruichen Environmental Protection Company, it is evident that Shanghai Ruichen Environmental Protection Technology Company possesses strong technological research and development

capabilities and innovation awareness in the field of environmental protection. The company's founder and a majority of its senior members have roots in Huawei, thus inheriting Huawei's company strategy of firmly grasping core intellectual property rights in research and development. From the early stages of entrepreneurship, the company has been committed to creating a technology-driven enterprise with the mission of achieving profitability through technology. In the realm of technological innovation, research and development investment serves as the foundation and safeguard. The company's research and development expenses have increased from 0.11 billion yuan in 2018 to 0.29 billion yuan in 2021, with an impressive average annual growth rate of 38.14%. As of the third quarter of 2022, the company's research and development investment has reached 0.21 billion yuan. Additionally, in recent years, the company's research and development expense ratio has consistently been around 7%, significantly higher than comparable companies in the industry. The substantial research and development investment has endowed Ruichen with robust innovation capabilities, driving technological advancements and product iterations, enabling the company's products to meet market demands and maintain competitiveness.

2.1.3. Product design strengths

Since its establishment, the company has placed great emphasis on product technology research and development, as well as accumulating project experience [9]. It focuses on the development and improvement of models, continuously learning and incorporating advanced model theories from both domestic and international sources, and independently developing new models. Over the years, the company has developed multiple core technologies in its main business and product-related fields, including a range of efficient air and hydraulic models. These core models and technologies have been patented, providing a solid foundation for the company's technical advantages in relevant fields. By the end of 2021, the company had developed basic models for 42 fan products and 81 pump products, obtaining a total of 73 patents. Through the development and production of these models, the company has successfully completed over 2200 units of high-efficiency centrifugal fans and over 1600 units of high-efficiency pumps, a production volume that is challenging for other companies to match. This extensive production process has enabled the company to accumulate a wealth of models and project experience, forming a high product barrier through a vast amount of customized data.

2.2. Weaknesses

2.2.1. Weak risk resistance ability

The main business of Ruichen Environmental Protection Company is the research, design, production, and sale of high-efficiency energy-saving equipment. Its products include high-efficiency centrifugal fans, high-efficiency centrifugal pumps, and other energy-saving products primarily used for energy-saving transformations of fans and pumps in industrial production lines. The products mainly target a specific group, making the business relatively single-focused. As a result, the company's risk resistance to market fluctuations is weak. It needs to continuously explore pilot projects in new areas and identify new opportunities in the market fluctuations. However, this trial-and-error approach comes with high costs, and the unstable external market environment determines the higher internal risks within the company.

2.2.2. Slow industry technological evolution

The overall industry in which Ruichen Environmental Protection operates is characterized by slow innovation. Unlike sectors such as telecommunications and artificial intelligence, industries like steel and cement in China, which are relatively traditional and belong to the mechanical sector, experience slower technological development and evolution. The technologies in the fluid mechanics field, such as pumps and fans that Ruichen Environmental Protection is involved in, have not witnessed significant breakthroughs in recent years. In today's fast-paced technological landscape, there is a risk of falling behind the market due to a lack of breakthroughs in certain areas, missing opportunities to capture market share swiftly, and even facing prohibition by new technologies [10].

2.2.3. Further deterioration in debt repayment ability

Due to the nature of energy-saving equipment, which is typically installed, commissioned, and revenue recognized after customer delivery, there may be a mismatch between production and sales for Ruichen Environmental Protection. A decrease in the production-sales ratio can significantly impact the company's debt repayment ability. From 2018 to 2020, the company's production-sales ratio decreased from 104.56% to 72.52%. Due to the lag in revenue recognition, the company's accounts receivable increased accordingly. At the end of each reporting period, the accounts receivable balance was 51.35 million yuan, 79.65 million yuan, 97.36 million yuan, and 115-million-yuan, accounting for approximately 35.59%, 40.49%, 32.63%, and 38.59% of the company's revenue, respectively, which is relatively significant. If the business and credit conditions deteriorate, there is a risk of bad debt losses, potentially adversely affecting the company's financial condition and profitability.

Furthermore, it is worth noting that Ruichen Environmental Protection currently relies on a relatively single financing channel, primarily bank loans. As a result, the company's debt-to-asset ratio has been increasing annually and slightly exceeding the average level of comparable companies. During this period, the company's debt-to-asset ratio (parent company) was 48.51%, 42.69%, 52.06%, and 57.09% [11]. The slight decrease in 2019 was mainly due to a financing round where the company introduced investors like Dongzheng Hande, supplementing its capital. As of June 2021, the company had numerous ongoing projects, resulting in significant contract liabilities from customer advances, leading to a slightly lower quick ratio and a notable increase in the debt-to-asset ratio.

2.3. Opportunities

2.3.1. Expansion of the environmental protection industry

According to statistics from the China Environmental Protection Industry Association, the national environmental protection industry's operating income was approximately 2.18 trillion yuan in 2021, representing a growth of around 11.8% compared to 2020, with a year-on-year growth rate increase of 4.5 percentage points. The operating income from environmental services was about 1.42 trillion yuan, showing a year-on-year growth of approximately 18.3%, with a year-on-year growth rate increase of 8.6 percentage points. Over the five years from 2017 to 2021, the compound annual growth rate of the environmental protection industry's operating income was 12.8%, higher than the GDP growth rate during the same period. In 2022, the operating income of the environmental protection industry reached around 2.22 trillion yuan, establishing itself as a significant force in the green economy [12].

