



The effectiveness of word of mouth in offline and online social networks



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ABSTRACT

Social networks connect users to share thoughts and build friendships. The high degree of intimacy among users has made it a good venue for word-of-mouth (WoM) marketing. Admittedly there are some basic differences, but this study focuses on the effectiveness of WoM marketing in offline and online social networks. A system was developed to simulate offline and online networks using small-world (SW) and scale-free (SF) networks, respectively. An offline network was found to be more effective in promoting a product with a fixed advertising budget and in selling higher margin products than an online network. However, if customers have diversified backgrounds and are strongly opinionated, an online network is a better venue. These findings can be used as guidelines to determine the appropriateness of moving WoM marketing from offline to online networks.

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1. Introduction

A social network is a platform that groups users together so that they can establish friendships and interact with one another on the basis of common activities. Social networks have extended from conventional offline networks to online networks due to the evolution of the Internet. The migration from offline to online networks may inherit many offline network properties. For example, perceived similarity is a major factor in online friendship while social attraction is the most important factor in offline friendship. However, many friendships originating online will move offline afterward (Anthenunis, Valkenburg, & Peter, 2012). Dunbar, Arnaboldi, Conti, and Passarella (2015) found that online social networks share many structural characteristics with offline face-to-face networks. For example, Facebook users' social network has approximately a four-layer structure and Twitter a five-layer structure (Servia-Rodríguez et al., 2014). Subrahmanyam, Reich, Waechter, and Espinoza (2008) found that adults use different online contexts to reinforce different aspects of their offline connections. Because an online social network connects users with similar characteristics or preferences, it becomes a reasonable venue for targeted marketing, such as word of mouth (WoM) communication, which is a natural part of online consumer interaction (Brown, Broderick, & Lee, 2007; Huang & Yang, 2011). A study from China Internet

Network Information Center (CNNIC) regarding the online market research in 2015 in China (<http://research.cnnic.cn/>) shows positive WoM (77.5%) is more important than price (72.2%) in purchasing a product online. Another study from the same institute regarding the social network behavior in 2015 indicates that more than 35% of Internet users share their purchase information and 32.3% share their purchased products through online referral.

Strategies such as WoM marketing using online social networks are generally believed to be effective. However, can WoM marketing strategies be conducted online as effectively as those offline? This is the focal question of this study. WoM marketing, also called viral marketing, disseminates a message in a peer-to-peer manner. Pauwels, Aksehirli, and Lackman (2016) found that WoM marketing on topical brands, ads, and purchases could drive both online and offline store traffic. Moreover, the encouragement of customer-to-customer interactions can enhance profitability (Libai et al., 2010). Compared with traditional marketing activities, WoM referral has a larger short-term response and longer carryover effect (Trusov, Bucklin, & Pauwels, 2009). However, Huang, Zhang, Liu, and Liang (2014) found that when launching a new product, the online WoM channel had more of an effect on the peak sales rate than the offline WoM channel.

Baker, Donthu, and Kumar (2016) studied individual conversations of different brands and found that the averaged purchase intentions using online WoM were 0.1% lower than offline WoM. Moving from offline to online social networks requires the differences between online networks and offline networks to be taken

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into account. For example, (1) the intimacy of offline social networks is higher than in online social networks that allow messages to be disseminated “virally”; (2) the number of connections in an online social network is higher than those in an offline social network, such that the message can spread more widely; (3) the diversity of users’ backgrounds and preferences is higher online, which can discourage message dissemination; and (4) the cost of online message distribution is lower while speed is higher.

Because online and offline social networks have some basic differences, this study focuses on discovering which factors determine the effectiveness of WoM marketing, and subsequently provides a guideline for a firm to determine when to move marketing from offline to online. When studying the difference between online and offline WoM marketing in launching a new beer in the Australian market, Groeger and Buttle (2014) noted that approximately 21% of a person’s offline conversations also reached other members through social networks and caused unmeasurable multiple exposures. Thus, since comparable online and offline networks are impossible to find, we will use simulations to demonstrate our arguments. Specifically, we use a small world (SW) network to represent offline networks and a scale-free (SF) network for online social networks. This is because most pairs of nodes have a short path length in an SW network that is typical of offline networks, i.e. most nodes that are not neighbors can be reached with a small number of steps (Watts & Strogatz, 1998). In contrast, an SF network is used to represent online networks’ distribution of nodes, because both follow a power-law distribution, in which some nodes act as connective hubs, e.g., Facebook, Twitter, Sina Weibo, etc. We will examine the effectiveness of WoM marketing in both networks by experimenting with parameters of network type, product type, and consumer properties.

