Editorial Board

Editor-in-Chief

Editorial Board Members

KNOWLEDGE RESERVOIR
知识储备出版社 PUBLISHING PTY LTD

Contents

ORIGINAL RESEARCH ARTICLE

KNOWLEDGE RESERVOIR PUBLISHING PTY LTD

https://akrpp.com/

E-mail: KnowledgeReservoir@outlook.com

Address: Level 10, 50 Clarence Street Sydney, NSW 2000.

Journal of Contemporary Economic Perspectives Vol 1 Issue 1 2026

ORIGINAL RESEARCH ARTICLE

Open Access

Research on the Optimization Path of Economic Structure Based on Statistical Analysis

Yu-Ting Zhang

Public Resource Trading Center of Xiangxi Tujia and Miao Autonomous Prefecture, Yongshun, Hunan, 416000, China

Correspondence to: Yu-Ting Zhang, Public Resource Trading Center of Xiangxi Tujia and Miao Autonomous Prefecture, Yongshun, Hunan, 416000, China

Abstract: With the deepening of economic globalization, the optimization of economic structure has become a core subject for national development and the enhancement of competitiveness. However, a clear path for the quantitative analysis and optimization of economic structure has yet to be established. This study conducts an in-depth exploration of the optimization paths of economic structure based on statistical analysis. By collecting macroeconomic data from various countries and regions over the years, we perform descriptive statistical analysis, exploratory data analysis, and deterministic and stochastic modeling to derive the patterns of change and influencing factors of economic structures. The results indicate that factors such as education investment, technological progress, industrial upgrading, and the effectiveness of environmental policy implementation play a significant role in promoting the optimization of economic structures. Based on these findings, several potential optimization paths are proposed, including increasing investment in education to cultivate technical talent, utilizing technological progress to advance industrial upgrading, and guiding the greening of economic structures through environmental policies. This study provides a reference framework for international policymakers, aids in guiding economic structural optimization efforts, and possesses significant theoretical guidance and practical application value.

Keywords: Statistical Analysis; Economic Structure Optimization; Influencing Factors

Introduction

The further development of economic globalization has led to increasingly close ties and frequent interactions between national economies, making the optimization of economic structure an indispensable and critical issue. Determining effective ways to optimize economic structure and enhance national competitiveness has become a primary concern for policymakers worldwide. However, regarding how to quantitatively analyze and operate the optimization path of economic structure, there are currently no clear research results in either the theoretical or practical spheres. This study aims to conduct in-depth research on this issue through the application of statistical analysis, striving to find a clear path for the optimization of economic structure. To fully understand the patterns of change and influencing factors, macroeconomic data from various countries and regions over the years were collected and deeply mined using

descriptive statistical analysis, exploratory data analysis, and deterministic and stochastic modeling. The study finds that factors such as education investment, technological progress, industrial upgrading, and environmental policies have a significant impact on structural optimization. Based on this, potential paths are proposed to achieve sustained and stable economic development.

1. Economic Structural Issues under the Background of Globalization

1.1 Overview of Economic Development under Globalization

Globalization, accompanied by economic and technological progress, has provided new opportunities for global economic development [1]. Trade barriers between countries have gradually diminished, allowing capital, resources, and labor to flow more freely on a global scale, promoting global integration. The rise of multinational corporations has accelerated the dissemination of technology and knowledge, improving production efficiency. However, globalization has also brought about imbalances in economic structure. Many countries face challenges such as the shrinking of traditional domestic industries and increased employment pressure. Optimizing economic structure to adapt to the globalization process has thus become an urgent task, requiring countries to formulate structural adjustment strategies based on their unique economic characteristics to achieve sustainable development.

1.2 The Importance of Economic Structure

The importance of economic structure lies in its critical impact on a nation's macroeconomic performance and long-term competitiveness. A rational economic structure not only improves resource allocation efficiency but also promotes sustainable development and drives technological innovation. Structural rationalization is a vital driver of growth; by optimizing and upgrading industrial chains, countries can effectively respond to global market changes and uncertainty. The quality of the economic structure directly affects employment rates, income distribution, and social stability. As globalization accelerates, international requirements for resource utilization and environmental protection have become more stringent, prompting economic structures to shift toward greener and more sustainable directions.

1.3 Challenges and Opportunities of Economic Structure Optimization

In the context of globalization, optimization faces challenges such as path dependency in traditional industrial chains, obstacles to the development of emerging industries, and intensified international competition. Conversely, globalization facilitates the cross-border flow of technology and capital, providing opportunities for optimization. Technological progress and the wide application of information technology drive emerging industries, while green economy concepts guide industrial transformation. Countries can achieve high-quality economic development through policy innovation and institutional reforms [2].

2. Statistical Methods for Economic Data and Their Applications

2.1 Acquisition and Processing of Micro and Macroeconomic Data

The acquisition and processing of micro and macroeconomic data are the foundations of structural analysis. Microeconomic data, derived from enterprises, individuals, and market behaviors, are obtained through surveys, financial reports, and transaction records, reflecting the operation of individual economic units. Macroeconomic data, such as GDP, employment rates, and inflation, are typically provided by national statistical bureaus and international organizations to reveal systemic characteristics. During processing, data must be cleaned and standardized to eliminate noise and outliers, ensuring reliability for descriptive and exploratory analysis.

