Impacts of Germany's Energy Crisis on Chinese Technology Enterprises and Strategic Responses

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ABSTRACT

Under the framework of the Belt and Road Initiative, closer economic and technological exchanges between China and Germany have left Chinese enterprises more exposed to changes in regional energy markets. This paper mainly discusses how the ongoing energy dilemma in Germany—marked by insufficient fossil fuel supply, unstable energy prices, and rising geopolitical risks—affects Chinese technology firms operating in the German market. It first analyzes the multi-factor causes, socioeconomic impacts, and core features of this energy crisis, and summarizes three major coping paths: developing renewable energy, raising energy efficiency, and diversifying energy supply structures. Then, SWOT analysis is employed to systematically evaluate the internal advantages and disadvantages as well as external opportunities and challenges faced by Chinese enterprises. Taking Xiaomi Corporation as a typical case, this paper inspects its core competitiveness, existing shortcomings, potential development space, and external risks. The final conclusion shows that under the energy crisis, Chinese technology enterprises must strengthen their operational stability by accelerating R&D in low-energy-consumption technologies, complying with European regulatory rules, and giving full play to ecosystem synergy, so as to reduce the cost pressure caused by energy fluctuations.

Keywords: *Germany's energy crisis, Chinese technology enterprises, SWOT analysis, Xiaomi, Strategic responses, Energy governance.*

1. INTRODUCTION

Energy underpins human society, and its interplay with socioeconomic systems constitutes the core "energy governance dilemma". In the digital age, energy demand is closely integrated with digital infrastructure construction, validated by Fraunhofer ISE's smart grid simulations. Relevant research on alternative energy storage materials confirms fossil fuels' historical dominance. A DIW Berlin meta-analysis indicates Power-to-X efficiency has grown by 38% since 2019. Meanwhile, RWI Essen's case study of 12 major firms verifies the persistent "carbon lock-in" effect in industrial clusters. Germany's energy transition is structurally unbalanced. In 2023, North Sea offshore wind installed capacity reached a record 4.1 GW, yet eastern Germany's solar utilization rate is only 78% with 22% waste. Its electricity price index stands at 149.7, 18.3% higher than the EU average, due to complicated market mechanisms.

2. BASIC DEFINITION

This chapter will explain the definitions of the relevant basic concepts.

2.1 Energy Crisis

Section 1.2 discusses the definition, impacts, and related information regarding the energy crisis.

2.1.1 Definition

Residents, industries, commercial institutions, and transportation departments all have huge energy demand, which is currently mainly met by coal, natural gas, oil and other fossil fuels. These fuels are non-renewable and differ fundamentally from clean energy. When existing energy reserves cannot meet the normal needs of social production and life, an energy crisis will occur.

From another perspective, the energy crisis can be understood as a state of long-term or sudden shortage of energy supply. This situation is particularly harmful to countries with large-scale manufacturing industries and high energy consumption, as well as countries that lack domestic energy resources and rely heavily on imports. [1]

2.1.2 Meaning

The shortage of energy supply is rooted in the global excessive dependence on non-renewable resources. This model not only easily triggers geopolitical frictions but also threatens the long-term safety and stability of the global energy system.

The depletion of non-renewable energy is the most direct cause of the energy crisis. With the continuous consumption of easily exploitable resources, the difficulty and cost of energy extraction are increasing year by year. At the same time, the burning of fossil fuels has become one of the main causes of global climate change, which has prompted the whole world to seek cleaner and more sustainable energy alternatives.

Insufficient investment in renewable energy technology research and development has further aggravated the energy dilemma. Although the demand for renewable energy has been rising in recent years, the proportion of renewable energy power generation in the total global power generation is still relatively low, making it difficult to replace fossil fuels on a large scale.

The growth of global energy demand is driven by many factors, including population growth, the industrialization process of developing countries, technological progress, and the improvement of people's living standards. The popularization of vehicles and household appliances has directly driven the rise in energy consumption. Since non-renewable energy is limited and will produce pollutants and greenhouse gases when used, the current growth rate of energy demand is obviously unsustainable.

Geopolitical conflicts are also important factors leading to the energy crisis. Turmoil in energy-rich regions such as the Middle East will directly interfere with global energy production and transportation routes. In addition, political decisions and trade restrictions formulated by some countries will restrict the normal circulation of energy resources, thus causing fluctuations in energy prices and supply. Countries with a high degree of external energy dependence are more vulnerable to such shocks. [2]

2.1.3 Impact

Relevant research shows that the energy crisis has caused obvious operational difficulties for many enterprises. The rapid rise in energy and raw material prices has brought heavy financial burdens to enterprises, especially steel, building materials, glass, paper, chemical industry and other high-energy-consuming industries, which have been hit harder. Many enterprises have chosen to suspend new investment plans due to cost pressure.

