BUILDING COMPETITIVE ADVANTAGE VIA CRM BASED ON DATA WAREHOUSE AND DATA MINING

Jiejun Huang, Wei Cui, Yanbin Yuan
School of Resource and Environment Engineering, Wuhan University of Technology, Wuhan, China

Keywords: Customer Relationship Management (CRM), Data Mining, Data Warehouse, Decision-making.

Abstract: Customer Relationship Management (CRM) is providing a novel approach for managing the relationships between a corporation and its customers towards maximal profitability and sustainability. Data mining and data warehouse are the useful information technologies, which provide powerful means for extracting and utilizing the business information from historical data resources and runtime data flows. This paper reviews the objectives, functionalities, and development trends of CRM, discusses the architecture, data model and development methodologies of CRM systems based on data warehouse and data mining, then outlines the applications of integrated CRM systems in decision making, including business administration, marketing, customer service, customer management, and credit evaluation. Eventually, it describes some problems and challenges for further research.

1 INTRODUCTION

How to manage the enormous enterprise and the involved customer group becomes a crucial problem for corporation. It is a gigantic impact for global economy, such as insolvency of Enron, financial fraud of Worldcom, and the degenerate of Polaroid and Xerox. For this reason, it is widely concerned for all the enterprise to improve the corporation management, and customer relationship management. Data warehouse and data mining are both promising new technologies to transact information. It is their individual superiority to organize the business macro-database, and to mine the hidden and meaningful information. And it is very helpful for increasing a company's effectiveness and enhancing the competitiveness (Adam R, 2001).

The paper is organized as follows. Section 2 provides a brief summary of CRM systems. Section 3 discusses the structure and the process of CRM system based on data warehouse and data mining. In section 4, the commercial application of the integration CRM system is deeply analyzed, including business administration, market selling, customer management and credit evaluating. At last, we describe a set of challenging problems in section 5, and conclude with a summary.

2 WHAT IS CRM

2.1 The Goal and Function of CRM

CRM is aimed for management efficiency, and used new technologies to manage relationship between corporation and its customers effectively. The main functions of CRM include analyzing the customer's purchase interests, classifying the customers, and seeking latent and worthy ones. Thereby, the corporation can carry out personality service; heighten customer's satisfaction and loyalty. In order to keep competitive advantage, the corporation must adopt the strategy of customer centred, and build CRM system (Alex B, Smith,K 2000). It will decrease selling-cost and provide scientific conference for company to draw up production strategy and development scheme.

Through the CRM, the company can adjust the portal to connect with the customer, manage market resource effectively and build more value customer relationship, perform customer segmentation, ascertain the target market. It establishes an integrated feedback system, customer can comprehend the company more easy, and the company can provide superior service for them. All that may lead to the relationship more closely between the company and its customers.

Huang J., Cui W. and Yuan Y. (2006).
BUILDING COMPETITIVE ADVANTAGE VIA CRM BASED ON DATA WAREHOUSE AND DATA MINING.
In *Proceedings of the Eighth International Conference on Enterprise Information Systems - AIDSS*, pages 287-290
DOI: 10.5220/0002439402870290
Copyright © SciTePress

2.2 Trends and Directions of CRM

CRM was expounded in the end of 20th century. Its systemic capability is enlarged constantly, and the application domains are more extensive. In the future, the CRM systems will be connected with network, and become integration, intelligent and automation.

2.2.1 Web CRM

CRM is the core parts of current company. With more and more company becoming members of the World Wide Web, It is well known that the Internet will become even more vital. The Internet has exploited a widely market across space and time, it will be a basic platform for the development of enterprises. The internal sources can be shared by Web CRM, and the business process is optimized. No doubt that web CRM will be the future direction; it can support all the process, such as web management, web service and web marketing.

2.2.2 Intelligent CRM

CRM combines automatic selling technologies and intelligent systems, such as automatic withdrawal system, intelligent query system and public information service system, to achieve business intelligent perfectly. The fusion of communication methods (phone, fax, and email), automatic processing the customer relationship, and building automatic prediction model, all of these can provide an intelligent method to make decision. The goal of CRM will be automatic and intelligent system; it can do all the trade automatically, including customer management, process the business information, advertise and sell activities.

2.2.3 Integrated CRM

There takes great progress in the combination of CRM and ERP, and leads to infallible tendency for development of enterprise (Allan R, 2002). Meanwhile, new technologies apply in CRM, including data warehouse, data mining and OLAP, which will strengthen the function of CRM. Data warehouse can efficiently manage and analyze the complex business information. OLAP can be used to analyze the data from multidimensional, visual and complex view (Nordine M, 2001). Data mining may discover the meaningful relationship, pattern, or model from the customer data, which can guide the business activities, including customer segmentation, customer retention, and customer scoring, etc.

