



Chapter VII

**Data Mining for Supply
Chain Management in
Complex Networks:
Concepts, Methodology
and Application**

Manoj K. Singh
i2 Technologies

Mahesh S. Raisinghani
University of Dallas, USA

ABSTRACT

The concept and philosophy behind supply chain management is to integrate and optimize business processes across all partners in the entire production chain. Since these are not simple supply chains but rather complex networks, tuning these complex networks comprising supply chain/s to the needs of the market can be facilitated by data mining. Data mining is a set of techniques used to uncover previously obscure or unknown patterns and relationships in very large databases. It provides better information for achieving competitive advantage, increases operating efficiency, reduces operating costs and provides flexibility in using the data by allowing the users to pull the data they need instead of letting the system push the data. However, making sense of all this data is an enormous technological and logistical challenge. This chapter helps you

understand the key concepts of data mining, its methodology and application in the context of supply chain management of complex networks.

INTRODUCTION

Fundamentally, a supply chain comprises the flow of products, information and money. In traditional supply chain management, business processes are disconnected from stock control and as a result, inventory is a direct output of incomplete or inaccurate information. The focus of contemporary supply chain management is on the organization, planning and implementation of these flows. First, at the organizational level, products are manufactured in one or several stages, transported and stored based on the customer's needs. This helps in determining the optimal structure of production sites, warehouses and transport and may involve business process reengineering. Second, the planning and control of component production, storage and transport are managed using central supply management and replenished through centralized procurement. Third, the implementation of the supply chain involves the entire cycle from the order entry process to order fulfillment and delivery. An order can result in new production orders, reiterations of stock reservations or orders placed with ancillary suppliers. Data mining can create a better match between supply and demand, reducing or sometimes even eliminating stocks.

Data mining, a process of discovering ideas in data, has become an indispensable tool in trying to understand the needs, preferences and behaviors of customers. It is used in pricing, promotion and product development. For instance, at Bank of America, the data mining efforts led to the unusual step of reducing required minimum balances in customers' checking accounts for two consecutive years. The bank learned that customers who have difficulty maintaining a minimum balance may take their business to competitors with lower minimum balance requirements. While it was clear that for a certain segment of the customer base, the minimum checking account balance was a key factor in their choice of banks, they needed to know if handling those customers' accounts was profitable for the bank. If the defecting customer did not contribute to the bottom line of the bank, then the smart decision would have been to leave the minimum balance alone (Fabris, 1998). Bank of America found the answer to this question by utilizing the data mining tool. This is a typical example of the application of data mining in the banking industry.

Traditionally data mining techniques have been used in banking, insurance and retail business. This is largely because of the fact that the implementation of these techniques seemed quite obvious and showed quick returns. For instance, data mining is being used for customer profiling where characteristics of good customers are identified with the goals of predicting new customers and helping marketing departments target new prospects. The patterns found in a customer database are applied to a prospect database for customer acquisition and target promotions. The effectiveness of sales promotions/product positioning can be analyzed using mar-

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