Application Analysis of Data Analysis in Power Material Procurement Management

Peiru Lin*

Stony Brook Institute at Anhui University, Hefei 230039, China

Corresponding author: Peiru Lin, linpeiru87@outlook.com

Abstract:

With the rapid development of China's economy, the power industry, as an important national infrastructure and energy security, is accelerating its development speed. As an important component of the power industry, the procurement of power materials directly affects the stable operation and economic benefits of the power system. Especially in the power industry, procurement management plays a crucial role, and its efficiency and accuracy directly affect the construction and operation of power engineering. With the continuous development and application of big data technology, more and more power companies are beginning to apply big data technology to the bidding and procurement management of power materials, to improve efficiency, reduce costs, and ensure the accuracy of procurement.

Keywords:

Data analysis
Power industry
Purchasing management

1. Introduction

Data technology can help power companies transition from traditional bidding procurement to intelligent bidding procurement. By analyzing and mining massive amounts of data, more accurate demand forecasting, supply chain optimization, cost control, and risk management can be achieved. The intelligent decision-making system based on big data can improve work efficiency, reduce human errors, and provide a more scientific and reliable decision-making basis for power material bidding and procurement management.

2. Application scenarios of big data in power material procurement

2.1. Material demand forecast

The procurement of power materials has the characteristics of periodicity, volatility, and uncertainty, and traditional procurement forecasting methods often have significant errors. Big data technology can collect multi-source data such as historical procurement data, market supply and demand data, and meteorological data, and use data mining and machine learning algorithms to accurately predict procurement demand, providing a basis

for power companies to formulate reasonable procurement plans. By analyzing historical data and combining current market conditions, enterprise production plans, and other factors, a demand forecasting model can be constructed to improve the accuracy of material demand prediction and reduce inventory backlog and shortage risks. At the same time, effective measures can be taken for digital control of big data in power marketing, including improving the big data digital control system, innovating big data digital control methods, and strengthening big data digital control [1].

2.2. Supplier evaluation and selection

The procurement of power materials involves numerous suppliers, and how to choose high-quality suppliers is the focus of attention for power enterprises. Big data technology can collect data on suppliers' qualifications, reputation, product quality, prices, delivery times, and so on. Through data analysis and visualization, it provides strong support for power companies to evaluate and select suppliers. By utilizing big data technology, a comprehensive analysis of supplier qualifications, reputation, product quality, delivery cycles, and other data is conducted to provide an objective and comprehensive supplier evaluation basis for the procurement department and optimize the supplier selection process. In addition, the application of digital technology has become an important means to improve the efficiency of power marketing and optimize the quality of service [2].

2.3. Price negotiation and procurement cost control

The price of electricity materials is influenced by various factors such as market supply and demand, raw material prices, policies, etc., and fluctuates greatly. Big data technology can collect real-time market data, raw material price data, etc., and use methods such as time series analysis and regression analysis to predict the prices of electricity materials, helping enterprises formulate reasonable procurement strategies. By analyzing big data, enterprises can grasp the fluctuation patterns of market material prices, provide reasonable procurement price strategies for enterprises, and reduce procurement costs.

2.4. Warehouse management and optimization

The storage management of power materials is an important link in the power supply chain. Big data technology can collect real-time warehouse data, such as inventory quantity, inventory turnover rate, warehouse temperature and humidity, etc. Through data analysis, it can help enterprises discover problems in warehouse management, propose optimization solutions, and reduce inventory costs.

2.5. Logistics delivery optimization

The logistics distribution of power materials involves many links, and how to improve distribution efficiency and reduce distribution costs is the focus of attention for power enterprises. Big data technology can collect logistics data in real time, such as transportation distance, transportation time, transportation cost, and so on. Through data analysis and optimization algorithms, it can provide distribution route optimization solutions for enterprises and improve distribution efficiency.

2.6. Procurement contract management

Utilizing big data technology to monitor contract performance in real-time, ensuring timely completion of contracts and avoiding the risk of breach.

3. The important role of big data in the management of power material procurement

3.1. Intelligent procurement decision-making

Combining internal enterprise needs and external market information, utilizing big data analysis technology to provide intelligent procurement recommendations for enterprises and achieve precise procurement decisions. By mining and analyzing historical data, future market changes can be predicted, providing forward-looking guidance for power material procurement decisions. Big data technology can collect, analyze, and process massive amounts of data in real time, providing strong support for the procurement of power materials. Through big data analysis, enterprises can quickly understand market supply and demand conditions, price fluctuations, supplier reputation, and other information, thereby optimizing procurement strategies and improving procurement efficiency.

