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# Municipal Co-Distribution of Goods – Business Models, Stakeholders and Driving Forces for Change

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## Municipal co-distribution of goods – Business models, stakeholders and driving forces for change

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Keywords: Co-distribution of goods, City Logistics, Freight transport, Business models, Stakeholder relations, Environmental impact, Social sustainability

### Abstract

Municipal co-distribution of goods has evolved from an isolated innovation developed in 1999 to an approach implemented in 39 municipalities by 2016, through which the business model has been refined with digital tools, first through e-commerce and then route optimization. A survey of all 33 municipalities in Skåne County shows that political commitment is necessary to make decisions to implement. Earlier analyses have primarily focused on mitigating negative environmental impacts of freight transport and regulation. This survey shows that equally strong criteria are to involve local food producers as tenderers and increase the efficiency of municipal supply chains. Where new business models are based on a zero-sum game with regard to cost, gains are primarily societal from a cost-benefit perspective in meeting municipalities' environmental goals and improve the local business climate.

### Introduction

Freight transport is one of the most significant challenges facing local governments with regards to urban development, as municipal decision-making must account for individual mobility and the transportation of goods to manage commerce and industry demand while counteracting negative side effects of fossil fuels. As a tool for solving problems of congestion and emissions, City Logistics involves measures as regulatory frameworks based on vehicle restrictions and environmental zones, delivery time restrictions and unloading constraints and

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consolidating goods in designated centers (Allen and Browne, 2010). Numerous resources have been invested in partnerships between public authorities, the transport industry and the academic community through various projects. Unfortunately, in retrospect theory has seldom been transformed into practical action. In Sweden, with few exceptions, when external funding stopped being provided, projects closed down (Swedish National Road Administration, 2009). These projects never survived the experimental or pilot stage like most other similar projects implemented in Europe at the time (Quak, 2008).

In Sweden, through comprehensive frameworks of public administration, it is important to distinguish between measures that promote the efficiency of urban freight transport and of municipalities as traffic controlling authorities (i.e., measures of City Logistics) and those that support municipalities as transport buyers and as owners of goods in a municipal supply chain. The need for local government to procure freight transport services is probably more urgent in Sweden than it is in any other country given Sweden's extensive welfare sector (Moen, 2013). In particular, free schooling, elder care and health care involve significant investments in food, consumables and office supplies. In this sense, a municipality can be compared to any private company that relies on products from external suppliers. This article addresses the municipal co-distribution of goods whereby a municipality becomes a transport buyer and whereby procurement and purchasing processes occur as part of a business model (cf. Teece, 2010).

Freight transport is considered difficult to understand by municipalities and it thus constitutes a subordinate area in relation to other technical services such as water and sewerage or city planning. As a result, municipal administration in Sweden lacks specific knowledge within the field of freight transport (Lindholm and Blinge, 2014) as well as knowledge of the transportation of goods as part of public procurement (Braic et al., 2012). A solution involves the municipal co-distribution of goods, which entails a physical and legal consolidation of all external purchases. In its rudimentary form suppliers leave goods at a freight consolidation center (FCC) where goods are loaded for distribution in shared vehicles to receivers. It is important to distinguish between business models used for the municipal co-distribution of goods (Moen, 2013) and FCCs initiated by private enterprises (Browne et al. 2005).

Another significant difference between the municipal co-distribution of goods and measures of City Logistics lies in the fact that the latter assumes that transport efficiency is generated by the optimization of logistics and transport activities via private companies within the framework of a market economy (Taniguchi et al., 1999). By contrast, the municipality as a contracting authority provides guidelines on the transportation and consolidation of goods through a strict procurement process governed by the regulatory framework of the European Union (EU). As a

benchmark, similarities can be drawn to how newspaper distribution channels evolved in Sweden and in many other countries using co-distribution as a common denominator. Co-distribution significantly reduces distribution costs by combining products from several publishers through a single distribution service. Ultimately, data from mutually competing companies are coordinated with vehicle routing to optimize delivery routes (Ferrucci, 2013). In Sweden, the newspaper industry was an early adopter and launched digital information and software for sorting, route optimization, and to follow-up daily operations (Rehn et al., 2001; Moen, 2010).

### **Business models**

The main business model used for municipal administration in Sweden involves purchases with free delivery whereby the transport of goods occurs directly from contracted suppliers to municipal receivers and where transport costs are included as a hidden surcharge in the product price. The 1990s witnessed a resistance to the business model of free delivery, as mileage increases linearly with the number of suppliers involved. Consequently, a school kitchen could receive up to 10-15 deliveries a week in separate vehicles (Moen, 2013). Making a change requires that transport services are procured separately from the goods into two procurement categories. Rather, as the main difference, legal responsibilities are transferred from the supplier to the municipality, and an FCC, vehicles and logistics services are procured externally or in few cases are organized by a municipality's own staff.

