Establishment of Electric Power Marketing System Based on Data Warehouse Technology

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Keywords: Electric power marketing; Decision support system; Data warehouse; Data mining

Abstract: At present, the electric power marketing system uses an operation-oriented database management system to complete specific businesses, such as statistical reports and random queries, thus initially realizing paperless and networked electric power business processing. However, with the continuous increase of power customers, the amount of data also increases. Manual collection and processing cannot guarantee the integrity and accuracy of data. The report forms generated by the business system are less flexible and cannot meet the needs of management and analysis of decision makers. With the continuous increase of power demand and the rapid development of power information network, people's demand for information management system to provide higher level analysis is increasing day by day. The application of data warehouse technology makes up for the insufficiency of decision support function of information management system. Due to this, based on the business process of electric power marketing, with the aim of providing high-quality service for customers and making full use of the advantages of data warehouse technology, this paper constructs a decision support system for electric power marketing on the basis of the existing management information system through data mining tools to make the decision of senior leaders of electric power enterprises more convenient, scientific and accurate.

1. Introduction

With the deepening of the reform of the power system, the pace of marketization of electric power enterprises is speeding up, the management requirements of all processes of their production are becoming higher and higher, and the processing of information also needs more and more support from advanced information technology. The traditional management method has been unable to meet the current technical requirements, resulting in the collection of information cannot be scientifically and effectively processed and utilized and the lack of comprehensive analysis and decision-making and scientific prediction of future development trends. Power Marketing Decision Support System (DSS） can collect various scattered detailed data sources, establish data warehouses oriented by various topics, and mine the internal rules of business and the quantity information that cannot be done by human. Based on this quantity information, it can make more scientific electric power marketing decisions. This paper is to adapt to this need, summarize the research results of decision support system which is maturing day by day, take the modern marketing theory as the guidance, merge the customer relationship management thought, comply with the electric power marketing business process, combine the electric power demand side management request, make full use of the advanced computer technology and the information network technology, initially construct the regional electric power resource model, use the data warehouse technology and the data mining technology, construct the new prediction algorithm, establish an efficient and practical electric power marketing decision support system based on the existing system of electric power supply enterprises, and provide the scientific decision basis for the electric power marketing.

  DOI: 10.25236/iciss.2019.077

2. Overview of Electric Power Marketing Content

2.1. Definition of Electric Power Marketing.

According to the definition of Philip Kotler, a famous marketing master, market refers to all potential customers who have specific needs and desires and are willing and able to meet such needs or desires through exchange. It is the sum of the actual and potential buyers' needs of a certain product. In a broad sense, marketing refers to an enterprise's business activity that starts from the standpoint of the seller, takes the buyer as the object, and in a constantly changing market environment, takes meeting the needs of all realistic and potential customers as the center, providing and guiding goods or services to reach the customers, while obtaining profits for the enterprise.

2.2. Analysis of Electric Power Marketing.

The core of electric power marketing is that electric power enterprises must face the market, face consumption, adapt to the changing environment, and make timely and correct responses, so that electric power enterprises can truly become the electric power products suppliers and service providers that users are satisfied with, and strive to deliver electric power products to consumers and users with the lowest cost, the fastest speed and the best quality[15]. Any electric power enterprise exists and operates in a constantly changing social environment, and conducts market operations with other enterprises and the public. The dynamic changing marketing environment may bring market opportunities to electric power enterprises, and may also form market threats.

3. Content and Process of Data Warehouse Design

3.1. Content of Data Warehouse Design.

Different from the development of general MIS system, the process of developing data warehouse is very complicated, mainly covering the analysis of data model, analysis of data environment, analysis of data quantity, design of physical quantity, analysis of subject area, construction of data warehouse, analysis of source data, filling of data and development of decision support system components. The data organization of data warehouse should be based on the following principles: since the data of data warehouse is object-oriented, it is necessary to collect data based on topics, then summarize and store the data.

3.2. Process of Data Warehouse Design.

Data warehouse needs to design database and user interface, data loading strategy, data storage tools and scheme maintenance at the same time. Realize the transformation from the standardized design of the traditional database to the dimension-based design, thus obtain good response performance for data query. The process of data warehouse design is as follows:

(1) Determine the topic of the system. Build a data warehouse on the original operating system, combine with the current situation and objectives of users, make a detailed analysis of the report requirements and business, thus carry out data analysis and induction on various topics.

