

The role of Swedish municipalities in the establishment of urban consolidation centres

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Abstract

Freight transportation in urban areas is one important area in the development of more sustainable cities. Despite that the need for transportation is derived from consumption, commonly the consignors (e.g. manufacturers) and not the receivers purchase the logistics service. As a consequence, freight to one receiver is distributed by different logistics service providers. Several Swedish municipalities have recognised the inefficiency in the flow of goods to their premises, resulting in negative environmental, economical and social impact. Some Swedish municipalities have established urban consolidation centres (UCCs) and started to place demands on the transportation service purchased. However, different establishments are applied by different municipalities, and there is a lack of overview and knowledge exchange between different initiatives.

The purpose of this paper is to describe and analyse initiatives taken by Swedish municipalities in order to identify important considerations in the implementation of more efficient city logistics. Furthermore, to describe how information and knowledge are spread between stakeholders in the initiatives and between initiatives.

This paper combines literature with regard to environmental management, city logistics, collaboration and knowledge transfer. Empirical data is gathered from interviews, internet information and brochures regarding initiatives taken by three Swedish municipalities.

The investigation of the initiatives shows several similarities but also many differences. Common determinants are lack of co-operation and knowledge exchange between actors and initiatives, and an unstructured way of capacity building. However, the results also provide examples of how knowledge can be integrated in the organisation.

Some municipalities have taken a first and very important step towards a more sustainable city logistics. This paper shows that this area of research is still in its infancy and new areas for further research is identified. There is a need for an expanded collaboration between actors in order to make the freight transports in the cities more efficient leading to less environmental and social impacts as well as decrease the transportation costs. The initiatives taken by municipalities show several strengths, but also weaknesses. Increased knowledge transfer can help municipalities overcome

several of these weaknesses. The overview provided facilitates an increased understanding of the strengths and weaknesses of different approaches, as well as hinders and driving forces, ways to collaborate and exchange knowledge.

1. Introduction

Local authorities (i.e. municipalities) are important actors in the struggle towards a more sustainable development (UN, 1992). They have a significant responsibility in society not only as service providers and important democratic arenas but also as key links between citizens and national and international public bodies. They act close to those affected by international and national policies, strategies, and general agreements. Municipalities act on many different levels in society and they are multifaceted organisations with a wide range of roles and responsibilities related to environmental issues and sustainability (Gustafsson 1996). Several of these responsibilities and roles are, seen from a Swedish context, controlled by national legislation. During the last decade, Swedish municipalities have extended their responsibility on sustainability management on a more voluntary basis in order to set a good example and to improve the cooperation with their stakeholders (Emilsson and Hjelm, 2009). Many municipalities in Sweden do, for instance, implement environmental or sustainability management systems, in order to organize their environmental and sustainability efforts (Emilsson and Hjelm, 2009). It is also common that municipalities educate the citizens in a more sustainable behaviour (in areas such as mobility, etc.) and supporting local business in their sustainability efforts. Municipalities play important roles in the greening of city logistics, as they are large purchasers of goods, e.g. office materials and food and equipment for schools (MSR, 2012), as well as in their role of designing and implementing policies and restrictions regulating the traffic situations in cities.

The transport of goods is increasingly prioritised on municipalities' sustainability agenda. The transport of goods in cities results in several negative sustainability matters, such as emissions, congestion, noise, accidents and decreased attractiveness of cities (OECD, 2003; Kennedy et al., 2005; Benjelloun et al., 2010). Road transport is responsible for 40% of the CO₂ emissions in cities (EC, 2007) and is the fastest growing source of CO₂ emissions in the urban environment (Dablan, 2007). Goods transports in cities is characterised by small, multi drop deliveries with constraints on delivery operations, constant acceleration and decentralisation, and frequent vehicle idling (Browne et al., 2005). It is important to understand what drives the goods flows, i.e. the demand for goods and services, to make the transports more sustainable (Allen and Browne, 2010; Behrends et al., 2008). The generation of transport and traffic in urban areas are generally organized from an origin perspective by e.g. retail chains, suppliers or logistics service providers' (LSPs) distribution centre instead of a destination perspective, e.g. an urban geographical perspective (van Rooijen and Quak, 2008).

