Expert Systems with Applications 37 (2010) 4212–4223

Contents lists available at ScienceDirect

Expert Systems with Applications

journal homepage: www.elsevier.com/locate/eswa

Mining customer knowledge for tourism new product development and customer relationship management

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ARTICLE INFO

Keywords:
Tourism management
New product development
Data mining
Customer relationship management
Apriori algorithm
Clustering analysis
Knowledge map

ABSTRACT

In recent years tourism has become one of the fastest growing sectors of the world economy and is widely recognized for its contribution to regional and national economic development. Tourism product design and development have become important activities in many areas/countries as a growing source of foreign and domestic earnings. On the other hand, customer relationship management is a competitive strategy that businesses need in order to stay focused on the needs of their customers and to integrate a customer-oriented approach throughout the organization. Thus, this paper uses the Apriori algorithm as a methodology for association rules and clustering analysis for data mining, which is implemented for mining customer knowledge from the case firm, Phoenix Tours International, in Taiwan. Knowledge extraction from data mining results is illustrated as knowledge patterns, rules, and knowledge maps in order to propose suggestions and solutions to the case firm for new product development and customer relationship management.

1. Introduction

In recent years tourism has become one of the fastest growing sectors of the world economy and is widely recognized for its contribution to regional and national economic development. Tourism product design and development have become important activities in many areas/countries as a growing source of foreign and domestic earnings. In this regard, marketing decisions and strategic planning of tourism new product development require knowledge of factors, attributes, patterns of customer demand and market supply affecting destination choice, customer preference/capability, product characteristic, type of trips and forecast of tourism flows in the short and long term. Thus, it can be suggested that the purpose of the study of tourism new product development (NPD) is to improve the ability to estimate and/or forecast and understand travel behavior, traveler satisfaction, and tourism management (Bramwell, 1998; Witt & Witt, 1995). In addition, an important objective of tourism product demand and development analysis is to improve the understanding of public behavior towards particular customer purchases profiles and patterns. It is, therefore, interesting to know how customers select their tourism products and investigates which factors and attributes are determining their choices become important sources not only understand the demand of tourism but also investigate the segmentation of possible tourism product development (Seddighi & Theocharous, 2002).

Customer relationship management (CRM) is the key competitive strategy businesses need to stay focused on the needs of the customers and to integrate a customer facing approach throughout the organization. By using information and communication technology, businesses are trying to get closer to the customer so that they can create long-term relationships in tourism industry (Sevki & Rifat, 2006). Customer relationship management refers to all business activities directed towards initiating, establishing, maintaining, and developing successful long-term relational exchanges and it is the set of methodologies and tools that help an enterprise manage customer relationships in an organized way (Lawson-Body & Limayem, 2004). As customers and businesses interact more frequently, businesses will have to leverage CRM and related technologies to capture and analyze massive amounts of customer information. Because, information and communication technology allows customer data to be collected, consolidated, manipulated, and analyzed on an unprecedented scale. However, CRM demands more than information and communication technology. The customer must become the focal point of the organization. All members of the organization must understand and support the shared values required for CRM (Piccoli, O'connor, Capaccioli, & Alvarez, 2003).

In addition, most of the parties involved in the product design and development, such as the tourism suppliers and retailers, are aware of the importance and need for tourism firms to acquire

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doi:10.1016/j.eswa.2009.11.081

and share better customer knowledge. But this is easier to say than done since customers' knowledge is concealed within the customers. It is available but not accessible, and there is little possibility of exploring the full volume of data that should be collected for its potential value. Therefore, how to effectively process and use customer data is becoming increasingly important. This calls for new techniques to help analyze, understand or even visualize the huge amounts of stored data gathered from business and scientific applications (Liao & Chen, 2004). Among the new techniques developed, data mining is the process of discovering significant customer knowledge, such as patterns, associations, changes, and significant structures from large amounts of data stored in databases (Liao, Chen, & Wu, 2008; Liao, Hsieh, & Huang, 2008). Customer knowledge extracted through data mining can be integrated with product and marketing knowledge from research and can be provided to up tourism stream suppliers as well as downstream retailers. Thus it can serve as a reference for product development, product promotion and customer relationship management.