(2) Design data warehouse logic. The data warehouse needs to be oriented to decision support, so its data volume is very large and needs to be continuously updated. Therefore, its logical structure must be carefully designed, so as to ensure that the increase of data volume will not reduce the query performance.

(3) Physical design of data warehouse. In order to ensure the stability of the system, it is necessary to physically design the form of data storage. Generally, large fact tables are stored in partitions. Store dimension tables with fewer records in a table space, in order to speed up the data storage, even make use of the loading mode of data residing in the system memory. Through the establishment of database index, the speed of data reading is improved.

3.3. Structure of Electric Power Marketing Data Warehouse.

The electric power marketing data warehouse has a three-layer structure, which are data source layer, data warehouse layer and application layer, as shown in Fig. 1.

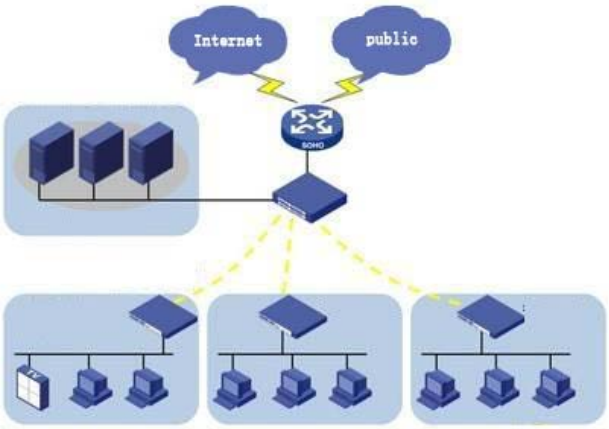

Figure 1. Structure of Electric Power Marketing Data Warehouse

(1) The data source layer is the data source of the electric power marketing data warehouse and provides data for the decision support system, including operational data in the business database, document data in the data file and external data.

(2) The data warehouse layer consists of data extraction, data warehouse and data warehouse management system. Among them, data warehouse is the core part of the whole data warehouse system, which is a collection of data organized according to the topic of data warehouse, including metadata and data in the business database.

(3) The application layer is based on data warehouse and mainly includes retrieval and query tools, OLAP tools and data mining tools. Decision makers use these tools to obtain valuable information from massive data in data warehouse and provide scientific basis for decision making.

4. Establishment of Electric Power Marketing Data Warehouse

The establishment of data warehouse is a continuous cycle process. In the development process, designers and business personnel of enterprises should communicate with each other, jointly formulate goals and engineering plans, determine the topic of electric power marketing data warehouse, and provide strong support for decision makers to make decisions.

4.1. Determine the Topic Domain and Design Data Structure.

Based on the analysis of the relevant business data and business processes of the electric power marketing department, the marketing topics are divided into electricity sales analysis, user analysis, industry expansion analysis, metrology analysis, load analysis, repair report statistics analysis, power supply service and complaint analysis, etc. The fact attributes and dimension attributes corresponding to each topic are listed. The data in the data warehouse are usually stored in star or snowflake structure to facilitate users' query and call.

4.2. Data Preprocessing.

The main data source of the data warehouse is a large amount of historical data of power enterprises, some of which come from the existing information system and the other need to be manually entered through the entry system software, which requires the validity check of the data during the data migration process and converse operational data and other external data into a unified format.

4.3. Data Mining.

Data mining is to extract the knowledge that users are interested in from the data of large

databases. These knowledge are implicit, unknown in advance and potentially useful information. The extracted knowledge is expressed as concepts, rules, laws, patterns, etc. Data mining plays an important role in the whole decision support. It converts a large amount of data which was preliminarily processed in the data warehouse into useful knowledge and decision information to provide effective support for decision makers.

5. Conclusion

With the deepening of the reform of the power system, China's power system is gradually improving, and the natural monopoly of electric power enterprises will be broken and the independent operation of all links will gradually realize, including power generation, transmission and distribution. In fact, electric power enterprises should change the traditional management concept, establish a management-based and strategy-oriented management concept based on advanced computer network technology, make strategic deployment according to market changes; optimize the internal management mechanism of the electric power market, so as to continuously increase the advantages of enterprises in market competition and simultaneously optimize the economic benefits and social benefits to the greatest extent. Based on the business process of electric power marketing, this paper makes full use of the advantages of data warehouse technology and data mining tools, and builds a decision support system for electric power marketing on the basis of the existing management information system, which makes the decision of senior leaders of electric power enterprises be more rapid, scientific and accurate.

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