

The modeling and analysis of the word-of-mouth marketing

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Abstract

As compared to the traditional advertising, word-of-mouth (WOM) communications have striking advantages such as significantly lower cost and much faster propagation, and this is especially the case with the popularity of online social networks. This paper focuses on the modeling and analysis of the WOM marketing. A dynamic model, known as the SIPNS model, capturing the WOM marketing processes with both positive and negative comments is established. On this basis, a measure of the overall profit of a WOM marketing campaign is proposed. The SIPNS model is shown to admit a unique equilibrium, and the equilibrium is determined. The impact of different factors on the equilibrium of the SIPNS model is illuminated through theoretical analysis. Extensive experimental results suggest that the equilibrium is much likely to be globally attracting. Finally, the influence of different factors on the expected overall profit of a WOM marketing campaign is ascertained both theoretically and experimentally. Thereby, some promotion strategies are recommended. To our knowledge, this is the first time the WOM marketing is treated in this way.

Keywords: word-of-mouth marketing, overall profit, differential dynamical system, equilibrium, global attractivity

1. Introduction

Promotion is a common form of product sales. The third-party advertising on mass media such as TV and newspaper has long been taken as the major means of promotion. However, this promotion strategy suffers from expensive cost [1, 2]. Furthermore, it has been found that, beyond the early stage of product promotion, the efficacy of advertising diminishes [3]. Word-of-mouth (WOM) communications are a pervasive and intriguing phenomenon. It has been found that satisfied and dissatisfied consumers tend to spread positive and negative comments, respectively, regarding the items they have purchased and used [4, 5]. As compared to positive comments, negative comments are more emotional and, hence, are more likely to influence the receiver's opinion. By contrast, positive comments are more cognitive and more considered [6–9]. The significant role of WOM in product sales is supported by broad agreement among practitioners and academics. Indeed, both positive and negative WOM will affect the purchase decision of potential consumers. Due to striking advantages such as significantly lower cost and much faster propagation, the WOM marketing outperforms the traditional advertising marketing [10, 11]. With the increasing popularity of online social networks such as Facebook, Myspace, and Twitter, the WOM marketing has come to be one of the main forms of product marketing [12].

Currently, the major concern on WOM marketing focuses on finding a set of seeds such that the expected number of individuals activated from this seed set is maximized [13]. Toward this direction, large number of seeding algorithms have been reported [14–23]. Additionally, a number of dynamic models capturing the WOM spreading processes have been suggested [24–34]. However, all the previous work builds on the premise that a single product or a few competing products are on sale. Typically, customers involved in a marketing campaign may purchase multiple products. The ultimate goal of such marketing campaigns is to maximize the overall profit. To achieve the goal, it is

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