



Contents lists available at ScienceDirect

European Journal of Operational Research

journal homepage: www.elsevier.com/locate/ejor

Production, Manufacturing and Logistics

Asymmetric retailers with different moving sequences: Group buying vs. individual purchasing

Yingchen Yan, Ruiqing Zhao*, Yanfei Lan

College of Management & Economics, Tianjin University, Tianjin 300072, China

ARTICLE INFO

Article history:

Received 17 August 2016
 Accepted 15 February 2017
 Available online xxx

Keywords:

Supply chain management
 Group buying
 Quantity discount contract
 Asymmetric information
 Moving sequence

ABSTRACT

Given a quantity discount contract, retailers often prefer group buying to individual purchasing to acquire a lower wholesale price. However, under the combined effects of asymmetric demand information and different moving sequences, information revelation/acquisition between retailers may occur under group buying, thereby directly affecting their preference between individual purchasing and group buying. To capture their real preferences, we develop a model in which two retailers with asymmetric demand information purchase products from a common supplier under either individual purchasing or group buying (when moving first, later or simultaneously) and then sell to the market. We show that the informed retailer may forego group buying due to her loss of information advantage because her order quantity is revealed by the uninformed retailer. Moreover, the uninformed retailer may also reject group buying, despite obtaining demand information, because acquiring information by purposely moving later eliminates the uninformed retailer's first-mover right and reduces his market share. Furthermore, in the context of information management, we demonstrate that the process of information revelation/acquisition harms the informed retailer to some extent but benefits the uninformed retailer to a greater extent relative to the first-best outcome under perfect information. We also address that the first-mover right becomes less valuable for both retailers with increased information value and, in particular, that their preferences concerning the moving sequence cannot reach a consensus in any case.

© 2017 Elsevier B.V. All rights reserved.

1. Introduction

When provided with a quantity discount contract, retailers often choose group buying rather than individual purchasing for the purpose of aggregating their order quantities to acquire more rebates. The appliance retailer Filco, for instance, obtained additional rebates of 4–6% by purchasing together with the Selective Consolidated Dealers Co-Op (Chen & Roma, 2011). In the iron and steel industry, in 2005, Valin Group and Arcelor Mittal reached a strategic cooperation framework agreement on iron ore procurement to acquire rebates.¹ Shougang Group purchased one hundred thousand tons of steel scrap through purchasing in cooperation with Baosteel to obtain a lower wholesale price.²

However, although it can provide retailers with reduced acquisition cost, group buying is nevertheless difficult to achieve in certain instances. As in-depth survey-based research presented in

Forbes of over 3000 buying stakeholders across a dozen industries,³ the major obstacle to group buying is the diversity of retailers in a common purchasing group. Among the various aspects of retailers' diversity in practice, it is particularly common for retailers to have different abilities and expertise in forecasting future market demand, which would directly lead to retailers having different demand information. Under such conditions, when choosing group buying, in addition to the lower acquisition costs, retailers have to take into consideration differentiation with respect to demand information, which might generate a series of follow-up problems and hence affect retailers' attitudes toward group buying.

A primary problem that may arise in this context is that the order quantity of the first-moving retailer can be directly observed by other group members in the process of group buying, which would provoke a new question for each retailer—whether she or he should choose moving first, last or simultaneously. For the informed retailer, if she moves first, the revealed order quantity may expose valuable demand information, hence depriving her of her

* Corresponding author.

E-mail addresses: yhyan@tju.edu.cn (Y. Yan), zhao@tju.edu.cn (R. Zhao), lanyf@tju.edu.cn (Y. Lan).

¹ <http://www.3us.com>.² <http://www.people.com.cn/GB/paper447/3747/457644>.³ <http://www.forbes.com/sites/patrickspenner/2013/10/21/youre-doing-it-wrong-demand-generation/>.

information advantage and even causing her to lose income; otherwise, her market share will decline because of the loss of her first-mover right, thereby also generating potential damage. For the uninformed retailer, the acquisition of demand information might further strengthen his desire to engage in group buying, but he must also consider the market share that would be lost if he were to purposely move later. Therefore, based on these considerations, it is difficult for retailers to choose an appropriate moving sequence, which further increases the difficulty of deciding whether to engage in group buying.

In the real world, retailers also often have to determine the moving sequence when they engage in group buying. For instance, Shougang Group and Baosteel, two street giants in China, reached a group-buying agreement in 2001, and Shougang Group first announced its intention to purchase one hundred thousand tons of steel scrap,⁴ meaning that Baosteel, the larger firm, announced its order quantity last. This was simply the result of the impact of information. In 2001, the US International Trade Commission (ITC) attempted to apply the “201 clause” to resist imported steel,⁵ and more remarkably, China entered the World Trade Organization (WTO).⁶ Both of these developments increased the uncertainty regarding the state of the steel market and enhanced the difficulty of forecasting, as noted by Chinese steel industry analysts in the fourth quarter of 2001.⁷ Thus Baosteel, the dominant firm and possessing better forecasting ability, might forego moving first to avoid information leakage. In addition, the moving sequence is also considered in some purchasing associations. These associations, to avoid disputes among group members, often claim that they will move simultaneously, or prohibit group members from observing others' order information (which essentially equates to moving simultaneously).