A business model defines how business operations are organized and how expansion occurs. However once a business model is established, it is difficult for companies to change working methods and stakeholder relationships in a product or service segment, requiring the use of measures that only senior management staff or owners should employ (Chesbrough, 2010). In turn, a new business model cannibalizes existing customer relations and thus diminishes sales and profits. Research show that changes are usually not brought about through the use of existing business models but instead through a bottom-up process whereby small start-ups grow through trial and error (Chesbrough and Rosenbloom, 2002). Market-leading companies have changed their business models (e.g., IKEA in retail) using centralized supply chain planning based on information technologies via standardized and transparent business processes (Jonsson et al., 2013).

In a change process governed by centralized planning, technologies are not the main obstacle to overcome. Rather, the main challenge involves adopting new working methods and achieving transparency in information flows with staff and external stakeholders (Kohn and Hüge-Brodin, 2008). To reconnect to the transport sector, a business model that shifts power in a transportation supply chain from the transporter to the transport buyer, assumes a transport buyer perspective and to

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increase the quality in a buyer-seller relationship (cf. Parsons, 2002). Specifically it implies a standardized service based on transparency and digital information functioning in a fully connected system that includes all stakeholders. In general, transport business models are missing a digital component that can transform operational activities, e.g., transport planning from manual dispatching to vehicle routing in an integrated application (Marchet et al., 2009).

R&D work based on frameworks of City Logistics has primarily focused on the negative environmental impacts of freight transport. Few studies have been conducted on how measures of City Logistics affect stakeholders and thus new business models (Quak et al., 2014). The business model of the municipal co-distribution of goods has evolved over time with regards to tasks and responsibilities. However, politicians and administrators commonly argue that environmental benefits and improvements of efficiency outweigh in what may otherwise be viewed as an overwhelming task, to change the behavior of an entire organization as well as business relations with external stakeholders.

The municipal co-distribution of goods business model, was initiated in 1999 through three collaborating municipalities, Borlänge, Gagnef and Säter, in Dalarna County (Backman et al., 2001). The Borlänge model or the first stage of co-distribution followed from the transport industry's customary business model with operations exclusively controlled by the procured transport company. Transporters were thus responsible for inbound goods, cross-docking, loading, transport planning and physical distribution to municipal receivers. Municipal deliveries were integrated with goods from other shippers through existing (static) pick-up and delivery routes. Although environmental considerations attracted attention, the issue of integrating local food producers as tenderers served as the strongest driving force behind changing the existing business model (Borlänge municipality, 2001). Demand for distribution to municipal receivers in a procurement process based on free delivery created major obstacles for small and medium-sized companies.

Sweden has been a pioneer in streamlining public administration at all levels replacing manual work procedures and paperwork with the use of computers and digital information, with an overall aim to allow for spending on social and political reform policies (cf. Ilshammar et al., 2005). Coordinating municipalities' incoming supplies involves not only transport set up but also a series of measures that directly or indirectly change procurement and purchasing processes. Over the past decades, municipalities have to various extents incorporated information technologies, from paper document scanning and the use of electronic invoices, to implementation of full-scale e-commerce systems. A recent study showed that 39 percent of Swedish municipalities now used some form of e-commerce (Swedish Association of Local Authorities and Regions, 2017). In the same vein, the Swedish government have

proposed that suppliers to local governments must submit electronic invoices as a legal requirement (Swedish National Financial Management Authority, 2015).

Stage two of the development of a business model of co-distribution of goods was conceptually integrated in 2011 based on the official Swedish SFTI standard for e-commerce (Single Face to Industry) commissioned by government agencies and coordinated by the Swedish Association of Local Authorities and Regions (2011). This development occurred in Växjö where the municipality through parallel projects initiated co-distribution of goods and an e-commerce system. The aim was to create a thoroughly computerized business process involving the municipality and external suppliers. Ultimately, an e-commerce system involves digital support for decentralized purchases at the lowest administrative level, while payment and electronic invoicing are centralized to streamline and quality assure business processes via centralized supply chain management (Braic et al., 2012).

At the same time, the Borlänge model was questioned owing to its excessive consideration of the transport sector's demands in its predominant business model, inhibiting the development of a more efficient procurement process and transparent contractual agreement. What could be expressed as a counterclaim by municipalities was a shift in focus that stressed the needs of their receivers and a pronounced need to improve the efficiency of the municipal supply chain. Hence, the municipality as a transport buyer actively used the opportunity to define contract terms of transport services procured, leading to reduced environmental impacts, improved delivery precision and a purchasing process fully integrated with e-commerce.

The city of Stockholm's 2006-2008 project became a catalyst toward digitization and transparency in the supply chain even though the new business model created was terminated after 18 months. The project was thoroughly evaluated through a study funded by the former Swedish National Road Administration, resulting in 30 recommendations made on topics of procurement, e-commerce, logistics and administration (Moen et al., 2008). These recommendations formed the basis of action research that led to the development of the Ystad-Österlen model (Moen, 2013). This third development stage can be viewed as a radical innovation in that it shifted the balance of power between stakeholders, as municipalities took over logistics and planning responsibilities from transporters (cf. Christensen, 1997).