3 BUILDING CRM SYSTEM BASED ON DATA WAREHOUSE AND DATA MINING

Data warehouse can help the company do better for its customer service, and then create immense profits (Gabrielle G, 1999), (Lariviere Bart, Van Den, 2005). More important that data warehouse has allowed the company to strengthen CRM core capabilities and business partnerships (Lawyer J, Chowdhury S, 2004). Data mining provides an information technology to develop and utilize the data; it is very helpful for making decision by extracting regulations, patterns and models from large databases. And using knowledge discovery techniques is favourable to reaching a competitive advantage with CRM (Gottgtroy M, 2003). Therefore, the CRM system based on data warehouse and data mining has significant business value, it components jointly as data collecting and integrating, data modelling and knowledge discovery, business application and decision making. The architecture of CRM system based on data warehouse and data mining is showed as figure 1. And the three steps to implement the CRM system described as following.

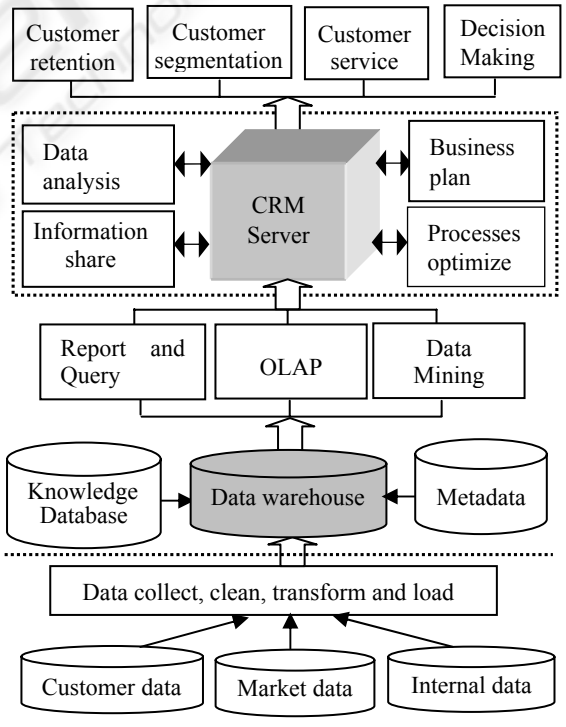

Figure 1: The architecture of CRM system based on data warehouse and data mining.

3.1 Surveying Market and Collecting Data

Define a business subject is a first step to make decision. We should collect the data about customers and market, and survey the market around the goal. There are lots of methods to capture the data, generally, as questionnaire, customer register table, statistics data, financial report, Web log files and tough points. The data not only includes customer information, internal data, competitive data and market information, but also includes the detailed data such as cost record spending on customers, transaction record and the customer contributions. In order to insure the reliability of the data, it must be cleaned and transformed and integrated. It is an indispensable step for the system, and it will affect the quality and effect of decision making directly.

3.2 Building Model and Extracting Knowledge

Building data warehouse of CRM, including design data structure, optimize its functions, store and manage the metadata, etc. In order to employ OLAP and make it easy to query and analyze data, we should organize the data efficiently (showed as fig.2). Then we can choose the method and algorithm exactly to build data mining model, and extract the hidden and meaningful knowledge. After understanding the model, we should evaluate and refine it until we have produced a model that is likely to be successful in discovering knowledge. The process is a core of the system which extracting the meaningful information by data mining model.

3.3 Result Evaluation and Business Application

This phase is to explain and evaluate the results, and then apply the knowledge to specific domain. Building the CRM server is to implement the optimization of process, exchange and sharing of information, feedback and transaction of customer data. The system has many functions such as analyzing the return of investment, the response rates, and the churn rates. Based on the result, the manager can draw up business plan and seek the target market. Furthermore, they can carry out the marketing strategy and adjust their production. By the evaluation model, we can execute the customer recognition, customer segmentation and customer retention, order tracking, and step-selling service, etc.

4 APPLICATIONS OF THE INTEGRATED CRM SYSTEMS

4.1 Business Administration

From the point of system, the company can make all of the processes optimization as customer service, product development and marketing. It supports information share and business cooperation, and maximize the functions including resource utilization and production. The company can find requirement of customers, and explore a new business domain and then improve the abilities of market adaptation. With the CRM system, the company can grasp the customers and markets more intelligently. It has embodied an obvious result in finance and telecommunication.