3.2. Optimization of procurement process

Through big data technology, real-time monitoring and data analysis of key links in the procurement process are carried out to identify bottlenecks and problems in the process, providing a basis for optimizing the procurement process. Data analysis helps identify problems and deficiencies in the procurement process, providing a basis for optimizing procurement strategies, achieving cost control, and optimizing resource allocation. Big data technology can help enterprises achieve refined management and reduce procurement costs. By mining and analyzing historical procurement data, enterprises can identify unreasonable links in the procurement process, such as long procurement cycles and inventory backlog, and optimize the procurement process to reduce procurement costs.

3.3. Inventory management optimization

Using big data technology to conduct real-time analysis of enterprise inventory materials, adjust inventory structure reasonably, improve inventory utilization, and reduce inventory costs. Through data analysis, real-time information on the market situation, supplier status, inventory status, and other aspects of power materials can be obtained, providing strong support for procurement decisions and improving procurement efficiency.

3.4. Risk warning and control

Through big data analysis, potential risks in the procurement process are identified, and risk prevention measures are formulated in advance to ensure the smooth progress of the procurement process. In this data-driven new era, in addition to power procurement, power marketing management is an important component of the power industry, and data analysis is also of great significance for its development [1]. Data analysis helps to understand the credit status, quality level, delivery cycle, and other information of suppliers, thereby improving the level of supply chain management [3].

3.5. Improve supplier management level

Big data technology can achieve a comprehensive evaluation of suppliers and improve supplier management levels. By analyzing data on suppliers' qualifications, reputation, product quality, delivery time, and other aspects, enterprises can screen out high-quality suppliers and establish stable supply chain relationships.

3.6. Ensure the safety of power supply

Big data technology can monitor the inventory, quality, and usage of power materials in real time, ensuring the safety of the power supply. By real-time tracking of materials, enterprises can promptly detect and solve problems such as insufficient inventory and substandard quality, ensuring the normal operation of power facilities. In the big data environment, the power industry is facing unprecedented challenges and opportunities. Diversified data processing needs are of great significance for the power industry to achieve innovation and efficiency improvement in the big data environment [4].

4. Innovative application of big data in power material procurement management

4.1. Establish a big data analysis platform

Real-time collection, analysis, and processing of various data during the procurement process. Analyze market supply and demand conditions, price fluctuations, and other information to provide data support for formulating procurement strategies. Evaluate the qualifications, reputation, product quality, and other aspects of suppliers to provide a basis for selecting high-quality suppliers, monitor material inventory in real-time, and provide data support for adjusting inventory reasonably.

4.2. Optimize the procurement process

Based on the results of big data analysis, optimize the procurement process and improve procurement efficiency. Through big data analysis, identify bottleneck links in the procurement process, take targeted measures to shorten the procurement cycle, adjust the procurement plan reasonably based on the results of big data analysis, reduce inventory backlog, evaluate suppliers, select high-quality suppliers, and improve procurement quality.

4.3. Implement refined management

By utilizing big data technology, implementing refined management, reducing procurement costs, and conducting real-time monitoring of market price fluctuations through

big data analysis, reasonable procurement price strategies can be formulated for enterprises. Based on the results of big data analysis, procurement strategies can be adjusted to reduce procurement costs. Through big data analysis, inventory can be reasonably adjusted to reduce inventory costs.

4.4. Innovation in supply chain finance

The application of big data technology in the procurement of power materials can provide support for innovation in supply chain finance. By analyzing data on suppliers, logistics, and other aspects, enterprises can evaluate the credit status of suppliers and provide data support for the supply chain finance business [5].

5. Exploration and Practice of big data in power material procurement

5.1. Establish a big data platform

Power companies should establish a unified big data platform to integrate internal and external data resources, including procurement data, market data, supplier data, etc., to provide data support for power material procurement. The combination of big data technology and power information management enables the collection, storage, processing, and analysis of massive power data, greatly improving the operational efficiency of the power industry and effectively reducing management costs, providing strong support for the informatization and intelligent development of the power industry [6].

5.2. Strengthen data mining and analysis capabilities

Electric power companies should cultivate professional data mining and analysis teams, use advanced data mining algorithms and data analysis tools to deeply mine procurement data, and provide strong support for decision-making.

5.3. Promote the digital transformation of procurement

Electric power companies should promote the digital transformation of procurement, combining big data technology with procurement business processes to achieve accurate prediction of procurement needs,

intelligent evaluation and selection of suppliers, price analysis and prediction, and other functions. Big data plays an increasingly important role in the digital operation of the power grid [7].