2.2 Application of Descriptive Statistics and Exploratory Data Analysis

Descriptive statistics summarize basic features of macroeconomic data through measures such as mean, median, and variance, making complex data intuitive. Exploratory data analysis (EDA) utilizes visualization techniques (e.g., scatter plots, histograms) to delve into latent patterns and anomalies. These methods reveal hidden relationships and trends within the economic structure, identifying key factors for structural optimization and providing a reliable basis for subsequent modeling and policy recommendations [3].

2.3 Application of Deterministic and Stochastic Models in Economics

Deterministic and stochastic models are vital analytical

tools. In economics, deterministic models are used to describe stable relationships between variables, such as resource allocation in input-output models. However, given the complexity and uncertainty of economic environments, stochastic models are often more applicable. These models incorporate random perturbations to reflect systemic uncertainty—common examples include stochastic interest rate and volatility models—helping researchers understand the interaction between long-term trends and short-term fluctuations.

3. Analysis of Factors Influencing Economic Structure Optimization

3.1 Impact of Education Investment on Economic Structure

Education investment is widely regarded as a critical factor. High levels of investment enhance labor skills and innovation capabilities, promoting the formation of human capital. Specifically, it enables workers to adapt to the requirements of industrial upgrading and drives the development of new technologies, thereby promoting structural diversification. Research indicates a significant positive correlation between education, technological progress, and industrial collaboration. Rationally allocating educational resources has become a core policy direction for enhancing global competitiveness.

3.2 Impact of Technological Progress on Economic Structure

Technological progress drives productivity and promotes the transformation of traditional industries into emerging ones [4]. By improving efficiency and reducing costs, it increases the proportion of high-tech industries, guiding resource reallocation. Innovation not only creates new market demand but also enhances international competitiveness and economic openness. From a policy perspective, encouraging R&D investment and accelerating the transformation of technical achievements are essential for shaping an optimized economic structure.

3.3 Impact of Industrial Upgrading on Economic Structure

Industrial upgrading involves improving technical levels and adjusting industrial compositions to achieve effective resource allocation. The introduction of high-value-added industries improves the efficiency and competitiveness of the industrial chain. This process is typically accompanied by shifts in employment structures and higher skill requirements, strengthening the economy's resilience against risks and its capacity for sustainable development [5].

4. Potential Paths for Economic Structure Optimization

4.1 Increasing Education Investment to Cultivate Technical Talent

Focusing on vocational and higher education—particularly technical courses aligned with industry demand—can effectively increase the supply of high-skilled talent. This facilitates the shift toward high-value-added and high-tech industrial structures. Policy support should focus on educational infrastructure, teacher quality, and school-enterprise cooperation to ensure that educational outcomes translate rapidly into productivity.

4.2 Utilizing Technological Progress to Advance Industrial Upgrading

Enterprises should be encouraged to increase R&D investment to establish technology-oriented development models. Economic entities should optimize the innovation environment, strengthen intellectual property protection, and establish robust technology transfer mechanisms. Introducing smart manufacturing into the industrial chain will enhance competitiveness and foster regional innovation clusters.

4.3 Guiding the Greening of Economic Structures through Environmental Policies

As a tool for greening the economic structure, environmental policies—through regulatory standards and green taxation—promote resource efficiency and low-carbon development. Establishing green financial mechanisms to provide funding for environmental projects can accelerate the transition toward sustainability and ecological balance.

5. Application and Significance of Optimization Paths Based on Statistical Analysis

5.1 Overview of the Application of Statistical-Based Optimization Paths

Systematic statistical analysis reveals inherent laws and key influencing factors in economic development. These results provide a scientific basis for policymakers to optimize sectors such as education, technology, and

environment. Tailored optimization paths are highly actionable for improving resource allocation efficiency and forecasting long-term trends in the context of global competition.

5.2 The Role of Optimization in National Development and Competitiveness

Rational economic structures effectively allocate resources and improve productivity. By enhancing human capital and driving technological progress, countries can achieve quality-based economic transformation. Environmental policies not only protect ecosystems but also promote green growth, enhancing a nation's international image and soft power. Together, these measures create a synergistic effect that lays a solid foundation for long-term development.

5.3 Value and Application Prospects of Statistical Analysis in Policymaking

Statistical analysis provides data-driven support, allowing for the precise quantification of economic phenomena. It helps identify critical trends and evaluate policy implementation effects, increasing transparency and scientific rigor. As data analysis technology advances, its application prospects in policymaking will broaden, facilitating continuous structural optimization.

Conclusion

Through deep statistical analysis and modeling, this study identifies education investment, technological progress, industrial upgrading, and environmental policy execution as key factors influencing economic structure optimization. These findings provide a reference for policymakers and improve theoretical models. However, the translation of theory into actual strategy and the handling of other potential variables remain areas for further exploration.

References

[1] Yan, R. H., & Peng, X. X. (2021). Statistical analysis framework and common statistical methods in medical research. Chinese Journal of Health Management, 15(03), 308-312.

[2] Tu, Y. Y., Zhang, H. B., & Li, J. (2021). Statistical analysis of influencing factors of economic growth based on regression models. Journal of Suzhou University, 36(03), 70-73.

[3] Jiang, Y. K. (2023). The impact of e-commerce on rural economic structural transformation and statistical analysis. China E-Commerce, (14), 14-16.

[4] Zhou, H. H., & Sun, X. Y. (2020). Statistical analysis of fire based on industrial structure. Guangdong Chemical Industry, 47(21), 78-80.

[5] Wang, F. (2021). Optimization of aircraft maintenance programs based on statistical analysis methods. Equipment Maintenance Technology, (03), 0315-0315.

