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Assessing partnership savings in horizontal cooperation by planning linked deliveries

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ABSTRACT

Cooperation through the supply chain has been seen as one of the most efficient ways of reducing costs and gaining competitiveness. Although many studies have considered vertical cooperation within a supply chain, less attention has been given to the benefits of logistics cooperation with other companies outside the same supply chain but providing similar services. For instance, empty returns can be avoided if a company can profit from cooperating with a partner to meet their complementary transport needs. In this paper we introduce a model to assess savings when planning connected deliveries. The model is solved with the GRASP metaheuristic, which is used to analyse the model's performance, as well as to assess the cost savings that can be obtained by this linking of deliveries. Extensive computational experiments confirm that benefits of this type of cooperation are marginally decreasing with the size of the partnership and that, for any number of companies, the gains to be expected increase with the percentage saving from route lengthening and decrease with the cost of linking any two deliveries.

1. Introduction

Increasing competition among companies, as well as growing expectations in quality and service from customers, not only demand tighter schedules and a more accurate operations planning process, but also necessitate cost reductions in the logistics function.

Firms have developed different strategies to try to reduce costs when designing their operations. Two well-studied alternatives are outsourcing operations, and searching for cooperation with other firms (Razzaque and Sheng, 1998; Kaya, 2011). In the first case, the company acquires specialisation in core activities that can be delivered at a reduced cost and with greater flexibility than can be provided by themselves (Wilding and Juriado, 2004); in the second, new opportunities to share resources and information, increase economies of scale, better utilise assets and increase sales, can arise through cooperation (Lambert et al., 1996; Fiala, 2005).

There are many different types of cooperation (e.g. Asgari et al. 2013), but probably vertical cooperation between companies is the variant that has received more attention as it is the central idea of the supply chain management concept (Simchi-Levi et al., 2007). However, relatively little attention (Leitner et al., 2011) has been given to horizontal cooperation,

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defined by Cruijssen et al. (2007c) as "*a cooperation between two or more firms that are active at the same level of the supply chain, and perform a comparable logistics function on the landside*". Actually, the level of integration required by the cooperation scheme assumed in this paper is minimal and corresponds to the type I horizontal cooperation in Cruijssen et al. (2007c). Basically, only the transportation requirements of the different companies need to be coordinated and planned. This requires a much lower commitment and trust than would be the necessary in the case of a closer relationship. Also, although of course it increases with the number of partners, the complexity of the cooperation is relatively small, thus making it easier to implement.

Some cases have been documented so far about the implementation of this strategy. For example, ZDN (eight Dutch competitor sweets producers sharing common clients), as far back as 20 years ago, made agreements to build a common distribution network thus saving in individual transportation by optimising vehicle capacity utilisation (Cruijssen et al., 2007c); or the case of Nistevo, Elogex and Transplace (Ergun et al., 2007a) that developed a common Internet platform to optimise their operations; or the case of 20 companies remotely located in northern Sweden, that agreed to cooperate in all their transportation operations from their home town to the national economic area in the south (Hageback and Segerstedt, 2004). Schmoltzi and Wallenburg (2011) mention some other international cases of horizontal cooperation carried out by FedEx, APL Logistics and the US Postal Service in different Asian countries.

According to Esper and Williams (2003), the main goal of horizontal cooperation is to provide a better service and reduced costs during the delivery process. In this paper we focus on a specific possibility for horizontal cooperation, namely linking delivery requests from different shippers that subcontract full truck load (FTL) transportation from logistic service providers (LSP) or use their own means. Through cooperation, new opportunities for productivity improvements arise by avoiding assets repositioning and reducing empty mileage (deadheading). Therefore, the shippers can retain all the cost savings attainable or, alternatively, if they do not use their own fleet, they can negotiate better rates with the carrier. Also, changing the perspective, this type of cost efficiency could analogously be attained through network expansion by a single LSP or a group of LSPs that decide to cooperate horizontally.

As an illustration, assume a company requires frequent deliveries to customers in B from A and to customers in A from C (Fig. 1a). Therefore, two empty returns must be paid for by the company to the transportation provider. Perhaps another company (Fig. 1b) has to deliver goods from B to C and D, again paying for two empty returns. By merging all the transportation needs and paying for a unique transportation run A–B–C–A, both companies would win, saving the cost of empty returns for the first company, and the cost of empty returns from C to B for the second company. Note that the more companies involved in the merged transportation operations, the higher the probability that synergies can be obtained for all their transportation needs.

The increase in efficiency due to merging the transportation needs of the different companies is due to economies of spatial scope that derive from adding new Origin–Destination pairs. This effect of network expansion and other strategic transportation network design issues are extensively studied, in a Less-than-truckload context, in Paul (2011).

Hence, by merging transportation needs, new opportunities for reducing empty trips (and therefore reducing costs) appear. We assume a certain reduction of the total route cost can be attained when linking with a new trip from a final destination, thus avoiding an empty return. Note that according to Ergun et al. (2007a), the empty mileage cost is not a trivial

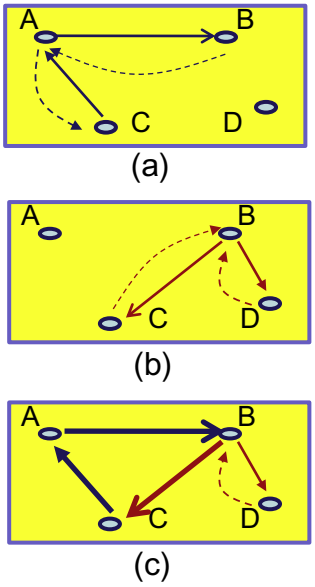

Fig. 1. Example of two companies with synergies when merging deliveries: overall three empty returns (dotted lines) are avoided.