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The five-step model – procurement to increase transport efficiency for an urban distribution of goods

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Abstract

The efficiency of a transport system is dependent on how resources in the system are utilized. The freight transport sector in Sweden is fragmented, composed predominantly of small operators affiliated with intermediary companies that handle sales and contact with customers. In addition, the majority of innovations in freight transport have been technical in nature, such as advancements in engines, fuel type and information technology. Organizational developments leading to changed behavior remain lacking. The aim of this paper is to further develop the procurement process with route optimization to improve overall efficiency in a transport system. An unconditional requirement is digital information at all stages in the supply chain. In a case study, a commercial vehicle routing software was used to create a situation analysis of a manually dispatched transport network to 324 retail outlets, which was subsequently compared to the route-optimized solution. Next, the case study was related to a new transport service purchasing model, the "Five-step model". The five steps are outlined, beginning with situation analysis followed by the simulation of new routes; the procurement process, including defining specifications and selecting a provider; open book pricing with joint review of routes; negotiations and contractor agreement; and, finally, payment with reverse billing. In the Five-step model, stakeholders negotiate in terms of distance, time, and sequenced routes, rather than a single price per stop, which is customary in the transport industry in Sweden. Implicitly, the relationship between parties changes, with greater transparency and ultimately a shift in power in the supply chain from the transport company to the transport buyer.

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Keywords: Five-step model; procurement process; route optimization; transport efficiency; urban freight

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1. Introduction

The freight transport sector, with countless senders and receivers of goods employing a variety of vehicles with disparate ownership, constitutes all stakeholders that have an impact on the provided transport services (McKinnon, 2010). The efficiency of the transport system is therefore dependent on the total resources used: business models, vehicles, drivers, information technology, and infrastructure. Changes in the transport system generally take place independently, with little effect on an aggregate level. In this sense, the freight transport sector can be characterized as a "loosely coupled systems", with high complexity, many actors with peer relationships, and decisions managed operatively (Weick, 1976; Dubois & Hulthén, 2014). These companies cannot, for obvious reasons, perceive the entire transport system; instead, they interact around a transport service, but note that they all start from their own business models and strategies (Teece, 2010).

A business model describes a company's external relationships with customers, suppliers and investors but also internal activities related to production, human resources, marketing and business development, in other words, how the company is positioning itself in the market based on strategic decisions by senior management and owners (Zott & Amit, 2006). The freight transport sector lacks a unified business model for transport services with general applicability, where the business model directly or indirectly affects efficiency in the transport system. Instead, interaction takes place between different actors in transport networks, i.e., between business models, interconnecting senders and recipients through direct links or the consolidation of goods in an effort to efficiently utilize transport resources (Voxenius, 2007). However, what is perceived as efficient in business terms on an individual level between buyers and providers can, in a societal context on an aggregate level, be proven ineffective by a low (overall) fill rate, which contributes to a high (overall) negative environmental impact (Santén, 2013).

Collaboration between the sender, transporter and receiver is determined in a procurement process where goods are linked to a specific transport service, which in turn is connected to an existing transport network. Procurement constitutes the interface between the parties involved and the time when key figures, such as margins and profits, are paired with business practices and, implicitly, efficiency in the supply chain (Sandberg, 2007). In the present study, the interface between transport buyers and transport logistics providers is called the "transport service purchasing model", based on a general procurement process of goods whose rudimentary form consists of three phases: defining specifications, selecting a supplier and reaching a contractor agreement (van Weele, 2010).

The aim of this paper is to analyze and evaluate a transport service purchasing model based on route optimization, the “Five-step model”, in terms of long-term (sustainable) economic development for all stakeholders in the transport supply chain. The introduction of new technology in the form of route optimization software requires transparency with digital information at all stages in the supply chain (the mantra of this study). In return, cost savings occur through a decrease in vehicle kilometers of travel (VKT), an increase in the fill rate, an increase in profitability per vehicle, and improvement in delivery performance with added value for the end-customers. The challenge with such a transparent procedure is that the power of the supply chain shifts from the transport company to the transport buyer and alters responsibilities and working practices between actors. In addition, increased transport efficiency inevitably leads to existing assignments becoming redundant because an increased fill rate reduces the resources needed in terms of vehicles and personnel.

The paper is organized as follows. First, an overview of urban freight in Sweden is provided, followed by a review of innovation and business models regarding freight transport. Next, a case study is presented in which route optimization is applied to an existing transport flow for the distribution of goods, accompanied by a situation analysis and a comparison to a simulation of new routes. The results of the case study are then related to the procurement process, and a new transportation service purchasing model, the Five-step model, is defined. The five steps, namely, situation analysis, simulation of new routes, the procurement process, joint review of contracts, and reverse billing, are highlighted. Lastly, some concluding remarks are presented. A procurement process involves two parties, a buyer and a provider; the purchaser is known as the transport buyer throughout the paper, and the counterpart is called the transport company.