ORIGINAL RESEARCH ARTICLE

Open Access

Innovative Strategies for the Economic Operation and Management of the New Energy Industry

Zi-Hua Jia

Bureau of Commerce of Kangbashi District, Ordos, Inner Mongolia, 017010, China

Correspondence to: Zi-Hua Jia, Bureau of Commerce of Kangbashi District, Ordos, Inner Mongolia, 017010, China

Abstract: The new energy industry is pivotal to the global economic transition, yet it faces significant challenges in economic operation and management. At the technical level, difficulties persist in the transformation of innovation achievements, reliance on imported core technologies, and incomplete standard systems. Regarding markets and policies, there are imbalances in mechanisms and insufficient execution. In the industrial chain and financial sectors, synergy is weak and support is inadequate. To address these issues, this paper proposes six innovative strategies, including technology-driven management, market mechanism optimization, and policy coordination. By constructing intelligent operation and maintenance systems and improving policy synergy, these measures aim to promote high-quality industrial development and enhance international competitiveness and sustainability.

Keywords: New Energy Industry; Economic Operation and Management; Challenges; Innovative Strategies

Introduction

As the global energy structure accelerates its transition toward decarbonization, the new energy industry has emerged as a new engine for economic growth. However, its economic operation and management encounter numerous bottlenecks that severely restrict industrial progress. Technological innovations struggle to transform into commercial achievements efficiently, market mechanisms and policy environments fail to adapt to industrial needs, and evident weaknesses exist in industrial chain synergy and financial support systems. Deeply analyzing these issues and exploring innovative management strategies is of significant practical importance for breaking development deadlocks, enhancing industrial resilience, and achieving sustainable development to secure a dominant position in global competition.

1. Challenges in the Economic Operation and Management of the New Energy Industry

1.1 Disconnection Between Technological Innovation and Commercial Application

Technological innovation is the core driver of the new energy industry, yet a clear gap exists between R&D and commercialization. First, despite massive investments, the industrialization of achievements faces low transformation efficiency. Key technical links remain dependent on foreign countries, and the lack of independent R&D for core materials and equipment limits autonomous development. Second,

commercial application costs remain prohibitive. For instance, energy storage technology—the key to New Energy Vehicles (NEVs)—accounts for a large proportion of total investment, making NEV lifecycle costs less competitive than traditional internal combustion vehicles. Furthermore, inconsistent international technical standards increase the difficulty for enterprises to expand into global markets.

1.2 Dynamic Imbalance Between Market Mechanisms and Policy Environments

In the NEV industry, price mechanisms for battery costs and energy replenishment do not fully reflect resource scarcity or environmental externalities. Terminal prices fail to demonstrate lifecycle cost advantages, and the pricing mechanism for battery cascading utilization and recycling is underdeveloped. Additionally, the ancillary service market lacks cost measurement and compensation standards for services like Vehicle-to-Grid (V2G) interaction. Regarding the policy environment, adjustments in subsidies have affected profit expectations, while regional differences in local government execution weaken policy effectiveness.

1.3 Weak Links in Industrial Chain Synergy and Financial Support

The new energy industrial chain—spanning raw material supply, equipment manufacturing, and operations—exhibits weak synergy [1]. Dependence on imported raw materials threatens supply chain stability. Furthermore, the financial support system is inadequate for projects characterized by large investments and long payback periods. Financing remains dominated by traditional green credit, with insufficient application of innovative tools like carbon emission rights trading. The absence of a robust risk-sharing mechanism further heightens investment risks.

2. Innovative Strategies for Economic Operation and Management

2.1 Technology-Driven Management Innovation

Construction of Intelligent Operation and Maintenance (O&M) Systems: Core intelligent technologies should be used to build O&M systems covering both traditional equipment and NEVs. By installing sensors and using the Internet of Things (IoT), real-time data on batteries and motors can be transmitted to cloud platforms for big data analysis and fault prediction.

Establishment of Energy Internet Platforms: Integration of distributed charging piles, swapping stations, and vehicle energy storage allows for bidirectional energy flow and optimized scheduling. Blockchain technology can be introduced to solve trust and settlement issues in power transactions.

Innovation in R&D Collaborative Mechanisms: Promoting the deep integration of industry, academia, and research is essential. Governments should set up special funds for joint breakthroughs in "three-machine" systems (motor, electronic control, and generator). Leveraging the successful experiences of companies like Tesla (cloud algorithms) and BYD (integrated systems) can enhance product competitiveness [2].

2.2 Market Mechanism-Based Management Innovation

Optimization of the NEV market structure is required, including the integration of sales and battery trading markets. Market mechanisms should be refined to clarify responsibilities in battery recycling and cascading utilization. Furthermore, demand-side management should be strengthened through differentiated electricity pricing (time-of-use and peak pricing) to guide users to charge during off-peak hours. Finally, integrating carbon markets with Green Electricity Certificate (GEC) trading will enhance the realization of the environmental value of new energy.

2.3 Policy-Coordinated Management Innovation

Planning Guidance and Dynamic Adjustment: Policies such as "NEVs going to the countryside" and purchase tax exemptions should be integrated into long-term development plans. A dynamic adjustment mechanism is needed to align with new technological directions and regional consumption potential.

Improvement of Supervision Systems: A full-lifecycle supervision platform should be established to integrate information from production to scrapping, ensuring precise policy implementation and quality safety in key areas like autonomous driving.

Optimization of Policy Synergy Mechanisms [3]: Strengthen the linkage between fiscal subsidies, tax incentives, and financial support to eliminate execution barriers and stimulate consumption vitality.