In short, the Ystad-Österlen model with in-house logistics simulates driving routes based on the requirements and objectives of administrative units where deliveries differ in volume and frequency. An unconditional demand for digital information at all stages of the municipal supply chain generates a truly transparent business model, whereby a municipality as a contracting authority provides ready-made driving routes through procurement documents (Moen, 2014). Bidders then submit tenders for prices per kilometer, per hour and per kg based on simulated

driving routes rather than for prices per delivery and per kg alone as was done under the Borlänge model in unity with the transport industry's customary business model.

Finally, the payment method was changed to a reverse billing approach whereby transport companies were paid by kilometers driven and by hours and minutes worked rather than based on a fixed price per delivery or for an eight-hour workday. Payment is reversed through a vehicle monitoring system that records times and distances where the municipality indicates what the transport company must invoice. This approach thus represents a reverse of the traditional business model.

Implemented for the first time in October 2013 in the municipalities of Ystad, Simrisham and Tomelilla in the southeastern corner of Sweden, the Ystad-Österlen model is innovative as a procurement process and business model (Moen, 2013). The R&D work was funded in part by the Swedish Transport Administration and by LEADER, an EU initiative that supports rural development projects.

### **Stakeholders**

On an annual basis, Swedish municipalities make large purchases of food, office supplies and consumables for their own operations that must be delivered by freight transport. Most goods transported involve food handling, e.g., deliveries to schools, preschools, retirement homes, healthcare centers, county-level hospitals, prisons and institutions. To put the municipality's purchases into perspective, the grocery trade's sales of food in Sweden amounted to SEK 155 billion in 2009, whereas the public sector's purchases of food and meals amounted to SEK 8.4 billion, representing 5.5 percent of total food sales (Swedish Competition Authority, 2011:63). In this sense, the municipality has become a stakeholder as a transport buyer operating in a market economy by ordering from suppliers where transport is included as a hidden surcharge or by ordering through a procurement process as in the case when co-distribution of goods is applied.

The purchasing processes of municipalities are important in this context, as the Swedish Public Procurement Act since its introduction in 1994 has rewarded economies of scale through directives on non-discrimination and on the equal treatment of suppliers to the public sector in the EU. Benefits highlighted include increased competition and the use of a transparent procurement process that protects taxpayer money. However, there are also drawbacks. Although quality requirements can be set, the lowest price must be adopted in practice. Economies of scale are also expressed through cluster collaborations between smaller municipalities or between small and large municipalities with the aim of lowering prices through discounts when larger volumes are purchased.

To provide an example, when the five municipalities of Ystad, Simrishamn, Sjöbo, Skurup and Tomelilla in the 2000s jointly employed food procurement within the framework of the Southeastern Skåne Collaboration Committee (SÖSK), this involved large-scale operations from start to end (Moen, 2013). Despite involving small municipalities, together the SÖSK involved a population base of more than 90,000 inhabitants and was large in scale in itself and comparable to the size of the city of Halmstad, the eighteenth most populous of the 290 municipalities in Sweden.

Furthermore, once the procurement period spanned five years and once products were categorized into a few large product groups that only so-called full-range wholesalers could manage, the operation became large in scale. However, above all, transport requirements owing to the business model's free delivery features and premier major suppliers, have by far constituted the most significant trade barrier preventing local producers from participating in public food procurement. To quantify this statement and to provide perspective on what is included in a contract agreement, a municipal catchment area of 60,000 inhabitants includes more than one hundred receivers (municipal kitchens) on a weekly basis, and another two hundred units receiving office supplies monthly (Moen, 2013).

When the bidding process awarded economies of scale, this led large-scale stakeholders to emerge as a counterpart on the supplier side. This indirectly means that only suppliers with established procedures for purchasing, warehousing, transportation and information technology are able to handle assignments. After Sweden joined the EU in 1994, the market quickly developed into an oligopoly with two dominant full-range wholesalers accounting for more than 50 percent of food sales to the public sector (Ryegård, 2012:4). An oligopoly in terms of economics is a market with a few companies that sell to many buyers but with strong barriers to entry (oligopoly), and this has been the case for the public procurement of food in Sweden. For example, in 2011, the city of Malmö purchased food for a total of SEK 180 million where 72 percent of purchases were made through a framework agreement with a full-range wholesaler (ibid:5). The SÖSK municipalities signed an agreement after the 2006 food procurement round with five major suppliers, but the full-range wholesaler delivered 73 percent of total product value (Moen, 2013:200).

The development of this oligopoly has affected municipalities' large-scale measures as a result of the institution of the Public Procurement Act and the free delivery business model, which requires suppliers to use their own transport systems. As prices for public procurement are ultimately a determinant factor, having food imported from within the EU based on EU requirements is less costly. Over time, economies of scale and the oligopoly have out-competed Swedish food producers through tender dumping, which have taken place with indirect support from EU directives. Under this framework, the minimum bid always wins. To illustrate, once products of a procurement have been legally established, the supplier



phases out a product and replaces it with a more expensive option. When there are no other tenderers available to meet the product and transport requirements, and as re-negotiating a new procurement process is immensely challenging, municipalities must accept higher costs than those of contract agreements due to a process of predatory bidding (cf. Alexandersson and Hulthén, 2006).