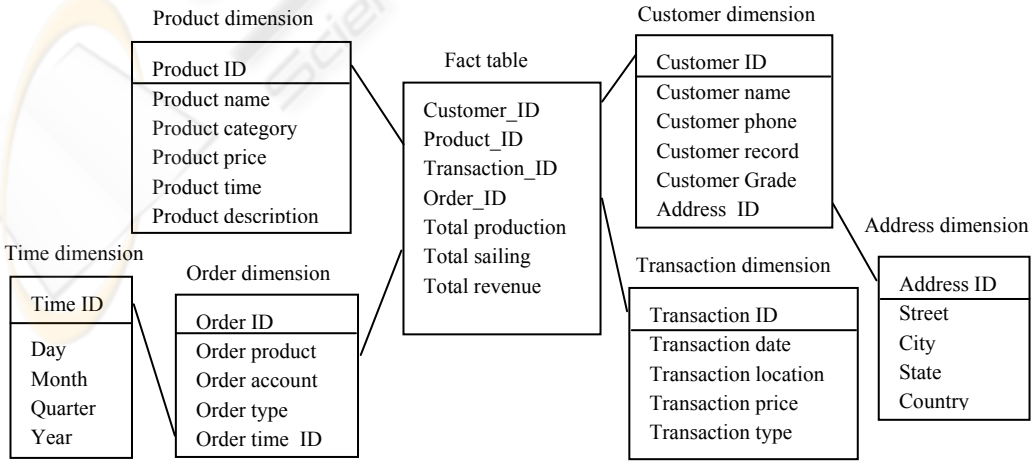

Figure 2: Snowflake schema of the data for CRM.

4.2 Customer Service and Customer Management

CRM has built a bridge for enterprise and customers, and becomes more efficient and rapid by data mining. With the right care and service, customers will be high-value, and their profitability will be optimized. After mining the customer's hobbies and interests, managers can improve business process. This will reduce the cost, and raise the benefit. Based on the information of customers, data mining can help segment the prospective customers, seek high profitable ones. Furthermore, it can create a solution to solve the problems, such as which customers are mostly to churn? The marketing tools merged with data mining have a mighty ability to predict the market, and business managers can implement the marketing campaign (Groth R, 1999). Companies can evaluate the marketing message to be delivered to customers and identify high-value ones. With personalized services, the relationship between company and customers is kept tightly.

4.3 Prediction and Marketing

Forecast and exploit the market is a crucial matter in improving economic benefit. CRM system can provide online service for customers, and the enterprise may quickly process the feedback about product function and selling service, and catch the information about interaction record, transaction history and request. After that, marketing and serving automatically will be come true, so the quality and efficiency of the actions has been improved. Web mining is helpful for identifying the profitable customers, improving the respond rate and reducing the cost. We can plan and predict the marketing campaigns after mining the customer data, implement positive selling and cross-selling, then provide the manifold and intelligent service. So that the business process has been expand and the quality and efficiency of the actions has been improved.

4.4 Credit Evaluation and Fraud Detection

Based on the transaction records, we can score the customer's credit rate, and then carry out selling and preferential service, enhance the abilities of market responding. In insurance, managers can analyze the action and feature of customers through building the evaluation model of customer. Then, they survey the instance and detect fraud, to discover who claims for compensation with perjury and predict a potentially fraudulent transaction. In telecommunication, data mining can predict and track cellular fraud for telecommunications, this control and reduces the unexpected risk effectively.

5 FUTURE RESEARCH

CRM is the core parts of current company, how to manage the customer relationship becomes a key of business competition. In order to take the lead of economic society, the company should make full use of the information technologies, and utilize its vantages and features. Data warehouse and data mining have mighty abilities to analyze the information, this provide a strong science evidence and technological support. The integrated CRM system will play an important role in commercial activity; and we believe that it will have a widely development market and application prospect.

ACKNOWLEDGEMENTS

The work in this paper was supported by National Natural Science Foundation of China (60175022, 40571128, and 40572166).

REFERENCES

Adam R. (2001). CRM Shifts to Data Mining to Keep Customers, *Global Finance*, 15 (11), 97-98.

Alex B, Smith,K(2000). Building data mining applications for CRM. McGraw-Hill Companies,Inc.

Allan R. (2002). Integrating ERP Can Overcome CRM Limits J, *Software Magazine*, 22 (1), 29-32.

Gabrielle Gagnon. (1999). Data Warehousing: An Overview, *PC Magazine*, 18 (5), 245-246.

Gottgtroy M, Gottgtroy P. (2003). Ontologies, CRM, data mining: How to integrate? *Management Information Systems*, 7, 307-316.

Groth R. (1999). Data Mining: Building competitive advantage,Prentice-Hall Ptr.

Lariviere Bart, Van Den poel Dirk. (2005). Predicting customer retention and profitability by using random forests and regression forests techniques, *Expert Systems with Applications*, 29(2): 472-484.

Lawyer J, Chowdhury S. (2004). Best practices in Data Warehousing to support business initiatives and needs. *Proc. of the 37th Annual Hawaii International Conference on System Sciences*, 3499-3507.

Nordine Melab. (2001). Data mining: A key contribution to E-business. *Information & Communications Technology Law*, 10(3), 309-318.

Ron K, Foster P. (2001). Applications of Data Mining to Electronic Commerce, *Data Mining and Knowledge Discovery*, 5(1/2), 1-7.