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Behavior scoring model for coalition loyalty programs by using summary variables of transaction data

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ABSTRACT

OKCashbag (OCB), the largest coalition loyalty program in Korea, offers a number of benefits such as sharing customer data with participating firms and cross-selling. There is great value in utilizing information pertaining to coalition loyal patrons. However, the size of transaction data is huge. We propose how to create necessary summary information by reducing the dimension of coalition transaction data. This information is then utilized to develop a behavior-scoring model. We expect that our study results can contribute to big data analysis for coalition loyalty program.

1. Introduction

OKCashbag (OCB) is the largest coalition loyalty program in Korea. OCB covers assorted business areas such as fuel retailing, telecommunications, brokering, banking, comprehensive retailing, restaurants, online retailing and entertainment including movie, to name a few. From a company perspective, this type of program offers a number of benefits over single-loyalty programs. First of all, marketing, operational and infrastructure costs can be shared (Capizzi & Ferguson, 2005; Nath, 2005). Second, it creates greater potential for cross-selling (Ferguson and Hlavinka, 2006). Third, coalition loyalty programs can complement the strengths and weaknesses of participating companies (Berman, 2006). Thanks to such benefits, coalition loyalty programs have become very important in the 21st century (Capizzi & Ferguson, 2005).

To maximize the benefits of such programs, it is important to utilize information pertaining to loyal patrons who have histories of frequent purchases in various participating firms. Insights derived from demographic information and the purchasing behavior can help us gain a better understanding of whether a coalition loyalty program is doing what it is supposed to do.

Loyal patrons are generally defined by the recency of their last purchase, the frequency of purchases within a given time period and the monetary values of all purchases (RFM) (Chiang, 2011; Hosseini, Maleki, & Gholamian, 2010). They tend to increase their spending over time and spread positive word-of-mouth (Migueis, Van den Poel, Camanho, & Cunha, 2012). Unlike general loyal patrons, OCB loyal patrons are defined in terms of the number of participating firms covered by individual customer's purchase history, in addition to the period since date of joining OCB, the frequency of saving points and the amount of points saved. Especially, OCB considers various purchase activities to be the most valuable information when identifying coalition loyal patrons. However, there have been few studies related to loyal patrons in coalition loyalty programs examining purchase activities in various firms over period. In coalition loyalty program, the amount of transaction data over various firms is large and the main issue is how to reduce the dimension of transaction data that describe various types of purchases. Purchase history is typically recorded as a multivariate time series.

The main purpose of this study is to develop behavior-scoring models that can identify loyalty patrons in coalition program over period by proposing summary variables that can reduce the dimension of coalition transaction data. First, we propose an application-scoring model, by utilizing customers' demographic information and their lifestyle categorized by OCB. Next, we propose a behavior-scoring model using summary variables of additional characteristics containing multivariate time series of purchase histories of customers in the OCB program. In order to identify customers' behavior trends, we create several summary variables from customers' transaction data. Our results are expected to contribute to not only OCB business but also similar coalition programs in utilizing customer data for their marketing strategies.

This paper is organized as follows: In Section 2, we review literature related to transaction data processing and loyalty programs. In Section 3, behavior-scoring models are developed using empirical data. In the last section of the paper, we discuss our study results as well as areas for further research.

2. Literature review

2.1. Loyalty program

General loyalty programs have been widely used as a means to engender customer loyalty. Sharp and Sharp (1997) regarded

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loyalty programs as a means to offer financial compensation and described the strategic purpose of loyalty programs from a business perspective. Liu (2007) used both reward and repeated purchase behavior as keywords to define loyalty programs. According to Liu, a loyalty program was a system that allowed customers to earn or accumulate rewards as they made repeated purchases. Leenheer, Van Heerde, Bijmolt, and Smidts (2007) defined a loyalty program as a comprehensive program of marketing activities that enhanced customer loyalty by rewarding loyal behavior and consequently strengthened the long-term competitiveness of the loyalty program operator. Such loyalty programs gathered and used customer information relating to demographic information, past purchase behavior, and purchase location. Firms utilized this information to maximize profits through marketing efforts (Kumar & Shah, 2004; Lacey and Sneath, 2006; Leenheer et al., 2007; Sohn & Kim, 2007).

Berman (2006) discussed the potential benefits of effective loyalty programs as increased customer loyalty, lower price sensitivity, and stronger brand attitude, access to important information on consumers and consumer trends, higher average sales due to cross-selling and up-selling opportunities, greater ability to target special consumer segments, and increased success in implementing product recalls. Moreover, such programs have positive effects on customer lifetimes and share of consumer expenditures (Berger & Nasr, 1998; Meyer-Waarden, 2007; Mulhern, 1999). Bolton, Kannan, and Bramlett (2000) investigated the effect of loyalty reward program. In their study, it was identified that loyalty reward program could strengthen customers' perceptions of the company's value proposition as customized strategies for customers. In addition, the programs could not only encourage customers to become more demanding pertaining to product or service benefits and price, but also increase customers' satisfaction (Bolton et al., 2000; Yen & Gwinner, 2003).