The third main stakeholders are transport companies that form a counterpart of the municipality in a procurement process when co-distribution of goods is applied. The Swedish transport industry is a mature business through which transport companies in the second half of the 20th century have developed additional transport services to increase profitability levels and raise margins (cf. Woxenius, 2007). Transport buyers for their part increasingly prioritize core operations with a steady increase in transport and logistics-related activities being outsourced to external partners. Furthermore, Sweden's transport industry consists of two sectors. Transport intermediaries such as freight forwarders, carriers and third-party logistics firms organize, negotiate and sell 80 percent of all commercial freights (heavy trucks) in Sweden (Swedish Association of Road Transport Companies, 2013). Individual transporters and small transport companies with vehicles and drivers physically move goods and work as subcontractors to intermediaries where the two constitute separate legal entities. In 2011, single owner operators managed nearly half of these vehicles and 83 percent owned less than six vehicles (Official Statistics of Sweden, 2012). This affords the industry a fragmented structure whereby intermediary companies fully direct contracts with transport buyers.

However, municipal co-distribution of goods fundamentally changes conditions and contract agreements between stakeholders and breaks up established supplier distribution networks as a result of free delivery services. Research has shown that the implementation of a regulatory framework for urban freights is characterized by conflicting interests among stakeholders, as most policy measures initiated are designed to both maximize short-term business earnings and long-term societal benefits (Olsson and Voxenius, 2014). Changing behaviors through the consolidation of goods and reducing emissions involves conflicting interests rarely mentioned in the literature. In doing so, it causes vehicles to become obsolete due to increased fill rates while intermediaries cannibalize on their own turnover and profits. To put it straightforward, this does not result in a win-win situation, as changes create friction in the supply chain (cf. Stathopoulos et al., 2012).

### **Development 1999-2016**

To put the success of municipal co-distribution of goods in Sweden into perspective, comparatively, a lack of necessary volumes, poor services and a lack of cost recovery caused most privately funded FCC projects to close down prematurely

(Allen et al. 2012). Municipal co-distribution of goods have not experienced the same problems, as municipalities have relied on environmental arguments and on the Public Procurement Act to separate goods and transport into two procurements.

Table 1 Municipalities in Sweden that have implemented co-distribution of goods, clusters, start years, business models and purchasing processes involved.

| Municipality | Cluster        | Inhabitants |         | Start year | Dis-used | Food | Goods | Out-sourcing | In-house |         |                      |
|--------------|----------------|-------------|---------|------------|----------|------|-------|--------------|----------|---------|----------------------|
|              |                |             | Cluster |            |          |      |       |              | UCC      | Vehicle | Logistics e-commerce |
| Borlänge     | Borlänge       | 51604       | 157483  | 1999       |          | X    | X     | X            |          |         | X                    |
| Gagnef       |                | 10175       |         | 1999       |          | X    | X     | X            |          |         |                      |
| Säter        |                | 11086       |         | 1999       |          | X    | X     | X            |          |         |                      |
| Smedjebacken |                |             |         | 2000       | 2001     |      |       |              |          |         |                      |
| Falun        |                | 57685       |         | 2011       |          | X    | X     | X            |          |         | X                    |
| Ludvika      |                | 26933       |         | 2011       |          | X    | X     | X            |          |         |                      |
| Katrineholm  |                | 33722       |         | 2003       |          | X    | X     |              | X        | X       | X                    |
| Stockholm    |                |             |         | 2006       | 2008     |      |       |              |          |         |                      |
| Halmstad     |                | 98538       |         | 2008       |          | X    | X     | X            |          |         | X                    |
| Uppsala      |                | 214559      |         | 2008       |          |      | X     |              | X        | X       | X                    |
| Nacka        |                | 99359       |         | 2009       |          | X    | X     | X            |          |         | X                    |
| Växjö        | Kronoberg      | 89500       | 175129  | 2010       |          | X    | X     | X            |          |         | X                    |
| Alvesta      |                | 19850       |         | 2015       |          | X    | X     | X            |          |         | X                    |
| Ljungby      |                | 28008       |         | 2015       |          | X    | X     | X            |          |         | X                    |
| Tingsryd     |                | 12393       |         | 2015       |          | X    | X     | X            |          |         | X                    |
| Älmhult      |                | 16618       |         | 2015       |          | X    | X     | X            |          |         | X                    |
| Lessebo      |                | 8760        |         | 2016       |          | X    | X     | X            |          |         | X                    |
| Värnamo      |                | 33906       |         | 2010       |          | X    | X     | X            |          |         | X                    |
| Falköping    |                |             |         | 2012       | 2015     |      |       |              |          |         |                      |
| Kristianstad |                | 83191       |         | 2013       |          | X    | X     | X            |          |         | X                    |
| Ystad        | Ystad-Österlen | 29448       | 62263   | 2013       |          | X    | X     |              |          | X       | X                    |
| Simrishamn   |                | 19485       |         | 2013       |          | X    | X     |              |          | X       | X                    |
| Tomelilla    |                | 13330       |         | 2013       |          | X    | X     |              |          | X       | X                    |
| Ängelholm    |                | 41336       |         | 2014       |          | X    | X     | X            |          |         | X                    |
| Eskilstuna   |                | 103684      |         | 2014       |          | X    | X     |              | X        | X       | X                    |
| Botkyrka     | Södertörn      | 90675       | 453431  | 2015       |          | X    | X     | X            |          |         |                      |
| Haninge      |                | 85693       |         | 2015       |          | X    | X     | X            |          |         | X                    |
| Huddinge     |                | 107538      |         | 2015       |          | X    | X     | X            |          |         | X                    |
| Nykvarn      |                | 10424       |         | 2015       |          | X    | X     | X            |          |         |                      |
| Nynäshamn    |                | 27752       |         | 2015       |          | X    | X     | X            |          |         | X                    |
| Salem        |                | 16615       |         | 2015       |          | X    | X     | X            |          |         |                      |
| Södertälje   |                | 94631       |         | 2015       |          | X    | X     | X            |          |         |                      |
| Tyresö       |                | 47103       |         | 2015       |          | X    | X     | X            |          |         | X                    |
| Kalmar       | Kalmar         | 66571       | 93945   | 2015       |          | X    | X     | X            |          |         | X                    |
| Nybro        |                | 20311       |         | 2015       |          | X    | X     | X            |          |         |                      |
| Torsås       |                | 7063        |         | 2015       |          | X    | X     | X            |          |         |                      |
| Karlstad     |                | 90198       |         | 2015       |          | X    | X     | X            |          |         |                      |
| Jönköping    | Jönköping      | 135297      | 154109  | 2015       |          | X    | X     | X            |          |         |                      |
| Habo         |                | 11586       |         | 2015       |          | X    | X     | X            |          |         |                      |
| Mullsjö      |                | 7226        |         | 2015       |          | X    | X     | X            |          |         |                      |
| Örebro       |                | 146631      |         | 2015       |          | X    | X     | X            |          |         | X                    |
| Kungsbacka   |                | 80442       |         | 2016       |          | X    | X     | X            |          |         | X                    |