Authorities have often viewed LSPs as an obstacle to policy implementation rather than core participants (Stathopoulos et al., 2012), and the flow of goods rather as a problem than essential activities. However, this is about to change. Several Swedish municipalities have implemented changes in the logistics system by establishing urban consolidation centres (UCC). However, different consolidation strategies are applied by different municipalities and there is a lack of overview of the measures taken. Furthermore, to what extent has knowledge been transferred between actors and initiatives?

The purpose of this paper is to describe and analyse initiatives taken by Swedish municipalities in order to identify important considerations in the implementation of more efficient logistics. The paper especially focuses on, information and knowledge dissemination between stakeholders in the initiatives and between initiatives.

This study does not aim at describing the potentials of the initiatives described in quantitative terms. The positive results from implementing city logistics initiatives have been measured and documented by some municipalities. However, the methods applied, measurements used and limitations set differs between the different initiatives and place large demands on the documentation in order to compare the gains from different projects. We have therefore chosen not to turn this paper into a measurement paper but instead place the focus on the initiatives taken and the implementation process of these.

2. Methods

This paper combines literature on environmental management, city logistics, and organisational learning. The role of municipalities is captured and described as a part of each literature area. The paper takes its point of departure in the role of municipalities for the establishment of UCC:s because municipalities are key players in this arena; it is their transports that are included in the UCC: and municipalities they are constant actors. Companies that are involved in these approaches may vary from time to time, while the municipalities remain there as actors. Furthermore, choosing only municipalities was considered as a relevant point of departure for this kind of study. Forthcoming studies will explore how other actors experience the UCC:s and their development.

The empirical data is based on city logistics initiatives taken by three Swedish municipalities, see Table 1. The cases were selected based on their reputation as successful initiatives in full operation. Other selection criteria were the access of information as well as an aim to differentiate the type of UCC initiative. Borlänge was one of the pioneers of establishing an UCC and their initiative is often cited when discussing city logistics initiatives. Two other municipalities Katrineholm and Värnamo differentiate with regard to the initiatives taken (e.g. ownership of the UCC and goods types included, but also with regard to population and municipality classification).

Table 1. Overall information on the three cases selected.

	Borlänge (etc.)	Katrineholm	Värnamo
Population (Statistics Sweden, 2011)	49 323 (Borlänge)	32 409	32 934
Classification of municipality (SALAR, 2011)	Municipality in densely populated region	Municipality in densely populated region	Manufacturing municipality
Year of EMS implementation	1999 (Borlänge)	1997	-
Year of UCC implementation	1999	2007	2009
Number of goods' recipients	125 (Borlänge) 18 (Gagnef), 18 (Säter) 21 (Smedjebacken)	90	145-150

The main method applied was telephone-interviews involving one respondent from each municipality studied. Before performing the interviews we searched for information regarding the initiatives on Internet and during the interviews we asked for additional written information regarding the initiatives. In the process of identifying respondents we looked for contact information on the Web-pages and brochures and we also consulted the receptionists at the municipalities' switchboards.. In each interview we asked for other respondents that could provide additional information. However, despite these efforts, only one respondent from each municipality were identified as they were described by others within the municipalities as having all information regarding the initiative. Most information regarding collaboration forms, information and knowledge exchange is built on the views and interpretations of these respondents. Most information regarding the initiatives taken is however also supported by information found on homepages and brochures. The interviews were semi-structured and designed to target each phase of the PDSA cycle (the PDSA-cycle will be further described in chapter 3.1). PDSA was considered an interesting approach to use for describing and analyzing the development and implementation of UCC since there is a clear connection to this management approach. The aim of the interviews was to increase the understanding of the initiatives (planning, implementation, operation and follow up). Furthermore, we aimed to capture the knowledge transfer and involved actors in each phase. Cross case analyses was made regarding the different initiatives but also for each phase of the PDSA separately.