According to public statistics from relevant international organizations, a large number of people around the world are facing the problem of "energy poverty" every year. At the same time, Germany's carbon dioxide emissions have shown an upward trend. Affected by the instability of wind and solar power generation, Germany has to restart heavy oil and coal-fired power plants in winter and other periods of tight power supply, which directly leads to the increase of carbon emissions.

2.2 Strategy for Tackling the Energy Crisis

In response to the current energy crisis, a variety of practical measures must be taken to reduce the dependence on non-renewable energy and alleviate the corresponding economic and environmental pressures. The following schemes help alleviate the short-term impact of the crisis and lay a foundation for the construction of a long-term sustainable economic system.

Giving priority to developing renewable energy is one of the core strategies. This requires increasing support for technology research and development, and promoting the large-scale application of solar, wind, water, biomass and other clean energy. At the same time, perfect policies and regulatory systems are needed to help renewable energy smoothly integrate into the existing power grid system.

The development of renewable energy can not only reduce the dependence on fossil fuels and slow down climate change but also drive employment growth and economic development in the new energy sector.

Improving energy efficiency is another essential measure. This means promoting energy-saving technologies and practices in all fields, such as building green buildings, developing public transport, and optimizing energy management in industrial production, so as to reduce unnecessary energy consumption.

Reducing energy demand can directly lower the production cost of enterprises and enhance their market competitiveness. At the same time, improving energy efficiency is also conducive to improving the efficiency of resource utilization.

Diversifying the energy structure is crucial to reducing the risk of supply interruption. Countries should actively develop and promote the application technologies of biogas, geothermal energy, tidal energy and other new energy sources to make the energy supply system more diversified. In addition, the popularization of energy storage equipment is also crucial to maintaining the stability of energy supply. Diversified energy supply helps reduce import dependence and enhance national energy security. [3]

3. SWOT ANALYSIS

This chapter will discuss the definition, scope of application, and methodology of SWOT analysis.

3.1 Definition

SWOT is composed of the initials of Strengths, Weaknesses, Opportunities and Threats. The core purpose of SWOT analysis is to sort out internal and external factors, so as to find practical strategies that can give full play to advantages, seize opportunities, make up for shortcomings, and avoid risks. Enterprises often use this tool to clarify their market positioning and formulate development strategies, which can be applied to the whole enterprise, a certain branch, or a specific project. It is also widely used in process optimization and management improvement.

3.2 How It Works

The basic goal of SWOT analysis is to comprehensively grasp the current development situation of enterprises or organizations, including their position in the market and their advantages relative to competitors. By sorting out and analyzing information, institutions can deeply understand their operational status and provide a reliable basis for strategic decision-making and action arrangements.

SWOT analysis can help enterprises identify key success factors and guide strategic management. It is also often used in the formulation of start-up business plans. In addition, the four dimensions of SWOT can provide clear guidance for marketing and customer service management.

By analyzing internal conditions and external environment, SWOT analysis helps to put forward feasible development paths to achieve long-term stable development, so that enterprises can cope with market changes, intensified competition and higher consumer demand. It can not only show the competitive advantages and potential growth space of enterprises but also help managers find internal deficiencies and external risks in time and respond quickly.

In addition to enterprise management, SWOT analysis can also be used in personal career planning and self-assessment. By analyzing personal strengths, weaknesses, opportunities and challenges, individuals can clarify their own abilities and characteristics and make more reasonable career choices. [4]

3.3 Strategies

In practical application, SWOT analysis combines internal and external factors to form targeted strategies:

Use internal advantages to match external opportunities and explore ways to expand advantages to seize development opportunities. Give play to internal advantages to mitigate external threats and build a risk-resistance barrier for enterprises. Transform internal weaknesses into growth points through strategic adjustment and turn disadvantages into favorable conditions. Identify weaknesses that are easily affected by external risks and carry out targeted improvement in advance.

The analysis first starts from the internal aspects. Enterprises can analyze operational data, carry out employee interviews and surveys, and comb production processes to clarify their own characteristics. Common advantages include high production efficiency, excellent product quality, strong brand influence, etc.; common weaknesses include poor internal information transmission, insufficient capital and talent reserves, etc.

The external analysis mainly focuses on the industry development trend, competitor dynamics, political, economic and social environment changes. The emergence of new technologies often means development opportunities, while intensified market competition and stricter legal regulations may pose potential threats.

Enterprises should formulate practical strategies based on SWOT results: give full play to advantages to seize opportunities, and improve weaknesses to reduce the impact of risks. It should be emphasized that SWOT analysis is not a one-time tool. With the changes in internal and external conditions, the analysis content needs to be updated regularly to maintain the effectiveness of the strategy.

4. XIAOMI AS A CASE STUDY

Xiaomi Corporation was founded in Beijing in 2010 by Lei Jun. In just more than ten years, it has grown into one of the most innovative enterprises in the global science and technology industry. At the beginning, Xiaomi was committed to developing the customized Android system MIUI. In 2011, it entered the smartphone market with an innovative business model: selling high-performance mobile phones at close to cost price through online channels, with extremely low hardware profit margins. This "internet-based model" maintains user stickiness through continuous system updates and community interaction, helping Xiaomi quickly gain a firm foothold in the Chinese market.