As is shown in Table 1, 39 municipalities (13.5 percent) had implemented co-distribution of goods by 2016-12-31. Co-distribution as a business model is still in its infancy, but with few exceptions, implementations have been successful. Only three municipalities have started and terminated a project. The municipality of Smedjebacken joined the Borlänge cluster from 2000-2001, but once volumes were considered to be too small, it withdrew. The city of Stockholm started its initiative in the fall of 2006 but discontinued it for political reasons. The municipality of Falköping operated its own facility from 2012-2015 but failed to attract local food producers, a prime driving force, and the project folded.

There are also significant geographic variations within Sweden with distinct growth nuclei but also blank spots. For example, after that the municipality of Falköping terminated its operations, it prevented further expansion into Västra Götaland County, the largest county in Sweden with 49 municipalities (17 percent). The region of Norrland is similar (5 counties), a remote area that occupies approximately 59 percent of Sweden's total area. While no business models have been applied in Norrland, studies show that co-distribution proves to be sustainable in rural areas. A case study of Pajala in northern Sweden shows that in the B2B segment, approximately 20 different transport companies and suppliers transport goods to and from local companies at least once a week with a fill rate of less than 50 percent (Hageback and Segerstedt, 2004). Co-distribution would not only increase the fill rate to and from Pajala and thus entail the use of fewer vehicles, but it would also allow local companies to streamline their planning and choose optimal arrival or departure days throughout the week.

Table 2 Exponential development of municipal co-distribution of goods 1999-2016.

|              |   |
|--------------|---|
| 1999 to 2009 | 7 implementations of co-distribution of goods     |
| 2010 to 2014 | 10 implementations of co-distribution of goods    |
| 2015 to 2016 | 22 implementations of co-distribution of goods    |
| Forecast     | Sweden 290 municipalities                         |
| 2017-2019    | 20-25 implementations of co-distribution of goods |
| 2020 -       | 100 + implementations of co-distribution of goods |

The number of implementations of co-distribution of goods has increased exponentially since the inception in 1999. Table 2 shows that the number of municipalities involved from 2015-2016 more than doubled, from the 17 initiated between 1999 and 2014. However, forecasting is never easy, as 20-25 municipalities have announced that they will implement the business model of co-distribution in 2017-2019, though this process takes roughly two years from initiation to full

operation. We will likely witness a paradigm shift in the 2020s with more than 100 municipalities embracing co-distribution. On a higher level, this will also entail a shift in supply chain power dynamics where more decisions will be made by municipal staff in their capacity of transport buyers (cf. Parsons, 2002). Swedish municipalities in this respect exhibit flock behavior whereby one municipality begins a trend over a long initiation period (in this case 1999-2014), after which a new business model is established and many more municipalities follow.