3. Frame of reference

The frame of reference takes its point of departure in describing the development in organisations' environmental management and positioning the environmental management of municipalities. City logistics is then described, focusing the use of urban consolidation centres, since this is an initiative commonly implemented by municipalities. This chapter ends with highlighting the importance of stakeholder collaboration as well as knowledge exchange within and between city logistics initiatives.

3.1 Environmental Management and PDSA

As briefly described in Chapter 1, municipalities have a broad responsibility when it comes to environmental and sustainability management and they are appointed key actors when it comes to furthering the development towards a more sustainable society. A wide range of environmental management and assessment tools/initiatives/approaches have been developed during the last decades to support this development (see Levett, 1997; English 1999;). Some tools are more related to procedures (such as Environmental Management Systems (EMSs)) and others to measuring and following up the environmental state (such as indicators) (Levett, 1997). Earlier research targeting Swedish municipalities shows that there, during the last decade, has been a shift from mainly including the environmental issues in the concept of sustainability towards including the other perspectives of sustainability (economic and social perspectives) and this could be due to maturing of the organisations (Emilsson and Hjelm, 2009). Furthermore, there has been a trend towards streamlining the environmental and sustainability management in municipalities (since the mid 1990:ies) by implementing EMSs, based on the main principles of ISO 14001, and Sustainability Management systems (SMSs). The PDSA approach originates from quality management (Deming, 1982), however it has also been adopted in other management approaches, for example EMSs and SMSs (see e.g ISO, 2004a; ISO 2011).

PDSA stands for Plan, Do, Study, Act and was originally launched as PDCA, where the C stands for Check, however there has been a shift towards Study during the last decade (Gupta, 2006).

In the *planning phase*, the organization maps its baseline level of, in the case of environmental management, environmental performance (ISO, 2004b). Mapping and analyzing the current practice, the actual organizational performance and impact helps the organization to understand and interpret strengths, weaknesses, and potential areas of improvements. This is followed by objective and target setting and designing of action plans. Then the organization enters the *do phase* where the organizational resources are identified and allocated in order to ensure that the responsibility is appointed for the action plans and their implementation (ISO, 2004b). The organization also needs to ensure that there is adequate competency. In the *implementation phase*, the main task is to integrate the action plans into the daily work of the organization, applying e.g. instructions and routines. The *study phase* focuses on evaluating and auditing whether the management system operate as planned. It is necessary to measure progress and to identify e.g. deviations from the plan. In the last phase in the PDSA-cycle, the *act phase*, the management reviews how the work is proceeding and decides on what to change in order to continually improve. This evaluation could be based on documentation from audits, the objectives and targets, the action plans and indicators.

Emilsson and Hjelm (2009) illustrates an step-wise development from environmental towards sustainability management in municipalities (Table 2). This is exemplified with the case of EMSs, however this model could be applied to other areas as well. Table 2 is an example of a step-wise expansion in order to allow for mutual learning within the organization and between the organization and its stakeholders. This implies that the employees as well as stakeholders gradually get an understanding of their role and contribution to overall performance in relation to the organization. Widening the systems perspective in this way could lead to deep learning and to what Senge et al (2006) calls *Prescencing* where the knowledge is converted into a reflective practice taking the context into account.

Table 2. Three phases in the development of environmental management (systems) (inspired by Emilsson and Hjelm, 2009).

	Internal EMSs	Mature EMSs	Sustainability Management Systems (SMS)
Organisational focus	Few departments; Internal	All departments	All departments; external stakeholders
Scope of management system	Direct environmental impact (e.g. transports)	Direct and indirect environmental impact (e.g. purchasing)	Direct and indirect environmental impact; social and economic impact (e.g. safety)
Actors involved	Mainly the environmental experts in the organization	Central environmental coordinator; most employees in the organization	Central environmental/ sustainability coordinator; most employees; external stakeholders (e.g. local business, entrepreneurs, citizens)

3.2 City logistics and Urban Consolidation Centers

Freight transport, and in specific, city freight transport are very complex, heterogeneous and dynamic (Lieb and Lieb, 2010; McKinnon et al., 2010), due to the involvement of many logistical activities (e.g. consolidation, coordination, sorting, storage, handling, and transportation). City logistics undertakes the important role and challenging task of satisfying the logistics need of urban areas and supporting cities economic, social, environmental and cultural development (Benjelloun et al., 2010; Cranic, 2004; EC, 2011). In this paper we define city logistics as: *“all co-ordinated measures comprising logistics collection and delivery activities of logistics service providers in urban areas that aim at the reduction or prevention of commercial traffic and its negative external effects”* (BESTUFS, 2007).