2.4 Industrial Chain Synergy Management Innovation

To enhance supply chain resilience, a localized substitution plan for key materials should be

implemented to break technical bottlenecks. Establishing a strategic reserve of raw materials like lithium, cobalt, and nickel is crucial for managing price volatility. Furthermore, industrial clusters should be cultivated to leverage the agglomeration effect, supported by digital supply chains that use IoT for real-time sharing and traceability.

2.5 Finance-Innovative Management Innovation

Innovation in green financial tools is required, such as promoting NEV Real Estate Investment Trusts (REITs) to securitize infrastructure assets. Financial institutions should be encouraged to issue green bonds specifically for R&D and charging infrastructure. Additionally, a risk-hedging mechanism—including insurance products for battery fires or autonomous driving accidents and the development of related futures varieties—will reduce investment risks.

2.6 International Cooperation-Based Management Innovation

Internationalization of Technical Standards: China should actively participate in the International Organization for Standardization (ISO) to lead the formulation of core standards for battery safety and intelligent connectivity [4].

Global Layout of the Industrial Chain: Enterprises should be encouraged to diversify overseas investments to mitigate policy risks in single regions and bypass trade barriers through joint ventures.

Response to Green Trade Rules: Collaboration with other major new energy nations is needed to advocate for fair trade rules and unify carbon footprint accounting to overcome non-tariff barriers.

Conclusion

Innovative strategies in the economic operation and management of the new energy industry are key to overcoming current development dilemmas. Through multi-dimensional measures such as technological innovation, market optimization, and policy coordination, the industry can address its pain points and move toward high-quality development. Future efforts should continue to deepen these strategies to adapt to the complex global market and secure a competitive advantage.

References

[1] Lai, L., Zhang, J. X., Sun, Y., et al. (2022). Research on Key Points of Competitiveness and Innovative Development of China's New Energy Industry under the "Dual Carbon" Background. Modern Management Science, (3), 51-57.

[2] Liu, Z., Huang, N., Pan, Y. X., & Zhu, Y. Q. (2024). Research on Strategy Selection of Innovation Participants in New Energy Industry under Universal Innovation Vouchers. Science and Technology Management Research, 44(24), 38-46.

[3] Wang, D. D., Le, W., Yang, Y. W., et al. (2024). Evolution of Technological Innovation Network of China's NEV Industry from the Perspective of Embedded Risk. Chinese Journal of Management Science, 32(11), 312-324.

[4] Li, Q., & Zhao, Y. Y. (2025). Analysis of the Mechanism of Government Subsidies on Innovation of New Energy Enterprises from the Perspective of Industrial Chain. Science and Technology Management Research, 45(3), 160-166.

ORIGINAL RESEARCH ARTICLE

Open Access

Research on the Impact of Environmental Regulation on Corporate Green Technology Innovation from the Perspective of Digital Economy

Cao Xia

Zhongshing Marine Equipment (Zhejiang) Co., Ltd., Changsha Branch 1, Changsha, Hunan, 410005, China

Correspondence to: Cao Xia, Zhongshing Marine Equipment (Zhejiang) Co., Ltd., Changsha Branch 1, Changsha, Hunan, 410005, China

Abstract: This paper explores the influence mechanism of environmental regulation on corporate green technology innovation under the perspective of the digital economy. By analyzing the connotation of the digital economy and its empowering role in environmental regulation, the article reveals the paths through which environmental regulation affects corporate green technology innovation via the cost effect, innovation compensation effect, and market orientation effect. Combined with the current status of the digital economy, environmental regulation, and corporate green technology innovation, practical paths such as improving the environmental regulation policy system, accelerating corporate digital transformation, and fostering a green innovation ecosystem are proposed. The case study section demonstrates the successful experience of a traditional chemical enterprise achieving green technology innovation and transformation with the help of the digital economy and environmental regulation.

Keywords: Digital Economy; Environmental Regulation; Corporate Green Technology Innovation; Influence Mechanism

Introduction

With the vigorous development of the digital economy, the relationship between environmental regulation and corporate green technology innovation has become a research hotspot. The digital economy, with its characteristics of high efficiency and precision, provides new means for environmental regulation, while environmental regulation exerts a profound impact on corporate green technology innovation. This paper aims to explore how environmental regulation affects corporate green technology innovation from the perspective of the digital economy, intending to provide theoretical support and practical guidance for the green transformation of enterprises.

1. The Connotation of the Digital Economy

The digital economy is a new economic form that takes digitized knowledge and information as key production factors, digital technology innovation as the core driving force, and modern information networks as important carriers. Through the deep integration of digital technology and the real economy, it continuously

improves the digitalization and intelligence levels of traditional industries, accelerating the reconstruction of economic development and government governance models. From the perspective of production factors, data has become a core force driving economic growth, much like traditional factors such as land, labor, and capital. Through collection, analysis, and utilization, data enables precise insights into market demand, optimization of production processes, and enhancement of management efficiency, creating new competitive advantages for enterprises. Digital technology is the core engine, encompassing frontier technologies like big data, cloud computing, artificial intelligence (AI), blockchain, and the Internet of Things (IoT). Modern information infrastructure, such as 5G and fiber optic broadband, breaks spatial and temporal constraints, making real-time information transmission and efficient resource allocation possible. The digital economy is reshaping the economic landscape in an all-around way [1].