Based on these considerations, such strategic interactions in group buying between asymmetric retailers with different moving sequences give rise to interesting questions that are worthy of exploration. First, under asymmetric demand information, how does information revelation/acquisition influence the retailers' profits under group buying? Second, having selected group buying, what moving sequences are favorable for each retailer? Can retailers reach an agreement on which sequence to follow? Third, given these two interactive impacts, do retailers prefer group buying or individual purchasing?

To capture the aforementioned issues, we develop an individual-purchasing-or-group-buying framework with two competing retailers under a given quantity discount contract. Based on this framework, to incorporate the influence of asymmetric information, we assume that the informed retailer (she) knows the exact realization of the demand state, while the uninformed retailer (he) knows only the prior distribution. Furthermore, we explore the impact on the moving sequence by assuming that the retailers have three moving sequences under group buying: a simultaneous-move sequence and two sequential-move sequences with either retailer moving first. Thus, four cases will be analyzed, including individual purchasing (IP), group buying with the retailers moving simultaneously (GS), group buying with the uninformed retailer moving first (GU), and group buying with the informed retailer moving first (GI). After deriving the equilibrium solutions of these cases, we study the interactions between individual purchasing and group buying when they are both viable and derive the subgame perfect equilibrium. Additionally, we also make comparisons among GS, GU and GI to explore the retailers'

preferences over moving sequences when they choose group buying. From the derived results, we obtain novel insights into the purchasing strategies of asymmetric retailers.

First, regarding information management, we find that compared to the corresponding first-best situation in which both retailers originally have perfect information, the informed retailer will be harmed by conveying a credible signal during the process of information revelation; the uninformed retailer will benefit as a result of the rival's concession. Moreover, and contrary to common sense, the benefit that the uninformed retailer obtains is larger than the loss suffered by the informed retailer. This is because the signaling process can cause the total order quantity to decline, hence generating a more appropriate market clearing price and then increasing the retailers' aggregate performance. Thus the benefit dominates the loss.

Second, regarding the first-mover right, both retailers would prefer to forego moving first when the value of information is increasing, as the informed retailer is concerned about the larger loss resulting from revealed information, and the uninformed retailer wants to purposely move later to acquire information. Significantly, these conflicting interests entail that two asymmetric retailers cannot reach agreement on moving sequences at any time. This is because as the value of information rises, when the informed retailer has already foregone moving first, the uninformed retailer would still not prefer to move later because the value of the information obtained thereby would not be a sufficient incentive to do so.

Third, with regard to the retailer's purchasing strategies, we provide an interesting insight that group buying under a sequential-move game may make both retailers worse off when the discount level is not high enough. Particularly when the informed retailer moves first, her decision of whether to pursue group buying is difficult, as group buying presents a tradeoff between a disadvantageous revelation of information and positive purchasing efficiency derived from the decreased acquisition cost. For the uninformed retailer, one may assume that group buying is always preferable, as he can simultaneously acquire exact demand information and purchasing efficiency. However, we find that this is not necessarily the case because when the uninformed retailer purposely moves later to infer the demand state by observing the informed retailer's order quantity, he will lose the first-mover right. Therefore, when the purchasing efficiency resulting from group buying is not large enough and the value of information is relatively low, the uninformed retailer would choose individual purchasing instead of group buying.

The remainder of this paper is organized as follows. In Section 2, we briefly review the related literature. In Section 3, we analyze the equilibrium outcomes when only one purchasing strategy is viable from among IP, GS, GU and GI, with emphasis on the signaling game in GI. In Section 4, we study the equilibrium outcomes when individual purchasing and group buying are both viable. In Section 5, we investigate the retailers' respective favorable moving sequences and explore whether they can reach an agreement on the moving sequence if they pursue group buying. In Section 6, we explore the supplier's preferences. In Section 7, we discuss the robustness of our insights to alternative modeling assumptions. In Section 8, we conclude the paper with a brief discussion.

2. Literature review

Our research lies at the intersection of group buying, quantity discount contracts, information flows, and the first-mover right. Next, we describe how our work relates to the literature in these areas.

⁴ <http://www.people.com.cn/GB/paper447/3747/457644>.

⁵ <http://gc.mysteel.com/00/1228/00/762122560B56693A.html>.

⁶ <http://news.qq.com/a/20090728/001165.htm>.

⁷ <http://gc.mysteel.com/00/1228/00/762122560B56693A.html>.

Download English Version:

<https://daneshyari.com/en/article/4959475>

Download Persian Version:

<https://daneshyari.com/article/4959475>

[Daneshyari.com](https://daneshyari.com)