In terms of integrating data mining approach and tourism, Wickramasinghe, Amarasiri, and Alahakoon (2004) proposed an approach that integrates traditional mathematical, data mining, and evolutionary techniques with a multi-agent system. It is implemented as a travel optimizer application for the e-tourism domain. Law, Bauer, Weber, and Tse (2006) developed a rough sets based model that can capture the essential information from business travelers. In addition, Junping, Min, and Xuyan (2008) introduced the concept of the holiday tourism information data mining, which improves a distributed sampling association rule mining algorithm: DS-ARM, define the realization process of the algorithm, test the capability of the algorithm, and use the algorithm in the analysis of the holiday traveler destination traveling behavior. However, a few research considered the integration of data mining and tourism problem on new product development and customer relationship management.

On the other hand, map display is a powerful tool with the ability to convey a large amount of information in a limited space, and it also provides an interactive tool to allow the user to interact with the underlying information (Lin, 1997). Thus, the mapping approach, which focuses on the use of IT, can be used as a tool to support new product development. Holmlund and Strandvik (1999) proposed perception configuration as a new concept, and introduced configuration maps as tools for analyzing perceptions in business relationship studies. Tülin and Russell (1998) presented market maps with a probabilistic spatial panel data model that allows the positions of products sharing the same name to be correlated across product categories. In a business setting, the combination of perceptions by two parties (such as buyers and sellers) can be represented as a perception configuration. All the perceptions are depicted on the horizontal and vertical axes of the map. This map can be used to capture both the composition and the dynamics of perception configurations, and it is generically applicable to dyadic perception studies. Daniel, Wilson, and McDonald (2003) utilized a marketing map to represent the best practice in marketing and also used the process map to understand how IT can be deployed in order to support a marketing information system. In addition, marketing map and product map are designed and implemented on business alliances and new product development (Liao, Chang, & Lee, 2008). Thus, the map mainly illustrates the links between various stages of the planning and marketing process (Liao, Chen, & Tseng, 2009; Liao & Wen, 2009). Based on this concept, this study implements a knowledge map to illustrate that new product development and customer relationship management are essentially the function that matches the customer profile and product segmentation.

Accordingly, this paper investigates the following research issues in a Taiwan tourism firm: What exactly are the customers' profiles for tourism market? Are tourism knowledge of the customers and the product itself reflected in the needs and wants of the market? Can tourism product design and planning for product mix be developed according to the knowledge of customers? Can the knowledge of customers be transformed into knowledge assets of the case firm for new product development and customer relationship management? In addition, regarding the marketing methods, the direct marketing model can also be considered to ensure that the products developed are customer-oriented after customer/product patterns and segmentations been found. Clustering analysis and the Apriori algorithm are methodologies for data mining, which is implemented to mine knowledge from customers for NPD and CRM. The knowledge extracted from data mining results is illustrated as knowledge patterns, rules, and knowledge maps in order to propose suggestions and solutions to the case firm. The rest of this paper is organized as follows. In Section 2, we present the background of the current life insurance market in Taiwan. Section 3 introduces the proposed data mining system, which includes system framework, and physical database design. Section 4 presents the data mining process, including clustering analysis, Apriori algorithm, knowledge extraction process, and result analysis for NPD and marketing. Managerial implications are presented in Section 5; and Section 6 presents a brief conclusion.

2. The case firm – the Phoenix Tours International

2.1. Background of the case firm

The case firm, the Phoenix Tours International, founded in 1957, is the only OTC listed companies with ISO 9001 international quality certification in Taiwan, Republic of China. Before 1980, Phoenix Tours focused on inbound tourism business. After Taiwan government opened foreign tourism market in 1981, the case firm starts to extend its services to global tourism business. In 2001 and 2002, the case firm was selected as "the best tourism firm in Asia" by Travel Trade Gazette (TTG) and this is the only firm obtained this honor in Taiwan. In the last five years (2003–2007), the case firm occupied 58% inbound and outbound tourism market share and earned 1.5 billion NT dollars business value in average.

2.2. The new product development procedure of the case firm

The case firm plays the role of middle stream on whole tourism supply chain and provides retailing service and product to the tourism market. Besides selling travel products to downstream firms and individual customers, its main task is also to design and develop new product, such as inbound and outbound travel products, new destination discovery, place marketing, customization tour, and cooperate with upper stream suppliers to produce and release new product to the market. The NPD procedure of the case firm is shown on Fig. 1.

There are several tasks for planning and operation department, which is responsible for product development and customer relationship management, including:

(1) To collect information in order to investigate possible current and future market opportunities. All information from supply chain is gathering from inside and outside sources.
(2) To study and analyze information in order to figure out market situations, future development and design/develop new product.
(3) To cooperate with partners in order to develop and maintain inbound and outbound supply chains and markets.
(4) To evaluate/test cost and market in order to confirm that new product is workable and profitable. Thus, product and