2. Influence Mechanism of Environmental Regulation on Corporate Green Technology Innovation from the Perspective of Digital Economy

2.1 The Empowering Role of the Digital Economy in Environmental Regulation

The digital economy provides more efficient and precise implementation means for environmental regulation. In environmental monitoring, IoT and big data enable real-time and accurate monitoring of environmental quality and corporate pollutant emissions. In terms of environmental supervision and enforcement, digital technologies improve efficiency and accuracy. Big data analysis can identify high-risk enterprises for targeted inspections, and blockchain ensures the authenticity and non-tamperability of environmental data. In policy formulation, the analysis of massive environmental and economic data provides a scientific basis for evaluating policy effects and predicting their impact on enterprises and economic development.

2.2 Impact Paths of Environmental Regulation on Corporate Green Technology Innovation

Environmental regulation affects innovation through several paths. First is the cost effect path: strict regulations increase compliance costs, motivating enterprises to innovate in cleaner and more efficient production technologies to reduce emissions. Second is the innovation compensation effect path: cost pressures prompt enterprises to gain "innovation compensation" by developing new green products that satisfy market demand for environmental protection, thereby enhancing competitiveness. Third is the market orientation effect path: regulations guide market preferences toward green products, encouraging enterprises to increase investment in green innovation to meet the willingness of consumers to pay a premium for eco-friendly products.

2.3 The Moderating Role of the Digital Economy

The digital economy plays a crucial moderating role. On one hand, it enhances the incentive effect of environmental regulation by reducing the cost for enterprises to acquire information on green technology trends and facilitating industry-university-research cooperation. On the other hand, it alleviates the constraints of environmental regulation. Enterprises can use digital means to optimize production and improve resource efficiency, lowering the pressure of compliance costs. Additionally, it offers new business models like the sharing and circular economies, enabling sustainable development while meeting regulatory requirements.

3. Current Status Analysis of Digital Economy, Environmental Regulation, and Corporate Green Technology Innovation

3.1 Status of Digital Economy Development

In recent years, China's digital economy has expanded continuously, becoming the world's second-largest digital economy. Technologies such as AI, big data, and IoT are widely applied across various sectors [2]. However, challenges remain, including significant regional disparities, insufficient core technology innovation capabilities, and severe issues regarding data security and privacy protection.

3.2 Status of Environmental Regulation Implementation

China has attached great importance to environmental protection, with a continuously improving regulatory system. Standards for air, water, and soil are becoming increasingly strict. However, issues such as weak enforcement in some regions, poor policy coordination, and incomplete assessments of the impact on enterprise development still exist.

3.3 Status of Corporate Green Technology Innovation

Enterprises' awareness of green innovation is rising.

Many have increased R&D investment in energy conservation and new energy vehicles. Nevertheless, overall innovation capacity remains weak, with a lack of core technologies and independent intellectual property rights. SMEs, in particular, face capital and technical constraints, and the market mechanism for green innovation is not yet fully mature.

4. Practical Paths to Promote Corporate Green Technology Innovation under the Digital Economy Wave

4.1 Improving the Environmental Regulation Policy System

Governments should build an intelligent environmental regulation system based on digital trends, using big data and IoT for real-time supervision and blockchain to enhance the credibility of enforcement. Policy coordination between departments should be strengthened to avoid conflicts and provide incentives for green innovation.

4.2 Accelerating Corporate Digital Transformation

Enterprises must actively integrate into the digital economy by introducing AI and big data to optimize processes and reduce regulatory costs. They should use digital platforms to accelerate the transformation of R&D achievements and explore new models like the circular economy [3].

4.3 Fostering a Green Innovation Ecosystem

Governments should increase financial support and establish special funds for green R&D. Enterprises should strengthen cooperation with upstream and downstream partners to build green innovation alliances. Simultaneously, promoting green consumption concepts will help expand the market demand for green products.

5. Case Practice: Transformation of a Traditional Chemical Enterprise through Digital Economy and Environmental Regulation

5.1 Enterprise Background

A traditional chemical enterprise faced significant environmental pressure due to high energy consumption and emissions. With tightening regulations and shrinking profit margins, the enterprise urgently needed to transform through green technology innovation.

5.2 Digital Empowerment of Regulation

Local environmental departments used IoT sensors to monitor emissions in real-time. A blockchain-based data storage system ensured that the reported environmental data was authentic and non-tamperable, providing a reliable basis for enforcement.

5.3 Digital Transformation Driving Innovation

The enterprise introduced big data to optimize production. AI algorithms dynamically adjusted reaction parameters, increasing efficiency by 15% and reducing energy consumption by 20%. Through a digital platform, it collaborated with universities to successfully develop a new eco-friendly catalyst that significantly reduced harmful gas emissions [4].

5.4 Policy Synergy and Ecosystem Cultivation

The local government provided tax reductions and low-interest loans for green projects. With increased publicity for green consumption, the enterprise's green product market share rose from 5% to 18%. It also formed a green innovation alliance with suppliers and customers to achieve collaborative development across the industrial chain.

5.5 Results of Transformation

After several years, the enterprise reduced energy consumption by 30% and emissions by 50%. Production efficiency increased by 25%, and profit margins rose by 15 percentage points, making it a model for green development in the industry.

Conclusion

In summary, the digital economy not only revolutionizes traditional economic models but also provides new tools for environmental regulation to effectively drive green technology innovation. Faced with the dual challenges of environment and development, governments and enterprises should work together to improve policies, deepen digital transformation, and build a green innovation ecosystem for a sustainable future.