City logistics measures are often combined with technological changes (e.g. hardware or equipment used, such as new clean vehicles and changed fuel); and Policy changes (e.g. municipalities restriction in access to cities and parking restrictions) as can be seen in e.g. the EU-founded projects CIVITAS, BESTUFS, START and CITYLOG.

The use of urban consolidation centres (UCC) is a city logistics measure commonly applied by Swedish municipalities (UCC is sometimes termed freight or satellite platforms, logistics centres or urban distribution centres). The UCC place an important function in separating the distribution activities in the city from those to and from the city. The grouping of different shipments (often less than truckload) from suppliers into a large shipment at a consolidation point (the UCC) makes it possible to better utilize the capacity of vehicles. Initially (1970s) the economical benefits of freight consolidation were in focus; however, lately the environmental benefits have also been put forward. The use of UCC can result in a reduction of vehicle km and trips in the city, increased utilization due to consolidation as well as a change in vehicles applied (e.g. lighter and cleaner vehicles more expedient for city distribution) (Browne et al., 2005 and 2007; BESTUFS, 2007).

Besides these environmental gains, the UCC can supply a wide range of value added activities for the receivers such as off-site stockholding, improved return logistics, reduction in numbers of deliveries, sorting, consignment unpacking, inventory control etc. (van Rooijen and Quak, 2010; Browne et al, 2005; BESTUFS, 2007). On the other hand, UCC can also be costly and complicated to establish and operate, since it implies an extra handling point and the need to collaborate between actors, a large variety of products might require different handling equipment (McKinnon et al., 2010).

3.3 Collaboration and Information Exchange in City Logistics

Collaboration of interaction and exchange of knowledge are important in projects that involve or affect several actors (Albrechts, 2006). It is important to have an understanding of the actors' competencies and organizational contexts in order to develop an effective concept (Emilsson and Hjelm, forthcoming). Knowledge is of little value if it is not communicated and translated into action (Senge et al, 2006).

When implementing city logistics initiatives, it is important to consider all involved or affected stakeholders and their different and sometimes conflicting interests (Patier and Rosther, 2009; OECD, 2003). Examples of city logistics stakeholders are governments, shippers, receivers, LSPs and residents (Benjelloun et al., 2010). Stakeholder collaboration and communication are of large importance to succeed with city logistics (OECD, 2003; Lindholm and Thalenius, 2006; BESTUFS, 2007;

Lindholm, 2010) and makes it more likely to identify solutions that are appropriate from many perspectives. There needs to be a feedback loop between knowledge and practice. Knowledge through participation from relevant stakeholders related to the UCC (e.g. receivers and LSPs) is required to understand the different needs and objectives and to develop a joint approach that fits all needs. Despite this, national governments and urban authorities do often neglect to involve LSPs in decision-making (Browne et al., 2005).

Despite the importance of collaboration, knowledge regarding successful forms of collaboration in city logistics initiatives are very limited (Martinsen et al., 2012). Many details about who to include and how to include them remain unclear and few studies do consider stakeholder relationships (Taniguchi and Tamagawa, 2005). Many urban freight studies lack in availability with regard to public publications (Allen and Browne, 2008; Patier and Browne, 2010). Researchers play an important role in spreading the knowledge gained from city logistics initiatives to new initiatives and to provide methods and frameworks for comparison and increased learning between projects (Björklund et al, 2011).