Moreover, the large state funded interdisciplinary project "The Good City", highlights that tax revenues could be used to coordinate (regulate) the movement of goods in the private sector, as the public can benefit from keeping heavy traffic away from streets and from reduced effects of fossil fuels (Swedish National Road Administration, 2009). Recently, politicians have raised similar questions at the national level. A proposal in the Swedish Parliament has explored whether to enforce local authorities to implement co-distribution of goods, while also allowing municipalities to introduce mandatory co-distribution schemes for non-municipal receivers through legislation (Svensson-Smith and Ling, 2015). As an alternative City Logistics strategy, local governments could control distribution in designated areas, i.e. control logistics to impose higher fill rates by regulating freight transport in the same way as public transport systems (Moen, 2016). This would mean that stakeholders – shippers, transporters, receivers, and property owners – through business partnerships would be legally required to participate in the business model in the same way as stakeholders for municipal co-distribution of goods.

Table 3 Municipal co-distribution of goods, cluster implementations.

| Cluster        | Municipalities | Inhabitants | Start year           |
|----------------|----------------|-------------|----------------------|
| Södertörn      | 8              | 453 431     | 2015                 |
| Kronoberg      | 6              | 175 129     | 2010 (enlarged 2015) |
| Borlänge       | 5              | 157 483     | 1999 (enlarged 2011) |
| Jönköping      | 3              | 154 109     | 2015                 |
| Kalmar         | 3              | 93 945      | 2015                 |
| Ystad-Österlen | 3              | 62 263      | 2013                 |

Swedish municipalities have maintained a long tradition of working together, and 28 municipalities (72 percent) have collaborated in municipal clusters through a shared FCC as shown in Table 3. The table clearly shows a large increase in 2015, with the Södertörn cluster with 8 municipalities in the southern region of the Stockholm metropolitan area representing a major addition. Expansion in Kronoberg County with 5 municipalities and with Växjö municipality acting as a catalyst together with clusters around the towns of Jönköping and Kalmar have meant that

the most southern counties of Sweden now account for more than half (20) of all implementations. Populous central areas of Sweden will likely join this trend. In terms of business models, the Borlänge model dominates and is used in 33 municipalities; three municipalities manage FCCs, vehicles and logistics in-house; and the three Ystad-Österlen municipalities developed a business model based on digital planning with route optimization and vehicle monitoring. Finally, digital purchasing and co-distribution have gone hand in hand with 26 of 39 municipalities with up-and-running e-commerce systems in 2016. Smaller municipalities have especially embraced Växjö's strategy of parallel implementation that involves rapid efficiency gains and a short payback period on investments.

It is important to emphasize that municipal co-distribution of goods represents part of the purchasing process and is essentially a procurement issue within a municipality, with school and elderly care administrators mainly responsible through significant food purchases. On the other hand, from a transport perspective, the result of co-distribution of goods is primarily an environmental issue in that it drastically reduces CO<sub>2</sub> emissions and causes fewer vehicles to operate in the street networks. In this context, causes and effects are not always easy to identify. It is however important to note that the municipal co-distribution of goods requires changing organization and work procedures to achieve expected results from new business model use.

### **The Skåne survey**

A key question concerns what drives municipalities to initiate changes. A comprehensive study of Skåne County (includes 33 municipalities) based on a questionnaire and supplementary interviews reveals trends based on quantifiable answers and qualitative follow-up questions (Levin et al., 2016). All municipalities in Skåne are aware of the business model co-distribution of goods, as an alternative to the free delivery business model. However, interest levels and ways to address the issue were found to vary greatly. Five municipalities had already implemented projects but with differing levels of ambition and using different business models. Two municipalities had made political decisions but had not initiated implementation. Five municipalities had planned to investigate the approach and to publish decision support documents. Among the remaining 21 municipalities, pros and cons of the business model had been discussed in 14, while seven municipalities responded that issues of co-distribution of goods had not been raised or was not viewed as relevant at the time. Lastly, smaller municipalities tended to argue that new business model must be implemented in collaboration with neighboring municipalities.

Municipal co-distribution of goods is a complex issue that involves entire organizations and that requires comprehensive political support and a unanimous decision to implement. In the survey, the following question was asked: Who (if anyone) has taken responsibility for the question of co-distribution of goods within your municipality? Of the 14 municipalities that had discussed the issues but were not ready for action, 13 stated that the question had been handled at the administrative level and one stated that the question had been posed to the political level. Of the other 12 municipalities that had conducted a feasibility study (5), that had made decisions (2) or that had already implemented (5), politicians had been involved in this work. In six municipalities politicians had focused on the question, in four municipalities a common process had been employed and in two municipalities administrators were in the driving seat. This implies that the involvement of politicians is crucial for changing business models, as in the 14 municipalities that had only discussed the question, in 13 municipalities, discussions had mainly taken place at the administrative level.

A supplementary question explored who is responsible for co-distribution within municipal organizations. Twenty of the 33 municipalities referred to a designated administrative residence where the majority (70 percent) had given responsibility for co-distribution to a municipal chief executive or to corresponding staff. This could be attributed to the fact that co-distribution of goods is largely an issue of procurement, where procurement functions are often handled by executive management teams. Five municipalities had placed technical administration teams in charge based on an earlier municipal structure involving an internal supply warehouse. Most municipalities abandoned the in-house structure when the Public Procurement Act was installed in 1994 or transferred control over supply warehouses to technical service departments.