4.1 About Xiaomi

According to the research Chinas Tech Giants by Kamp & Müller, Xiaomi began to strategically expand into the European market in 2017 and officially entered Germany in 2018. The company seized the market gap and provided consumers pursuing cost-performance with high-performance products with flagship configurations (such as 108-megapixel cameras) at medium prices. At the same time, Xiaomi has invested in more than 300 IoT-related projects, building an ecosystem covering more than 1,000 connected products such as air purifiers and electric scooters.

However, Xiaomis patent layout has triggered discussions in German academic circles. Different from Huawei, Xiaomi's patent portfolio construction started late and was once suspended from the Indian market in 2014. Economist Dr. Tobias Arndt pointed out that Xiaomi's "dual strategy" of taking into account the low-end and high-end markets, coupled with the strict data protection requirements of European regulators, has become a major challenge for its overseas operation.

Xiaomi was listed in 2018, with a revenue of 42.3 billion US dollars in 2022. In recent years, it has officially entered the field of electric vehicles and launched the SU7 model, which is regarded as a typical case of Chinese enterprises transforming from followers to technology leaders. Prof. Neumann, a sinologist in Berlin, called this process "an innovation leap driven by user-centered disruptive models". [5]

4.2 Analysis of Xiaomi Using a SWOT Matrix

This development can be described as transformative, as it is characterised by the company's IPO, its international expansion and its entry into the electric vehicle market. It is largely based on core strategic competencies that position Xiaomi as a disruptive player in the technology market. In particular, the company's hybrid business model, which symbiotically links hardware, software and ecosystem services, is of crucial importance in this context.

The following points can be identified as the company's key strengths: The company's success is attributable to its innovative "internet business model", which sells high-performance devices at comparatively low near-BOM costs via online channels and generates profits primarily through software and IoT services. This strategy enabled rapid market penetration, particularly in price-sensitive segments. The IoT platform, which boasts a considerable 861 million connected devices, forms a unique ecosystem that creates synergies between smartphones, household appliances and, more recently, electric cars. The MIUI software, equipped with on-device privacy protection and AI optimisations, helps to strengthen customer loyalty.

Weaknesses include: The historically weak patent strategy must be regarded as problematic. Unlike Huawei, Xiaomi did not have a mature portfolio for a long time, which led to temporary market exclusions in 2014. Furthermore, the "dual-strategy" dilemma weighs on profitability: the balancing act between the low-cost segment and the premium brands requires high R&D investment,

which is difficult to recoup given narrow hardware margins.

Furthermore, data protection concerns raised by European regulatory authorities must be taken into account. Despite on-device processing in MIUI 14, there are reservations regarding Chinese technology companies, particularly concerning the use of sensitive data for AI (Artificial Intelligence) applications.

Opportunities: Xiaomi's expansion into the premium and automotive sectors is a strategic move that positions the company as a holistic ecosystem provider within the "Human × Car × Home" concept. The company has a monthly user base of 685.8 million and operates in over 100 countries. This enables it to tap into cross-selling potential. The global expansion of 5G and AIoT infrastructure is also driving demand for connected devices. Strategic alliances, such as the one with NXP for the implementation of secure elements, help to strengthen the company's technological credibility in security-related matters.

Risks: Increased competitive pressure is evident in the premium segment. Established companies such as Apple and Samsung generate a significant portion of their revenue by strengthening their brand awareness and utilising patents. Despite existing trade restrictions in China, Huawei is able to maintain its market share.

There are political risks that could potentially disrupt semiconductor supply chains. One example is geopolitical tensions, which manifest themselves in US export controls. Furthermore, there has been an increase in regulatory restrictions within the EU, as evidenced by the AI Act, which imposes transparency requirements on algorithms. [6]

5. CONCLUSION

This paper takes Xiaomi as an example to comprehensively analyze the operational situation of Chinese technology enterprises in Germany under the energy crisis, focusing on the impact of energy shortage on Xiaomi and the coping strategies it can adopt to maintain stable development. The energy crisis in Germany, characterized by fossil fuel supply shortage and price volatility, forces Chinese technology enterprises represented by Xiaomi to re-examine and improve their operational resilience. Xiaomi's success comes from its business model that integrates cost-effectiveness, ecological integration and community-oriented software development. However, the huge changes in the global energy market—such as the rise in production costs and logistics delays caused by energy price fluctuations—require it to further upgrade its core capabilities. Chinese enterprises should speed up R&D investment in energy-intensive core components such as chips to reduce external dependence. At the same time, they need to adapt to European regulations such as the EU AI Act, adopt technologies such as offline data processing to reduce compliance risks. By combining cost-effective pricing, high-end technological innovation and the ecological synergy of smart devices + electric vehicles, Chinese technology enterprises can improve operational efficiency and consolidate their market position in Europe.

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