4. Empirical Findings

In this chapter we present the empirical findings from the three municipalities studied (Borlänge etc., Värnamo and Katrineholm). All municipalities have implemented an UCC changing the distribution patterns. The type of receivers covered in the initiatives is today the same: Schools, Day care centres, Service Facilities for elderly, Offices etc. of the municipality. However, large differences can be found between the initiatives as presented in e.g. table 1.

4.1 The Borlänge Case

Three neighbour cities Borlänge, Säter and Gagnef made in 1999 a mutual agreement to change the distribution structure and separate the purchase of food from the purchase of logistics services. In the year 2000 Smedjebacken municipality was included in the initiative. In this description we do however refer to all municipalities as one since Borlänge is the largest municipality and the main actor in this initiative.

A mutual UCC was introduced to which all food is transported. Both large packages and smaller consumer packages were included. A central ordering body was installed connected to the receivers by an electronic ordering system. Each receiver got a predetermined day every week for deliveries and two more additional days if needed. Since there already were four established distribution centrals in the city of Borlänge, they saw no need for building a new and costly UCC.

4.1.1 Plan

One initial target with the project was to increase the competition between suppliers, i.e. several small suppliers did not have sufficient logistics services to be included in the tender. Other objectives were to cut costs, improve the environment in the city and safety at the delivery points.

Knowledge regarding the economical and environmental benefits from applying UCC and changing the purchasing performance was brought to the municipality when one employee at the purchasing department returned after serving the county council as well as working for a logistical consultancy organisation. He involved the environmental department and formed a group including the head managers of both the purchasing and environmental departments. After one year the project got

financial support from the City council (1M SEK). External funding from the Swedish Energy Agency was also added to the initiative (0,6M SEK).

A consultancy service was purchased from TFK (a private institute for transport and logistics research) investigating the baseline and identifying potentials applying the initiative. During this process the municipality became aware of their lack of data regarding their transport demand. The municipality identified the need to reclaim the ownership of this information from the supplier in order to decrease their supplier dependence.

The municipality decided early to purchase the logistics services but to be active and stipulate its conditions. An active dialogue with the LSPs secured the inclusion of their viewpoints. Three separate purchasing were made: one on food, one regarding the distribution and one on a platform for electronic purchase.

A need for increased knowledge at the delivery points (e.g. schools) was identified as the computer skills and purchasing skills of most employees were low at this time. The initiative was introduced very fast, within three months all involved parties were informed, introduced and educated.

4.1.2 Do

The municipality did not plan for any test period; instead they directly launched a new permanent solution. Training programs were introduced for the receivers and purchasers, since e.g. less frequent deliveries demanded increased planning skills and a new tool for purchasing was launched. As a result the project also received large acceptance.

The city logistics service including vehicles, drivers, the UCC and its personnel was purchased in a public procurement. The first contract agreement time was for four years and demands were placed on the vehicles (EURO class), fuel consumption and type of fuel, tyres, maintenance etc.

The project was very intense in its early phase due to time pressure. One major setback in the implementation was the immature information technology. The purchasing program did not work as expected which resulted in a change back to more old fashion technologies.

4.1.3 Study

After one and two years (2000 and 2001) the results from the initiative were evaluated. The environmental impact and noise levels were decreased and safety at receivers improved due to fewer vehicles (the amount of stops at most receivers dropped by 50-75% dependent on the size of the receiver). It was also possible to deliver in early mornings when the traffic is less intense.

A survey showed that the personnel at the receivers and the purchasers generally were pleased with the new system. The amount of deliveries was enough and the days selected were suitable. They did however have some minor storage problems due to the larger quantities delivered and the handling of heavier parcels.

The number of suppliers increased from eight in 1999 to fifteen in 2001. The amount of local suppliers also increased. Small companies seldom have the resources to deliver to a large number of different receivers, but can often deliver to one UCC. Due to the rise in number of suppliers, the administration increased. Furthermore, more ecological products were purchased. Since they did not find the suppliers transport cost data reliable enough, the economical potentials of this initiative was

not estimated. One unexpected negative experience was that the suppliers' price for the products did not decrease despite that the number of delivery points were drastically reduced.