The analysis of digitization patterns shows that municipalities in Skåne at the lowest levels use scanned invoices and at the highest levels support full-scale e-commerce. All of the municipalities stated that they scanned invoices. That is, no municipality manually managed their purchases. At a higher digital level, 14 municipalities stated that they used electronic invoices to some extent. The 15 municipalities that reported using e-commerce systems used them primarily for purchases from full-range wholesalers and from other major commodity suppliers through Electronic Data Interchange (EDI) with many orders placed. Municipalities using e-commerce actively worked to include as many suppliers and product groups as possible into their digital systems, which involved initiating a scaled-down web portal as small suppliers are either unable to use EDI or aspire to install a full-scale EDI system.

### Driving forces for change

What drives municipalities to implement co-distribution of goods and to bring about profound changes in business models, which undoubtedly create friction both internally with staff and externally with stakeholders? The Skåne survey asked the following question of 26 municipalities that had implemented, had decided to implement or had discussed co-distribution of goods; What are the prime driving forces? Questions and answers given are shown in Figure 1, and most of the 26 municipalities described two driving forces, as the questions posed are complex. Seven municipalities stated that the question was not relevant. These responses are listed in the figure as "Undetermined view".

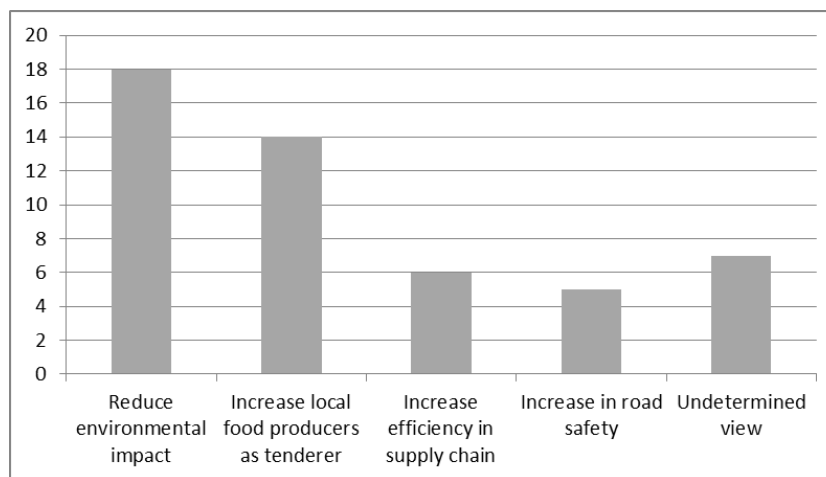


Figure 1 Driving forces behind implementing municipal co-distribution of goods.

The major driving forces involved are not unexpected to reduce environmental impacts linked to municipalities' environmental targets. This emphasis on environmental aspects can be attributed to large R&D projects undertaken in the area of urban transport in Sweden in the early 2000s. At the time, the Swedish National Road Administration funded a substantial amount of research on road safety (SNRA, 2009). Local governments was challenged to follow up with environmental policies, as environmental and regulatory perspectives have governed theoretical and methodological frameworks of most research on urban freight transport in Sweden (cf. Gebresenbet et al., 2011).

Furthermore, relationships between transport industry operations and municipalities as traffic regulating authorities (whose responsibility to act based on stakeholder relationships and environmental issues) were often mixed in early

Swedish projects, e.g., SAMLIC (Eriksson et al., 2005) and SAMTRA (Ljunberg and Gebresenbet, 2004). When new transport measures are introduced, it is crucial to consider whether regulatory frameworks or organizational and physical coordination must be employed, as the political will is concretized for a system to be adopted from a societal perspective (cf. Kordnejad, 2016). In essence, shifting business models to co-distribution of multiple suppliers goods substantially increases fill rates, which drastically reduces total demand for vehicles and fossil fuel emissions. For the municipalities of Ystad, Simrishamn and Tomelilla, the number of deliveries made to municipal receivers was reduced from 26,000 to 6,000 stops (by 75 percent) on a yearly basis (Moen, 2013). These are notable figures compared to traditional measures for the fields of urban freight transport and City Logistics (Quak and DeKoster, 2009).

Previous attempts made to describe the development of municipal co-distribution of goods, have focused unilaterally on environmental issues in relation to non-transport driving forces (cf. Björklund and Gustafsson, 2015). As shown in Figure 1, desires to increase the number of local food producers involved as tenderers in public procurement and supply chain efficiency levels, acted as equally significant driving forces. Rather than an issue of environmental policy, it is an issue of business development in local government administration. Local governments have increased the number of local producers acting as suppliers to create an economic climate that encourages local businesses to grow. This approach is reflective of Swedish public opinion on the matter. This has been particularly noticeable in Skåne County as the main food-producing county in Sweden.

The second prime driving force has remained virtually unexamined but has arisen from mounting pressures from citizens (and thus politicians) for schoolchildren, the elderly and hospital patients to be served locally (Swedish) produced food. This approach stresses the prioritization of small-scale and socially sustainable production that stands in stark contrast to large-scale production systems used within the EU. The two driving forces merge with an awareness that food production has a carbon footprint. In Sweden, 20 municipalities use software and climate databases for food production as part of a “climate smart meal planning” procurement process, for which the next step would involve measuring the transport of food as a significant parameter (Florén et al., 2016).

