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Strategies for new product diffusion: Whom and how to target?☆

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ABSTRACT

This paper examines the promotional strategies for new product diffusion by leveraging peer effects among consumers. Previous studies have offered conflicting recommendations on whom to target (e.g., influentials, susceptibles, or unsusceptibles) with respect to new product promotions. Utilizing agent-based modeling and simulation (ABMS), we show that each of the proposed consumer groups can be a promising target, depending on how they are targeted, according to target size and promotion intensity. The authors further recommend the optimal combination of *whom* and *how to target* under budget constraints. Specifically, where a budget is limited, the best approach is to target as many susceptibles as possible with a weak promotion. Targeting unsusceptibles with free products should be the first choice, where the budget is large. In other cases, the best approach is to target as many influentials as possible with a moderate promotion.

1. Introduction

New products are essential to a firm's continued growth in revenues and profits. In order to ensure the success of new products, firms frequently develop and implement targeting programs. Firms offer promotions (e.g., discounts or freebies) to one or more special groups of consumers to foster product diffusion through peer effects among consumers (Ho, Li, Park, & Shen, 2012; Iyengar, Van den Bulte, & Valente, 2011). Recent technological advances, such as customer relationship management systems, consumer behavior scanners, online brand communities, and social media, offer firms unprecedented opportunities to leverage peer effects (Gruner, Homburg, & Lukas, 2014; Hinz, Skiera, Barrot, & Becker, 2011). As a consequence, the last decade has witnessed an increasing number of studies on targeting strategies (Haenlein & Libai, 2013; Hinz et al., 2011; Libai, Muller, & Peres, 2013; Nejad, Amini, & Babakus, 2015).

Despite this, two questions still need to be answered. The first is "whom to target," since previous studies provide conflicting recommendations: some propose to target influentials, that is, who have a wide-ranging influence in society (Hinz et al., 2011; Iyengar et al., 2011; Nejad et al., 2015); some others propose to target susceptibles, who are especially susceptible to peer effects (Jain, Mahajan, & Muller, 1995; Mahajan & Muller, 1998); and others point to unsusceptibles, who are the opposite of susceptibles and less prone to peer effects (H. Hu, Lin, & Cui, 2015a; Janssen, 2011). The second question is "how to target." This involves two issues, namely, target size (i.e., how many target consumers should be selected) and promotion intensity (i.e., how intensively they should be incentivized) (Aral, 2011). Related studies have examined the optimal number of free giveaways to offer (Libai et al., 2013; Nejad et al., 2015). However, those results do not apply to other commonly-practiced promotions that are less attractive than free products, e.g., 10% price discount and "buy two get one free" offers. With reference to the above-mentioned research gaps, this study aims to identify the most promising targets in various size-intensity settings.

In addition, we consider targeting strategies that are constrained by marketing budgets. For example, a limited budget may only allow a firm to offer free products to 0.1% consumers, or reach far more consumers with a 10% discount in price. In the former, the program may not be able to reach a sufficient number of key consumers, and thus fail to support product diffusion. By contrast, a 10% discount may be unattractive to induce adoptions. Hence, which one would be the better choice? Moreover, does it vary across consumer groups (influentials, susceptibles, and unsusceptibles)? It is the goal of every firm to make the best of their marketing investment. Thus, this study also investigates the optimal combination of *whom* and *how to target* under budget constraints.

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Table 1
Comparison of studies related to targeting programs.

Study	Methodology	Whom to target[a]				How to target		Budget constraints
		I	S	U	R	Intensity	Size	
Jain et al. (1995)	Mathematical		√		√	Free giveaway	Variable	No
Mahajan and Muller (1998)	Mathematical		√		√	Free giveaway	Variable	No
Lehmann and Esteban-Bravo (2006)	Mathematical		√		√	Free giveaway	Variable	No
Iyengar et al. (2011)	Empirical	√				Free giveaway	Not considered	No
Hinz et al. (2011)[b]	Empirical	√			√	Free giveaway	Variable	No
Watts and Dodds (2007)	ABMS	√			√	Free giveaway	Only one seed	No
Kiss and Bichler (2008)	ABMS	√			√	Free giveaway	Variable	No
Delre, Jager, Bijmolt, and Janssen (2010)	ABMS	√			√	Free giveaway	Not considered	No
Janssen (2011)[b]	ABMS	√	√	√	√	Modest promotion	Fixed	No
Libai et al. (2013)	ABMS	√			√	Free giveaway	Variable	No
Nejad et al. (2015)	ABMS	√	√		√	Free giveaway	Variable	No
H. Hu et al. (2015a)[b]	ABMS	√	√	√	√	Modest promotion	Fixed	No
This study	ABMS	√	√	√	√	Variable	Variable	Yes

[a] I = influentials, S = susceptibles, U = unsusceptibles, and R = random targets.
[b] The study also identifies targets based on other indicators of network centrality, such as betweenness and closeness.