2. WoM marketing in online social networks

Researchers have focused on different aspects of adopting WoM marketing to online social networks. The first is about social influence. For example, Mayzlin and Yoganasimhan (2012) found the motivation for posting a blog entry is to signal the ability to link readers to valuable information. Baker et al. (2016) showed that stronger-tie WoM could increase purchase intentions and retransmission intentions than weaker-tie WoM. Shriver, Nair, and Hofstetter (2013) found those who published more blog entries have more friends, and when they have more friends they are motivated to publish more blog entries. Sun and Zhu (2013) showed that if bloggers allow ads to appear on their blogs and can share revenue, they are motivated to create messages to increase readership. Gopinath, Chintagunta, and Venkataraman (2013) and Zhao et al. (2013) found that consumers are influenced by product reviews, and WoM marketing can stimulate demand. Shriver et al. (2013) and Li and Du (2014) studied the influence of opinion leaders.

The second area of study is factors that affect purchase decisions. For example, Gopinath, Thomas, and Krishnamurthi (2014) and Subramanian et al. (2014) emphasized the quality of message, i.e. “what they said” was more important than “how much they said.” Lee, Hosanagar, and Tan (2015) focused on the bandwagon effect and differentiation behavior during message dissemination. The effect that the heterogeneity of consumers has on message dissemination is another perspective that has been explored. For example, Bapna and Umyarov (2015) found those who have fewer friends are more easily affected by WoM marketing. Ma, Krishnan, and Montgomery (2015) observed that consumers who purchased the same product show a homophily of preference, social influence, or other exogenous causes. Zhang, Liu, and Chen (2015) differentiated “friend-network” from “stranger-

network” in message dissemination behavior. They found the former used WoM marketing and the latter preferred user-generated content. Baker et al. (2016) showed that positive WoM could increase purchase intentions but was less impactful than the damage caused by negative WoM. Aral and Walker (2014) distinguished online users using different strengths of ties, and Manchanda, Packard, and Pattabhiramaiah (2015) examined the user interaction in firm-sponsored online customer communities. Amaldoss and Jain (2015) analyzed the pricing strategy in monopolies versus duopolies and (Li & Du, 2017) addressed the influence in online promotion.

The third area of study focuses on demand. For example, Toubia, Goldenberg, and Garcia (2014) used a BASS model to forecast product demand using WoM marketing. Labsomboonsiri, Mathews, and Luck (2017) noticed that those customers seeking to solve their problems and develop social bonds preferred to be involved in WoM. Yildirim, Gal-Or, and Geylani (2013) studied the loss due to segmentation of customers. Negahban (2013) considered order quantities and Abedi, Berman, and Krass (2014) examined the location problem in WoM marketing.

3. Model

Social networks are places where people establish certain relationships. In a social network, information disperses quickly along social ties. The information is generally highly valued by recipients. This is why WoM marketing is commonly conducted via a social network. In a network format, consumers are the vertices and their relationships are the edges.

In this study, we investigate whether or not moving a product online using WoM marketing is a good strategy and what the determinant factors are. To do so, we make use of the approach in Negahban (2013) to develop a two-stage marketing strategy to simulate WoM marketing in both an online social network and offline social network. That is, a company first uses direct advertising to promote products to designated customers, and then uses these customers as source nodes to influence their connected nodes (friends) to buy the products. The final market demand is the combination of both sources.

This problem is treated as a classical newsvendor problem, where the demand for the product is initiated endogenously rather than exogenously. That is, retailers need to determine their order quantities and inventory levels to satisfy demands before the product launching. There is no replenishment allowed. If a retailer orders more than its customer can consume, the surplus will generate overage cost. In contrast, if the demand cannot be satisfied, there is underage cost. The newsvendor problem is a single period, stochastic inventory problem dealing with fixed-price perishable goods with uncertain demand. The model uses stochastic variables to simulate the demand for products given an individual unit’s profits and costs. In this case, a firm needs to determine the possible order quantity to maximize profits or minimize costs. The example of the newsvendor problem can be seen in Nagarajan and Shechter (2014) and Xu, Meng, Shen, Jiang, and Ji (2015) where the decision preference is loss-averse. In addition, Chen, Long, and Perakis (2015) studied order quantity and revenue in relation to conditional value at risk (CVaR) and the smallest risk tolerance level under different risks. Levi, Perakis, and Uichanco (2015) focused on the data-driven newsvendor problem using real-world data and noticed the market demand of a product is affected by the accuracy and complexity of data sampling. Negahban (2013) and Dai and Meng (2015) considered a multi-variant decision model in which market demand is affected by factors such as price and sales efforts.

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