



Design of an intelligent supplier relationship management system: a hybrid case based neural network approach

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Abstract

In today's accelerating world economy, the drive to continually cut costs and focus on core competencies has driven many to outsource some or all of their production. In this environment, improving supply chain execution and leveraging the supply base through effective supplier relationship management (SRM) has become more critical than ever in achieving competitive advantage. It was found that the use of artificial intelligence in the outsourcing function of SRM to identify appropriate suppliers to form a supply network has become a promising solution on which manufacturers depend for products, services and distribution. In this paper, an intelligent supplier relationship management system (ISRMS) using hybrid case based reasoning (CBR) and artificial neural networks (ANNs) techniques to select and benchmark potential suppliers is discussed. By using ISRMS in Honeywell Consumer Product (Hong Kong) Limited, the outsource cycle time from searching for potential suppliers to the allocation of order is greatly reduced.

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Keywords: Supplier relationship management; Supplier selection and benchmarking; Supply network; Case based reasoning; Artificial neural network

1. Introduction

The integration of customer/supplier relationship management (CRM/SRM) to facilitate supply chain management in the areas of supplier selection using an artificial neural network (ANN) approach to validate the search result using CBR technology during the retrieval stage of the cycle in a real time base is a promising solution for manufacturers to identify appropriate suppliers and trading partners to form a supply network on which they depend for products, components, services and distribution. The result is the formation of an integrated supply network that allows the most appropriate suppliers of the manufacturers to deliver competitively priced, high quality products and services to their final customers according to their demand effectively. Choy, Lee, and Lo (2002a) designed a case based SRM system using a help desk approach and it was then applied in the purchasing department of an outsource-type manufacturer in Hong Kong, which has greatly improved the efficiency in the outsource cycle. Choy, Lee, and Lo (2002b) also suggested and illustrated

the technique of using case based reasoning (CBR) and ANN technologies in selecting and benchmarking potential suppliers during the process of new product development for manufacturers who outsource a significant part of their business. In this paper, an intelligent supplier relationship management system (ISRMS) using a hybrid CBR technique to select potential suppliers from a supplier list, followed by the benchmarking of the potential suppliers using ANN technique under a CRM/SRM platform, is discussed. By using ISRMS, manufacturers can shortlist and benchmark appropriate suppliers according to the position the supplier is ranked, resulting in the identification of preferred suppliers with references to the suitability of the supplier attributes selected. As a result, the outsourcing cycle time from searching potential suppliers to the allocation of orders to the most appropriate supplier can be greatly reduced with high accuracy.

This paper is divided into seven sections. Section 2 introduces customer relationship management (CRM) and SRM. Section 3 is about CBR and ANNs and their suitability in SRM. Section 4 is the development of ISRMS using a CBR system incorporating major tasks in SRM to form a distinct intelligent supplier evaluation system with the aid of the neural network (NN) shell, which

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is important for manufacturers wishing to outsource operations to reliable, suitable suppliers and business partners. The procedures for constructing the CBR based supplier selection module and NN based supplier benchmarking module, which are the critical issue for the success of ISRMS, are also detailed in this section. Section 5 is about the application case study, results and benefits by using ISRMS as an intelligent supplier relationship management system in the purchasing department of Honeywell Consumer Product (Hong Kong) Limited, to aid the conventional human reasoning process of suppliers selection. Finally a conclusion of the application of ISRMS in general is made in Section 6.

2. Customer relationship management and supplier relationship management (CRM/SRM)

Customer Relationship Management (CRM) is a process by which a company maximizes customer information in an effort to increase loyalty and retain customers' business over their lifetimes. The primary goals of CRM are to (a) build long term and profitable relationships with chosen customers, (b) get closer to those customers at every point of contact, and, (c) maximize the company's share of the customer's wallet (Shaw, 2001). Simply stated, CRM is about finding, getting, and retaining customers. It is at the core of any customer-focused business strategy and includes the people, processes, and technology questions associated with marketing, sales, and service. CRM allows the formation of individualized relationships with customers, with the aim of improving customer satisfaction and maximizing profits, identifying the most profitable customers and providing them with the highest level of service. Moreover, in the Internet age, CRM accesses new markets throughout the world wide web (www) to access world class capabilities and consequently increase the commoditization by shortening the product life cycle, and eroding margins. In summary, CRM is focused on leveraging and exploiting the interaction with the customer to maximize customer satisfaction, ensure return business, and ultimately enhance profitability for all.

It is found that the first wave of CRM processes focused on sales force, customer and field service automation, with a heavy emphasis on data access and transaction efficiency by

building out associated data infrastructures (data warehouses, segmented data marts, etc.). However, as each division within global enterprises initiated customer-related data projects on their own, they neglected acquiring supports from the company's suppliers effectively, who have become members in the company's supply chain.

As the trend toward use of technology to drive competitive advantage has taken root, visionary manufacturers are starting to take advantage of a new competitive opportunity called SRM. Herrmann and Hodgson (2001) defined SRM as a process involved in managing preferred suppliers and finding new ones whilst reducing costs, making procurement predictable and repeatable, pooling buyer experience and extracting the benefits of supplier partnerships. It is focused on maximizing the value of a manufacturer's supply base by providing an integrated and holistic set of management tools focused on the interaction of the manufacturer with its suppliers. In fact there is an interesting and satisfying symmetry between the role of CRM and the role of SRM in the manufacturing environment as illustrated in Fig. 1, which shows an enterprise applications architecture linking customers with the supply bases. As companies recognize the value of managing their supply base as a competitive weapon, SRM becomes the single most important technology investment they can make to ensure that supply chain transformation they are driving is successful (Herrmann & Hodgson, 2001). In fact, SRM improves the flow of product demand and supply information throughout the supply chain by four kind of activities. They are indirect and direct procurement, sourcing, and trading exchange. In fact, by integrating CRM with SRM properly through the process of product design and development, and the application of supply chain management under the platform of an ERP system, SRM solutions can provide significant competitive advantage by delivering value in three important areas: (1) dramatic cost savings, (2) increasing flexibility and responsiveness to customer requirements, and (3) substantially faster cycle times. Together these benefits can lead to meaningful faster time to market share in the course of the product life cycle based on customer demand with a maximum degree of customization.

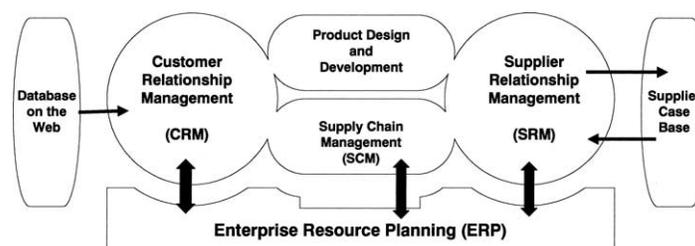


Fig. 1. Enterprise applications architecture.

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