References

[1] Liu, J. K., & Xiao, Y. Y. (2022). China's environmental protection tax and green innovation: Leverage effect or crowding-out effect? Economic Research Journal, 57(01), 72-88.

[2] Li, Z. J., Zeng, X. P., He, S. D., et al. (2024).

Digital economy, R&D factor flow, and corporate green innovation. Journal of Yunnan University of Finance and Economics, 40(12), 96-110.

[3] Ai, Y. F., & Kong, T. (2021). Can regional big data development promote corporate green innovation? Journal of Zhongnan University of Economics and Law, (06), 116-126+160.

[4] Xu, J. (2024). Evaluation research on the coordinated development of digital economy and carbon total factor productivity. China Business Theory, 33(24), 39-42.

ORIGINAL RESEARCH ARTICLE

Open Access

Data Analysis and Economic Operation Optimization Strategies in Electricity Markets

Lei An

Huadian (Ningxia) Energy Co., Ltd., Yinchuan, Ningxia, 750002, China

Correspondence to: Lei An, Huadian (Ningxia) Energy Co., Ltd., Yinchuan, Ningxia, 750002, China

Abstract: Data analysis in the electricity market plays a pivotal role in grasping market dynamics, forecasting supply and demand, and evaluating market efficiency. This paper explores the primary content and methodologies of electricity market data analysis, including the analysis of load, price, generation resources, and market transaction data, as well as the application of statistical analysis, data mining, and machine learning. Based on the analytical results, optimization strategies are proposed for the generation, transmission, distribution, and consumption sides. These strategies aim to enhance the operational efficiency of the electricity market and promote the sustainable development of the power industry.

Keywords: Electricity Market; Data Analysis; Economic Operation; Optimization Strategies

Introduction

The electricity market is a core component of modern economic operations, and its stability and efficiency are vital to the entire economic system. With the deepening of power system reforms, the importance of data analysis in the electricity market has become increasingly prominent. By systematically analyzing market data, power enterprises and regulatory authorities can more accurately grasp market dynamics, scientifically forecast power supply and demand, and comprehensively evaluate market efficiency. This enables the formulation of more precise and effective optimization strategies for market operation. This paper delves into the main content and methods of electricity market data analysis and proposes optimization strategies based on these findings to provide theoretical support and practical guidance for the healthy development of the electricity market.

1. The Importance of Data Analysis in the Electricity Market

Data analysis is indispensable to the development of the power industry. Market data covers diverse and real-time information such as supply-demand relationships, price fluctuations, and competitive postures. By analyzing these data, power enterprises can promptly identify market trends. In the generation phase, by analyzing price data across different periods and regions, enterprises can clarify price characteristics and patterns. This allows for the flexible adjustment of generation plans and the scientific scheduling of unit startups and shutdowns—increasing output during peak-price periods and reducing it during low-price periods to maximize economic benefits.

Furthermore, data analysis is critical for accurate supply and demand forecasting, which is the foundation of market stability. By integrating historical

market data with meteorological and economic factors and utilizing advanced models, enterprises can precisely predict future demand. This allows for the proactive allocation of resources and prevents both power shortages and resource wastage. Additionally, data analysis provides a basis for evaluating market efficiency. Analyzing transaction and behavior data allows for the assessment of market concentration to identify potential monopolies and evaluate the rationality of price fluctuations [1].

2. Main Content and Methods of Electricity Market Data Analysis

2.1 Main Content of Data Analysis

Power Load Data Analysis: This involves analyzing data across various time scales (annual, monthly, daily, hourly) to master load variation patterns, peak-valley characteristics, and seasonality. This provides fundamental support for power system planning and dispatch.

Electricity Price Data Analysis: This focuses on the price formation mechanism across day-ahead, real-time, and ancillary service markets. It explores the correlations between prices and loads, fuel costs, and policy regulations. Enterprises utilize these correlations to formulate bidding strategies and manage market risks.

Generation Resource Data Analysis: This covers installed capacity, generation volume, costs, and utilization hours for various resources (thermal, hydro, wind, PV). It assesses the economic efficiency of different resources and the consumption status of renewable energy to identify bottlenecks in integration and dispatch.

2.2 Primary Methods of Data Analysis

Statistical Analysis: Descriptive statistics (mean, variance, correlation coefficients) are used to reveal basic data characteristics. Regression analysis and time-series analysis are employed to model causal relationships and forecast future trends, such as predicting next month's load based on historical trends.

Data Mining: Clustering analysis groups users by consumption behavior to provide a basis for differentiated pricing. Association rule mining identifies relationships between different market items, while decision trees assist in classifying and predicting complex decision-making problems.

Machine Learning: Algorithms such as Neural Networks, Support Vector Machines (SVM), and Deep Learning are utilized to process non-linear, high-dimensional data. Deep learning is particularly effective in short-term load forecasting as it captures complex variables like weather and holidays to improve accuracy [2].

3. Optimization Strategies for Economic Operation of Electricity Markets

3.1 Generation-Side Optimization Strategies

Enterprises should formulate scientific generation plans based on data analysis, unit performance, and fuel costs. During low-load periods, priority should be given to low-marginal-cost renewable energy (hydro, wind), while thermal units should be utilized for peak-shaving during high-load periods. Furthermore, cost control should be strengthened through optimized fuel inventory management and technical upgrades to reduce energy consumption. Finally, enterprises must enhance renewable energy consumption by breaking through technical bottlenecks related to intermittency and participating in green power trading markets.