2.3.2. Increased investment in technology

In 2021, the average research and development (R&D) expenditure of environmental protection enterprises increased by 2.8% year-on-year, with R&D expenditure accounting for 2.9% of their operating income. This percentage is higher than the proportion of R&D expenditure to operating income for national industrial enterprises above a certain scale in 2021 (1.33%). Among these enterprises, the environmental monitoring sector had the highest proportion of R&D expenditure to operating income, reaching 6.0%. The average number of patents granted per enterprise increased from 3.0 patents per enterprise in 2020 to 3.3 patents per enterprise in 2021. With high investment in technology, these enterprises are expected to achieve technological breakthroughs, enhance their technological barriers, and strengthen their risk resistance capabilities [13].

2.3.3. Expansion of market entities

In terms of the operational longevity of enterprises, in 2021, 68.2% of environmental protection industry enterprises nationwide were established within the past 10 years. Among them, 35.3% of enterprises were established within the past 5 years. This indicates that over the past decade, especially in the last 5 years, the number of market entities in China's environmental protection industry has rapidly increased, leading to an accelerated release of market vitality. Additionally,

mergers and acquisitions in the environmental protection industry have accelerated, with state-owned enterprises and private enterprises collaborating for development. The industry concentration has further increased, with central and state-owned enterprises expanding into the environmental protection market. The number of provincial-level environmental protection groups continues to rise, and the trend towards diversification of market entities in the environmental protection industry is becoming more pronounced. The number of listed environmental protection companies in China is growing rapidly [14].

2.4. Threats

2.4.1. Low industry concentration

In the current segmented field where Ruichen Environmental Protection operates, imported products are more recognized in the domestic market. Foreign brands such as the UK's Howden Group [15], Japan's Ebara Corporation, and Germany's RHEWUM Group hold advantageous positions in the domestic market. The domestic market is still dominated by small and micro-enterprises, with industry concentration levels currently at a relatively low level. Most enterprises are not yet of a scale to compete with foreign companies, leading to significant market competition pressure and weaker risk resistance capabilities. This situation makes it challenging for domestic companies to achieve healthy and sustainable development.

2.4.2. Significant pressure on receivables repayment

In terms of profitability, the asset returns capability and profit level of environmental protection enterprises remained relatively stable year-on-year, with an average return on net assets of 10.5% and an average profit margin of 9.6%. Looking at asset operational capability, the average total asset turnover ratio and accounts receivable turnover ratio for enterprises within the scope of the study are low, with values of 0.5 and 3.1, respectively. Compared to 2018, the change in total asset turnover ratio and accounts receivable turnover ratio for the same sample of enterprises in 2019 was within 0.1, indicating that the asset operational capability of environmental protection enterprises has remained stable, with significant pressure on receivables collection. In terms of debt repayment capability, the average asset-liability ratio for enterprises within the study scope is 60.6%. Compared to 2018, the asset-liability ratio for the same sample of enterprises in 2019 increased by 2 percentage points, indicating a rising trend in financial risk for environmental protection enterprises [16].

3. Conclusion

Based on the analysis of the strengths, weaknesses, opportunities, and threats facing Shanghai Ruichen Environmental Protection Company's strategic development, combined with a SWOT matrix, the following are four strategic directions for the development of Ruichen Environmental Protection: S-O, W-O, S-T, W-T. The content of the S-O strategy is to leverage technological advantages and innovation awareness, increase research and development investment, drive continuous product upgrades and innovation to meet market demands and maintain competitiveness; actively utilize government policy support to develop into a leading enterprise; expand market share, strengthen marketing and brand building, enhance market visibility and influence to increase market share and explore new business areas; develop corporate culture to build internal strengths further. The core of the W-O strategy is to seize opportunities and address weaknesses. Shanghai Ruichen Environmental Protection Company needs to enhance its industry chain and promote production standardization. It also needs to increase technology investment to build a technology-driven enterprise and secure core intellectual property rights. Additionally, the company should be willing to innovate and explore new opportunities to capture new markets. The S-T strategy mainly involves leveraging internal strengths to address challenges. Shanghai Ruichen Environmental Protection currently holds over 60% market share in the niche field of cement energy-saving transformations. Additionally, the company is the sole provider of solutions for high-efficiency energy-saving fans in the steel industry. It should

continue to solidify its market position, maintain core technology mastery, elevate its technical standards to widen the gap with small and medium-sized enterprises. By adopting a comprehensive and customized approach, the overall project threshold is relatively high. However, this approach may not be suitable for large state-owned enterprises or foreign companies with organizational structures and business models that may not easily adapt to this practice.The content of the W-T strategy is to integrate internal resources to address challenges. Efforts should be made to develop new products and overcome product singularity. Streamlining internal development projects to reduce the asset-liability ratio is also crucial.

Shanghai Ruichen Environmental Protection Company should base its strategy on the S-O strategy, with the W-O and S-T strategies as core strategies, while also considering the W-T strategy. By overcoming weaknesses, leveraging strengths, seizing opportunities, and addressing challenges, the company can effectively navigate its strategic direction.

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