Introducing a cost-benefit perspective is necessary to understand underlying driving forces and why municipal co-distribution of goods as a business model has grown successful. When evaluating urban freight transport initiatives and FCC projects in particular, difficulties arise when defining relationships between stakeholders, those who make the necessary investments and those who receive benefits. The fundamental contradiction lies in the fact that those who invest are not automatically those who benefit, as benefits are often societal in nature as



environment or accessibility and cannot be defined in monetary terms, e.g., revenues, profits or returns on investment (Balm et al. 2015). Determining societal gains from a business-economic perspective is not relevant in the private sector, as companies need revenues and profits to survive in a competitive market (Chesbrough and Rosenbloom, 2002).

On one hand, a cost-benefit analysis must consider societal gains and increases in municipal supply chain efficiency. On the other hand, it is the responsibility of municipalities to define the prices of societal benefits and to determine their own accountability with regard to municipal missions. For a change in business model to be commercially viable, socio-economic benefits must be determined in relation to environmental goals and goals for societal sustainability, i.e., an increase in local food producers as tenderers. This is particularly the case for the business model of municipal co-distribution of goods. By taking action before and after procurement, a municipality can ensure a zero-sum game whereby the prices of goods procured drop in parity with the cost of FCC, vehicles and logistics services. This cost has been estimated to fall within a range of 8-12 percent or at an average of 10 percent (Swedish Environmental Protection Agency, 2006). Ten percent is also largely in line when costs are followed up ten years later with some of the municipalities in Table 1 (Moen, 2017).

To achieve a zero-sum game, a "staggered" procurement process has been developed and was first set up in the municipality of Växjö, where suppliers were given the opportunity to submit a discount of up to nine percent to compensate for (last mile) distribution to receivers (Växjö municipality, 2016). Therefore, what really matters is that direct costs of a business model are black figures from an economic calculation or zero-sum game. This means that benefits are not defined in monetary terms but instead as reduced environmental impacts, local producers as tenderers, and municipal supply chain efficiency (Moen, 2017). Benefits are therefore societal in nature and become a bonus in a zero-sum game through a change in business model, and they can only be accounted for through a cost-benefit analysis.

However, more than the consolidation of goods is required to entice local producers to participate in procurement. Municipalities must work proactively to identify presumptive bidders, follow up through outreach activities, organize competence development and account for digital platform system integration, for local producers to consider participating in public procurement. Municipalities have divided procurement tasks and singled out products available in a local area to include local producers as tenderers (Braic et al., 2012). Fresh red meat and poultry, bread, vegetables, fruits, and brewery goods all constitute foodstuffs for which municipalities encourage local suppliers to become bidders within the framework of the Public Procurement Act.

Finally, there is a contradiction where the two driving forces will collide in a business model with free delivery. An increased number of suppliers implicitly involves an increase in the number of delivery vehicles, which is in violation of a municipality's environmental policies and which counteracts CO2 emissions and congestion reduction and traffic safety. To illustrate this, the 33 municipalities examined in the Skåne survey managed an average of 4.87 food suppliers (Levin et al., 2016). If the number of local food producers were to increase from 5 to 15, the number of transport vehicles would increase by the same factor in a business model based on free delivery. In essence, without both driving forces in place and with unanimous political backing, municipal co-distribution of goods cannot be used as a viable business model.

## Conclusion

Several City Logistics and FCC initiatives have been developed from an experimental stage, have transformed into pilot studies, but only a few have been established as new business models. Consequently, with considerable societal costs, numerous projects have been terminated once funding was no longer provided. The case of municipal co-distribution of goods constitutes an exception. Despite its slow adoption, the business model evolved from a radical innovation in 1999 to a model fully operating in 39 municipalities by 2016. Its use within the framework of the Swedish Public Procurement Act has been made possible by separating the transport sector from products over two procurement rounds whereby municipalities have taken legal responsibility over transport services and the power of the transportation supply chain, hence a radical innovation (cf. Christensen, 1997).

Two main driving forces (reduced environmental impacts and an increase in the number of local food producers acting as tenderers) must be present for the business model to be viable. Under the business model, prices fall by 10 percent to make up for FCC, vehicle and logistical costs, i.e., a zero-sum game, where benefits are reduced environmental impacts and local business climate improvements. Note that green solutions should not only support environmental and societal sustainability but should also provide economic gains, or a zero-sum game, otherwise stakeholders will not accept a new business model (cf. Boons and Lüdeke-Freund, 2013).

This article provides background information and illustrates driving forces of the development of municipal co-distribution of goods in Sweden. The business model is "somewhat unique" to Sweden given the country's comprehensive welfare sector through which local governments are often the main transport buyers in smaller municipalities without industries or commerce. Ultimately, the business model could be applied to non-municipal receivers but this would involve digitization and that municipalities regulate vehicle movements as done in public transport (Moen, 2016).

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