5.4. Strengthen cooperation and communication

Electric power companies should strengthen cooperation and communication with other enterprises and research institutions in the field of big data, and jointly explore the application scenarios and practical paths of big data in power material procurement. In addition, intelligent training service quality evaluation in the power industry can be used as a starting point to analyze and mine data, providing strong data support. Based on data mining algorithms, data can be analyzed and mined to provide personalized services [8].

6. The future development of big data in power material procurement management

6.1. Intelligent procurement decision-making

With the continuous advancement of big data analysis technology, the decision-making of power material procurement will become more intelligent. In the future, power companies may adopt more advanced machine learning algorithms and artificial intelligence technologies to achieve automated and intelligent procurement processes. These systems will be able to automatically complete tasks such as procurement planning, supplier selection, and contract signing based on real-time data and preset rules, greatly improving efficiency and accuracy.

6.2. Collaborative optimization of supply chain

Big data technology will promote the collaborative optimization of the power material procurement supply chain. By integrating data from upstream and downstream of the supply chain, power companies can better coordinate supply and demand relationships, optimize inventory management, and reduce inventory backlog and stockout risks. Meanwhile, through data sharing and analysis, collaboration between various links in the supply chain can be strengthened, improving overall response speed and market adaptability.

6.3. Predictive maintenance and risk management

Electric power companies will utilize big data technology for more accurate predictive maintenance, by monitoring equipment status and operational data in real-time, predicting potential faults and maintenance needs, thereby reducing unexpected downtime and extending equipment lifespan. Meanwhile, big data analysis can also help enterprises identify and evaluate potential risks in the supply chain, such as supply disruptions, price fluctuations, etc., to develop corresponding risk response strategies.

6.4. Green procurement and sustainable development

Big data technology will also assist in the transformation of power material procurement towards green procurement and sustainable development. By collecting and analyzing data on the environmental performance, energy consumption, carbon emissions, and other aspects of materials, enterprises can pay more attention to the environmental friendliness of the procurement process, select suppliers and products that meet environmental standards, and promote the achievement of sustainable development goals.

7. Strategic recommendations for implementing big data applications

7.1. Establish a big data platform

Electric power companies should establish a unified big data platform, integrate internal and external data resources, and provide data support for procurement management. At the same time, it is necessary to ensure the scalability and compatibility of the data platform to adapt to future technological developments and business needs. By constructing a data analysis technology framework, it can be applied to multiple levels such as data collection, management, storage, and analysis applications [9].

7.2. Strengthen data governance

Data governance is the foundation of big data applications. Enterprises should develop comprehensive data governance strategies, including data quality control, data security, data privacy protection, etc., to ensure the authenticity, accuracy, and security of data.

7.3. Cultivate a data culture

Enterprises should cultivate employees' data awareness and culture, and encourage them to use data analysis and decision-making. Through training and education, improve employees' data processing and analysis skills, and create a favorable internal environment for big data applications.

7.4. Building a partnership

Electric power companies should establish partnerships with big data technology suppliers, research institutions, etc. to jointly develop and apply big data technology. Through cooperation, enterprises can acquire new technologies faster and improve their big data application capabilities.

7.5. Continuous innovation and improvement

The application of big data technology in the management of power material procurement is a continuous process of innovation and improvement. Enterprises should maintain an open mindset, constantly try new technologies and methods, continuously optimize procurement management processes, and enhance their core competitiveness [10].

8. Conclusion

The application of big data technology in the management of power material procurement can help improve procurement efficiency, reduce procurement costs, optimize inventory management, and create greater economic benefits for enterprises. Electric power enterprises should fully utilize big data technology to promote innovation and upgrading of procurement management and achieve efficient, standardized, and intelligent operation of procurement business. At the same time, enterprises will strengthen talent cultivation and technological research and development, continuously improve their ability to analyze and apply big data and provide strong support for the management of power material procurement. The application of data analysis in the management of power material procurement is of

great significance. By analyzing data on procurement needs, supplier evaluations, procurement costs, and procurement risks, procurement efficiency can be improved, procurement strategies can be optimized, procurement costs can be reduced, and supply chain management levels can be enhanced. Against the backdrop of increasingly fierce market competition and resource constraints in the power industry, fully leveraging the advantages of data analysis to provide strong support for power material procurement management is of great significance for ensuring power supply and promoting high-quality development of the power industry.

Disclosure statement

The author declares no conflict of interest.

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