We address our research objectives by using agent-based modeling and simulation (ABMS), a relatively new computational modeling approach that has been used to explore diffusion-related research questions (Rand & Rust, 2011). This approach allows us to examine various scenarios that occur in the real world but are difficult to capture by other methods.

The remainder of this paper is structured as follows. The following section elaborates on the theoretical background of targeting programs. The third section develops the hypotheses. The fourth section introduces the ABMS model, and the fifth section presents the outcomes. The paper concludes with a discussion of the theoretical contributions and managerial implications, as well as directions for further research.

2. Background

2.1. Mechanisms underlying diffusion: peer effects

Peer effects, which are characterized as the dependence of one's adoption decision on interactions with others, are essential to the adoption of a wide range of products. Specifically, peer effects refer to an increase in the probability of a consumer's adoption of a product with respect to the number (or proportion) of peers who have already adopted the product (Bollinger & Gillingham, 2012; Iyengar et al., 2011; Moretti, 2011).

DiMaggio and Garip (2012) highlight three principal mechanisms underlying peer effects, namely, local network externality, social learning, and normative influence. Local network externality arises when the value of a product is dependent on the number of peers adopting it. Classic examples include telephone and online social networking, where a greater number of users increase the value to each. Social learning occurs when prior adopters share product information with their friends, which reduces the cost or risk of buying a new product or increases its utility. For example, association with friends who have already used a new type of laptop can reduce quality uncertainty. Friends may also share the experience of the additional features of the equipment, thereby raising the reservation price.

The third mechanism, normative influence, functions as social rewards bestowed on adopters and sanctions exacted on non-adopters by their peers. For example, the tendency to use biodegradable garbage bags can be reinforced by the positive response of friends and neighbors who appreciate the use of environment-friendly products. Normative influence may also arise because of status competition (Iyengar et al., 2011). For example, high-status physicians might be driven to adopt a medical innovation quickly once they observe the adoption of lower-status peers, out of fear that their own status advantage will be eroded (Burt, 1987).

Consumers are heterogeneous in terms of susceptibility to peer effects; thus, they tend to adopt a new product at different times (Rogers, 1995). A small number of risk-taking consumers, often referred to as innovators, will try an unproven product as soon as it becomes available. Some consumers, who are known as early adopters, are especially susceptible to peer effects and adopt quickly. Next in the adoption line is the early majority, which refers to consumers who are relatively more cautious in trying new products and who only adopt after early adopters have validated the product. The late majority, consisting of skeptical consumers, adopt only after the product has become popular in the population. Consumers who avoid change and are unsusceptible to peer effects do not adopt the product until traditional alternatives become unavailable; they are also known as laggards.

2.2. Targeting strategies

When developing promotional campaigns, marketers need to determine who the targets are (Aral, 2011). Several options are available. Undifferentiated targeting is a common strategy, whereby marketers ignore market segment differences and appeal to prospective customers randomly through mass distribution. A typical example is when Microsoft distributed 450,000 free copies of Windows 95® to consumers across the US (Rosen, 2009). Alternatively, marketers may focus on a specific group of consumers. For example, US pharmaceutical firms often spend fairly sizeable budgets on marketing products to opinion leaders (Nair, Manchanda, & Bhatia, 2010). Another example is cell phone makers like Apple and Samsung, when launching an upgraded handset, offer a trade-in plan to customers who have demonstrated a willingness to buy their products (Apple, 2017; Samsung, 2017).

Studies commonly suggest that specialized targeting is superior to undifferentiated targeting. However, these studies can be divided into two categories in terms of the criteria used to identify promising targets, as summarized in Table 1. One category focuses on consumers who are at the center of a social network. In this line of research, influentials connected with a high number of peers are often recommended. The other category of studies pinpoints targets based on consumers' susceptibility to peer effect (also known as the propensity to adopt) and recommends susceptibles, who constitute the basis for a successful diffusion, and unsusceptibles, who resist change and disrupt the process of diffusion. These conflicting recommendations necessitate evidence-based comparisons (Hinz et al., 2011; Nejad et al., 2015).

In addition to deciding whom to target, marketers must consider *how to target*, including target size and promotion intensity, to make the best use of marketing efforts. Prior studies have placed primary focus on

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