3.2 Transmission-Side Optimization Strategies

Optimizing Grid Planning and Construction: Grid layout should be scientifically planned based on supply-demand forecasts. Strengthening regional interconnection through cross-regional transmission channels can realize optimal resource allocation.

Improving Operational Efficiency: Advanced dispatching technology and automated equipment should be used for real-time monitoring. Optimizing power flow distribution through reactive power compensation and transformer tap adjustments can reduce transmission losses [3].

3.3 Distribution-Side Optimization Strategies

Enterprises should promote the intelligent transformation of distribution networks by installing smart meters and automation terminals to enable fault self-healing capabilities. Additionally, they should develop integrated energy services, providing users with energy hosting, energy-saving renovations, and distributed energy construction (PV, storage). Establishing user-side energy management systems can guide users to adjust their consumption patterns based on peak-valley price signals.

3.4 Consumption-Side Optimization Strategies

Implementing Demand Response (DR) is vital. Price signals and incentives can guide users to shift non-urgent production tasks to off-peak hours, thereby balancing supply and demand. Furthermore, the promotion of energy-saving technologies and the development of distributed power sources and energy storage (e.g., lithium batteries) allow users to store energy when prices are low and release it during peaks. This "peak-shaving and valley-filling" function improves the stability of the entire power system [4].

Conclusion

In summary, electricity market data analysis is a vital tool for the industry, enhancing competitiveness for enterprises and providing a decision-making basis for regulators. Through the integration of advanced analytical methods, power enterprises can optimize generation, procurement, and planning to maximize benefits. As technology advances, data analysis will play an even more significant role in ensuring the fair competition and sustainable development of the power industry.

References

[1] Yang, F. (2024). Research on the optimization of electricity marketing strategy based on big data analysis. Electrical Technology and Economy, (9), 281-284.

[2] Chen, H., & Du, H. H. (2024). Electricity market data analysis and economic operation optimization strategy. Computer Procurement, (12), 19-21.

[3] Ma, P. Y. (2024). Research on market pricing strategy based on big data analysis in power marketing. Electrical Technology and Economy, (11), 308-310.

[4] Kang, Z. K., & Kang, Z. X. (2023). Short-term electricity price forecasting in the electricity market based on big data analysis technology. Automation Technology and Applications, 42(7), 95-98.

ORIGINAL RESEARCH ARTICLE

Open Access

Analysis of Decision-Making Techniques in Corporate Economic Management

Bin Hong

Zhejiang Communications Industry Services Co., Ltd., Hangzhou, Zhejiang, 310000, China

Correspondence to: Bin Hong, Zhejiang Communications Industry Services Co., Ltd., Hangzhou, Zhejiang, 310000, China

Abstract: This paper focuses on decision-making techniques within corporate economic management. It first discusses the significance of these techniques, such as assisting enterprises in adapting to market fluctuations, rationally allocating limited resources, and evaluating decision risks. Subsequently, it introduces common types of techniques, including qualitative methods like Nominal Group Technique, quantitative methods like Break-even Analysis, and integrated qualitative-quantitative methods like Fuzzy Comprehensive Evaluation. Finally, the paper proposes optimization strategies—such as strengthening decision-making teams, constructing robust information systems, emphasizing dynamic adjustments, and fostering a healthy decision-making culture—to promote the steady development of enterprises.

Keywords: Corporate Economic Management; Importance; Decision-making Techniques

Introduction

As global economic integration continues to accelerate, the corporate operating environment is becoming increasingly complex and volatile. Domestic market competition is intensifying, while international markets present multifaceted challenges. Fluctuations in consumer demand and competitor strategies can either open new windows of opportunity or harbor potential risks. Under these circumstances, the quality of economic management decisions is of paramount importance. Scientific and effective decision-making enables enterprises to accurately capture market dynamics, rationally allocate limited resources, and mitigate risks. The core of enhancing the scientific rigor and effectiveness of decision-making lies in the proper application of decision-making techniques. This paper provides an in-depth analysis of these techniques.

1. The Importance of Decision-making Techniques in Corporate Economic Management

The acceleration of global economic integration has led to a rapidly changing market environment. Enterprises must navigate fierce domestic competition while addressing various international challenges. Adjustments in policies and regulations, shifts in consumer demand, and changes in competitor strategies can represent either opportunities or threats [1]. Decision-making techniques help enterprises capture these dynamic changes in a timely manner, analyze their impact, and formulate scientific decisions that

adapt to the market. Through market research and data analysis, enterprises can accurately identify the latest consumer trends and adjust product strategies to seize market opportunities.

Corporate resources—including capital, human resources, and physical assets—are finite. A primary task of economic management is to allocate these resources to maximize efficiency. Decision-making techniques assist in the scientific evaluation and analysis of various resources to determine optimal allocation. For instance, by applying linear programming, enterprises can arrange the procurement and use of raw materials to meet production demands while minimizing costs and maximizing resource utilization. Furthermore, the decision-making process involves inherent uncertainties; erroneous decisions can result in significant losses. Decision-making techniques allow for the simulation and analysis of various factors to assess risk levels. In investment decisions, the use of Decision Tree Analysis can evaluate the gains and risks of different scenarios, helping managers select the optimal path to ensure steady corporate development.

2. Common Types of Decision-making Techniques

2.1 Qualitative Decision-making Techniques

2.1.1 Nominal Group Technique

The Nominal Group Technique is a structured qualitative method that balances independence with collective input. When applying this technique, an enterprise assembles a decision-making group comprising experts, managers, or employees from diverse fields. Members first work independently, utilizing their knowledge and experience to record ideas in writing. This is followed by a presentation phase where each member introduces their proposal without interruption, ensuring every viewpoint is fully presented. Finally, members evaluate the ideas through voting, scoring, or ranking to identify the most feasible solution. This method prevents "groupthink" and enhances decision quality, particularly in creative areas like marketing campaign planning.