Allaway, Berkowitz, and D'Souza, (2003) explored the processes and driving forces of spatial diffusion across a retail market area following the launch of a new loyalty program, and their findings supported the importance of targeting the innovation adopter group. Leenheer and Bijmolt (2008) examined antecedents of loyalty program adoption by retailers and the perceptions of retailers regarding the effectiveness of loyalty programs. The authors found that making loyalty program membership mandatory was an important step to reinforce the share of wallet. Verhoef and Donkers (2005) emphasized acquisition channels for effective loyalty programs while Guenzi and Pelloni (2004) emphasized interpersonal relationships (Kumar & Venkatesan, 2005). Wirtz, Mattila, and Lwin (2007) examined the impacts of such loyalty programs on the share of wallet and explored the moderating role of behavior loyalty on this relationship by focusing on two characteristics of reward programs: perceived attractiveness and perceived switching costs between loyalty programs. They found that perceived switching costs were highly effective for driving share of wallet at low rather than high levels of attitudinal loyalty, but only when combined with an attractive reward program. The attractiveness of a reward program had a positive impact on the share of wallet regardless of the level of psychological attachment to the company.

2.2. Coalition loyalty program

A coalition loyalty program was defined as a program in which three or more companies unite to share branding, operational costs, marketing expenses and data ownership of a common loyalty currency (Capizzi & Ferguson, 2005). The difference between coalition loyalty program and other loyalty program is to utilize the number of alliance companies. Another important difference is the goal of the program. For most loyalty program, the evident goal is to create and reinforce the relationship with the existing customer base. This is done by promoting direct sales and by locking in customers by offering them the ability to collect points over time. Therefore, the main goal of coalition loyalty programs often is not only to strengthen and directly support the value proposition of the firm, but also to offer cost and strategic advantages related to networking, the spillover effects of partners' images, and cross-selling opportunities (Cigliano, Georgiadis, Pleasance, & Whalley, 2000; Lemon & von Wangenheim, 2009).

Coalition loyalty programs can reduce the expense of setting up and maintaining loyalty programs and increase the desirability of loyalty program membership by complementing each organization's strengths and weaknesses (Berman, 2006). The range of rewards for customers can be another benefit. This range is often very large and normally much larger than in a single loyalty program. In a coalition loyalty program several partners participate, so they can, for instance, offer a variety of rewards from their own assortment (Dunlap, 2004; Rowley, 2004). Capizzi and Ferguson (2005) emphasized that a firm with a coalition loyalty program had a greater likelihood to be the first to market a product or service when compared to other firms attempting to catch up with copycat programs. Consumer loyalty was mainly directed to the coalition loyalty programs and not the retailers themselves (Vesel & Zabkar, 2009). Moore and Sekhon (2005) showed that members of coalition loyalty program exhibit weaker emotional and financial bonds between the program provider and its customers. Rowley (2005) found that using multiple channels in coalition loyalty programs can effectively build customer relationships. Nunes and Dreze (2006) indicated that one of the objectives of the coalition loyalty program is to yield more insights into customer behavior preferences than general loyalty programs.

2.3. Big data analysis

Organizations have been accumulating massive volumes of data. The size of world's data is estimated to be doubling every 20 months (Frawley, Piatetsky-Shapiro, & Matheus, 1991). However, much of the data has not been effectively utilized due to the lack of advanced methods to analyze this large-scale and intricately structured data (Sen, 1998, Chopoorian, Witherell, Khalil, & Ahmem, 2001). This problem has been compounded by the organization's growing use of Web applications. These applications enable businesses to gather more data from their electronic transactions, which, in turn, require extensive analyses to better serve users and customers. The challenge of too much data and too little information is at the heart of the movement toward data mining (Chopoorian et al., 2001).

For analysis of big data, Bayesian Networks can be used for reconstructing the data (Schadt, Linderman, Sorenson, Lee, & Nolan, 2010). Clustering algorithms are also widely used in many scientific and engineering applications for analysis of big data. Especially, parallel clustering algorithms provides a good way to handle large data sets (Kuo, An, Wand, & Chung, 2006; Li, 1990). Bai, White, and Sundaram (2009) had proposed a framework for visual decision making in multi-paradigm, multi-domain problems that deal with complex multi-dimensional data.

Typically, such big data have more variation than other types. Therefore, data integration is one of the important elements for analysis. For integration skills, service based method like WSDL an XML format provides a model for describing Web services (Raschid, 2003). Hernandez and Kambhampati (2004) classify data integration approaches into warehousing, mediator or view integration (Hernandez & Kambhampati, 2004; Raschid, 2003).

Additionally, in case of customer transaction data, Bhat and Goel (2011) proposed a slightly unconventional data mining method where the transaction data is analyzed from the application