



Service investment for online retailers with social media—Does it pay off?



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ABSTRACT

We investigate the impact of investments in delivery service with one or two major competing online retailers. Customers diffuse among the retailers, based on purchasing experience and online reviews (i.e., social network). Firms decide on investments aimed at maximizing profit. For both Nash and Stackelberg competition cases, the effect on market share, optimal investment cost and profit are calculated. Cases without social network are also studied, showing that a social network leads to faster convergence of the market. When a social network exists, both the leader and follower invest more, with higher profits. Our results confirm experiences from competition practice.

1. Introduction

As online retailers are playing a more and more important role in the modern society, traditional retailers have started to build online sales channels. For companies like Amazon, Zalando, or Alibaba, the online channel is the prime way through which customers can order. Omni-channel companies use physical stores to reach the customer in addition to the online channel. Online sales still grow rapidly. As an example, Coolblue, a main online retailer in the Netherlands, has realized annual growth percentages of around 50% in the last five years, leading to a turnover of €857 million in 2016 (Coolblue – Wikipedia, 2017).

For online retailers, accurate, speedy, reliable, and punctual order delivery is pivotal. If customer expectations are not met, this will affect the repeat purchasing probability. A study conducted by Forrester Research (2014) shows that retailers are increasingly aware that providing a convenient and personalized service to customers is key to improving customer loyalty. In particular, next day delivery or the option for customers to collect from stores, drive repeat purchases. As an example, Coolblue has invested heavily in delivery services, by providing multiple delivery options, increasing speed of delivery, and so on. They thereby force competitors to follow them in delivery services offered. Some of the advanced delivery options of Coolblue are shown in Table 1.

For physical store retailers, collecting consumers' comments on products or services is quite cumbersome. Comments can be collected from phone interviews, emails sent to customers, the service desk at physical stores, or via surveys held at the store entrance. While these methods may suit their purpose, they take time to execute, incur collection costs and may have low response rates. Still, a rapid response to unsatisfied customers is necessary to prevent that negative comments will spread out through word-of-mouth and affect the store's reputation and future sales. Indeed, Word-of-mouth recommendations may have a strong impact. According to Nielsen (2015), 92% of consumers believe recommendations from friends and family over all forms of advertising.

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Table 1

Delivery policies of Coolblue (Coolblue, 2016). All delivery services are free, except for special options.

Delivery service options	Description
Next day delivery	Order before 23:59, delivery on the next day (Mon-Sun)
Sunday delivery	Order before 23:59 on Saturday, delivery on Sunday between 12:00–18:00
Delivery on appointment	Free from 18:00–21:30 (Mon-Fri), fee of €9.95 on Sat and 08:00–18:00 from Mon-Fri. Early morning delivery: €17.95, 06:30–08:00, 07:00–09:00 (Mon-Fri)
Same day delivery	Fee of €9.95: order on Mon-Fri before 15:00, delivery on the same evening between 18:00 and 22:00
White goods delivery	Order before 23:59, delivery on the next day (Mon-Sun) Free installation and fee for other additional setups
Pick up options	At physical stores or TNT pick-up points

According to the [Word of Mouth Marketing Association \(2014\)](#), 64% of marketing executives indicated that they believe word-of-mouth is the most effective form of marketing. However, only 6% say they have mastered it.

For online retailers, collecting comments on products and services is quite convenient, as many customers post their comments after purchasing. Other consumers, searching the same product or searching the retailer, can view these reviews before planning their purchase. In this way, previous purchasing experiences will affect future purchasing. In the online world, retailers also compete on service and customer ratings. Online store rating platforms, such as [www.kieskeurig.nl](#), help consumers compare products and online retailers on various aspects. Using this platform, we compared three main competing online retailers with similar assortments in the Netherlands, Coolblue, Bol, and Wehkamp on service ratings (three aspects: ease of ordering, service, and assortment, each on a scale of 1 to 10, with 10 indicating excellent). Compared with the other two online retailers, Coolblue has the highest scores on all dimensions (9.3, 9.2, 8.9) and stands out especially in service ([Kieskeurig, 2016](#)). Coolblue continues to invest in new delivery services. For example, on October 1st, 2015, Coolblue started its own white goods (like dishwashers, washing machines, and refrigerators) delivery service, with fifty delivery vans ([Coolblue, 2015](#)). These white goods are installed at the customers' location for free; the old machine is collected and discarded for free, if desired. According to annual reports ([Bol, 2017](#); [Bol and Coolblue, 2017](#)), Bol and Coolblue are the top two online retailers in the Netherlands based on turnover, with 950 million and 615.8 million euros, respectively, in 2017. Although Bol is the older company, Coolblue leads the way with service investments, which are generally followed by Bol, sometime later. Bol, the most competitive rival of Coolblue, also invests heavily in delivery service. In September 2017, Bol started to use a third new logistics center, with 1 million skus in stock and 135,000 square meters of floor space ([Bol, 2017](#)), aimed to better serve customers in the Netherlands and Belgium and to raise the delivery service level. Following Coolblue, Bol now also scheduled to offer a two-hour delivery service, taking place with electrical vehicles at the end of 2018 ([Bol, 2018](#)). Because of such continuing investments, Coolblue and Bol score better on almost all aspects of delivery service than other competitors. This leads to the question to what extent an investment in delivery service for online retailers pays off in profit and market share, in a competitive environment. Should a company be a leader or a follower, and what is the impact of the social network on profit and market share? These questions are addressed in this paper.

In order to answer these questions, we first build models for a single firm as well as for two main competing firms, while other competitors are present. We solve the single-firm model and the two-firm model analytically or numerically and determine the optimal service investment, maximizing the profit per unit time or the market share. We also show the effect of the social network on the market size and profit. Results are given for two main cases, a Nash competition case and a leader-follower competition case. We show that, compared to the Nash competition case, the optimal investment in the leader-follower competition case is much lower for both the leader and follower while the profit per unit time is higher for both.

2. Literature review

We study the impact of investment in service on profit and market share in a competitive environment in the presence of online reviews. We first review the work concerned with price and service competition, then work related to investment strategies and finally work studying the effects of a social networks on profit.

Price and service competition have been a major focus of research in operations research and management science. Most works studying price competition (e.g. [Dewan et al., 2003](#)) or service competition (e.g. [Kurata and Nam, 2010](#), [Chen et al., 2008](#)), or both price and service competition (e.g. [Xiao and Yang, 2008](#), [Bernstein and Federgruen, 2007](#), [Wu, 2012](#), [Allon and Federgruen, 2007](#), [Tsay and Agrawal, 2000](#)), focus on maximizing profit. [Li and Lee \(1994\)](#) study a model of price competition in which customer satisfaction is not only affected by price and quality but also by delivery speed. They build a single-period model with two competing firms making decisions on price, quality and order processing speed to maximize profit or market share of the firm. They find that a firm with a higher processing rate always has a price premium and can obtain a larger market share. [Bernstein and Federgruen \(2004\)](#) use a general equilibrium model for industries with price and service competition. Different models, such as simultaneous price and service-level competition, two-stage competition and price competition only are analyzed. The target inventory fill-rate for the whole horizon is decided at the beginning of the first period, then decisions of retail price and order quantity are made at the beginning of each following period. They prove that a Nash equilibrium exists in each model, under which the retailer decides a stationary price, inventory fill-rate and a base-stock policy. [Jin and Ryan \(2012\)](#) consider a model with one buyer and two suppliers who compete simultaneously on price and service (order fill rate). The buyer decides on how to allocate demand to minimize the cost, and suppliers

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