2.1.2 Electronic Meetings

With the rapid development of information technology, electronic meetings have emerged as a vital qualitative tool. Utilizing network platforms, participants from different locations can engage in real-time discussion via text, video, and online voting. This breaks the constraints of time and space, making it ideal for multinational corporations. For example, regional heads of a global firm can use electronic meetings to share local market intelligence and collectively determine a global strategic direction.

2.2 Quantitative Decision-making Techniques

2.2.1 Break-even Analysis

Break-even Analysis is a quantitative method used to determine the point at which total revenue equals total costs by analyzing the relationship between costs, sales volume, and profit. At this point, the enterprise neither makes a profit nor incurs a loss. This method is instrumental in evaluating the feasibility of new projects, setting pricing strategies, or determining production scales [2]. If projected market demand exceeds the break-even volume, the project is deemed viable.

2.2.2 Monte Carlo Simulation

Monte Carlo Simulation is a quantitative method based on probability and statistics. It establishes mathematical models and performs random sampling of uncertain factors to simulate various outcomes. By analyzing a large number of simulation results, enterprises can understand the probability distribution of outcomes and assess risks. This is widely used in finance to evaluate investment portfolios against market volatility and interest rate changes, providing a scientific basis for investment decisions.

2.3 Integrated Qualitative and Quantitative Techniques

2.3.1 Fuzzy Comprehensive Evaluation

This method combines fuzzy mathematics with comprehensive evaluation. In economic management, many factors (such as product quality or employee performance) are "fuzzy" and difficult to measure with precise numerical values. This technique converts qualitative evaluations into quantitative data by establishing a fuzzy evaluation matrix. When evaluating suppliers, for instance, an enterprise can weigh factors like quality, delivery time, and service to calculate a comprehensive score for selecting the best partner.

2.3.2 Data Envelopment Analysis (DEA)

DEA is a method used to evaluate the relative efficiency of Decision-Making Units (DMUs) with multiple

inputs and outputs. Within an enterprise, different departments or projects can be treated as DMUs. By analyzing inputs (capital, labor, equipment) and outputs (output volume, sales, profit), DEA helps identify low-efficiency units and provides a basis for optimizing resource allocation across the organization.

3. Suggestions for Optimizing Decision-making Techniques

3.1 Strengthening Decision-making Team Construction

The quality of the decision-making team directly impacts scientific rigor. Enterprises should build diversified teams that include strategic managers, technical experts, market analysts, and financial personnel. Diversification ensures that problems are analyzed from multiple professional perspectives. Furthermore, regular training in data analysis, logical thinking, and collaborative communication is essential. By analyzing actual cases and hosting seminars, team members can master the latest techniques and apply them flexibly to improve decision effectiveness.

3.2 Constructing Robust Information Systems

Effective decision-making relies on accurate and timely information. Enterprises must build information systems to integrate data from disparate departments (production, sales, finance), breaking down "information silos" [3]. Beyond internal data, systems should leverage Big Data, Cloud Computing, and the Internet of Things (IoT) to monitor market trends, customer preferences, and competitor strategies. For example, a Customer Relationship Management (CRM) system can mine customer data to guide product development and targeted marketing.

3.3 Emphasizing Dynamic Adjustments in the Decision Process

Given the continuous fluctuations in the economic environment, the decision-making process must be dynamic. During implementation, enterprises should establish feedback mechanisms to collect real-time information on progress and resource use. If a deviation from the expected outcome is detected—such as sales failing to meet targets—the enterprise must be flexible enough to adjust pricing, marketing, or production plans to align with market realities.

3.4 Fostering a Healthy Decision-making Culture

Enterprises should cultivate a culture that encourages innovation and tolerates failure. Respecting diverse opinions allows frontline employees to contribute unique insights from customer feedback. Furthermore, if a decision was made based on scientific rigor but failed due to unforeseen external factors, the enterprise should remain inclusive [4]. A culture that punishes all failure leads to conservative and stagnant decision-making, whereas a supportive culture stimulates creativity and helps find optimal solutions to complex challenges.

Conclusion

In corporate economic management, decision-making techniques serve as a critical pillar for steady progress in a complex market. These techniques are indispensable for adapting to market changes, allocating resources, and managing risks. While qualitative and quantitative tools provide the necessary framework, sustainable development also requires high-quality teams, integrated information systems, dynamic adjustments, and a supportive corporate culture.

References

[1] Wu, Y. (2024). Analysis of the driving role of information technology support on corporate economic management. China Collective Economy, (25), 69-72.

[2] Xie, X. (2023). Research on the application of information technology in modern corporate economic management. Investment and Entrepreneurship, 34(4), 137-139.

[3] Fu, J. (2025). Research on the optimization path of technical and economic decision-making in construction project management. Brick and Tile World, (1), 142-144.

[4] You, X. (2025). Methods and practice of optimizing management accounting decision-making with Big Data technology. China Electronic Commerce, 31(5), 124-126.

Published by KNOWLEDGE RESERVOIR PUBLISHING PTY LTD,

Level 10, 50 Clarence Street Sydney, NSW 2000.

Website: https://akrpp.com/

Email: KnowledgeReservoir@outlook.com