4.1.4 Act

After the first two follow ups the responsibility for the initiative was transferred to the purchasing department. The initiative went on without any continuous improvement or follow ups until recently (year 2011/2012). The number of minor suppliers has drastically reduced during the last years, and no clear explanation behind this has been identified. Another reversion is that the LSP has started to deliver later, which disturbs the receivers' other activities, and the transport is carried out during more congested hours.

In the year 2010 purchase, six LSPs participated in receiving information regarding the purchasing, three tenders were given and two LSPs met the demands . However, due to insufficiencies in the municipality's purchasing performance and the rules of public procurement, the municipality could not select the LSP they found most attractive. The municipality has come to an understanding that their purchasing performance must be improved before the end of this contract period. They must, for example, be more precise regarding follow up . The municipality is also considering the use of route optimisation as a basis for the purchase.

The municipality still wants to support minor suppliers and have identified several strategies which could facilitate what they call "a system's change", by increasing the possibility for small actors to enter the market. One strategy is to ask for tenders not specifying the total amount, but instead ask for "possible amount". Another strategy is to increase the number of product categories by increasing the level of detail, e.g. from bread to a specific sort of bread. A third potential strategy would be to also take responsibility for the transport from small suppliers to the UCC. A fourth strategy is to purchase larger quantities (some minor companies can only deliver full pallets) and to add the value adding service of dividing consignments at the UCC.

Other potential developments discussed are to increase the tender to both include more products (e.g. office material, cleaning equipment, return transport) and to increase the number of receivers (e.g. by including nongovernmental schools, minor shops, gas stations, restaurants etc.) and including neighbouring municipalities.

The municipality has always strived to spread their experiences from the initiative, as positive marketing and since they want other municipalities to follow. It is however only during the last few years that other municipalities have shown interest in this information. Borlänge offer study visits for e.g. other municipality representatives, consultants and suppliers. Many municipalities have now introduced similar systems with minor changes.

Finally, the respondent state that there is a large need to coordinate the city logistics knowledge of, and initiatives taken by, different municipalities on a national level. The municipalities does not have the resources to keep on track what is happening in all municipalities, there is a large risk that they invent similar solutions or do not identify the best solutions. There ought to be some place to turn to in order to gain a total view, such as a web page.

4.2 The Värnamo case

Värnamo initiated the process to develop a more coordinated approach to the municipality's transports in 2009. An economic analysis made by a consultancy firm showed that there were potential gains to be made by establishing an UCC outside of Värnamo (Värnamo kommun, 2009). Once the decision to establish an UCC was made, the municipality recruited a logistics' manager (with 30 years of experience of logistics within the private sector) that was appointed the responsibility for developing their coordinated transport concept. The Värnamo UCC was first established and designed by the local authority; however it is now run by an entrepreneur. There is however a close collaboration between the entrepreneur and the municipality. All consumables are run via the UCC, while issues such as building material and some furniture are excluded. Food was initially thought to be excluded due to the special conditions required. In 2011, ready meals were also included in the transports from the UCC. However, the latter needs to be transported every day to the delivery points, while other food is delivered once a week to each receiver.

4.2.1 Plan

The first step in the planning phase was to perform a base line analysis that would serve as a basis for developing a delivery and transport plan. The base line analysis includes inventories of the departments invoices in order to get an understanding of the amount of purchased goods, how often goods were purchased and delivered and which and how many distributors that were used. Another important input of this analysis was to get an understanding of the number of purchasers in the municipality. In short, this means that purchasing and delivery routines were mapped and analysed. No logistics' companies were involved in the development of this plan, however the logistics' manager continually informed the already contracted suppliers about the baseline analysis and about the upcoming changes. Some of the suppliers chose to adapt to these new conditions even if their contract was based on the old routines that were set before the development of the new concept.

Before the delivery plan was implemented, the logistics' manager and the distributor who won the bid to operate the UCC made site visits at all the 145-150 delivery points in order to check the local physical conditions (such as the accessibility to the different premises). One important reason for this (among many) was to get an understanding of what size of trucks that could access the different places.

In order to legitimize, communicate and to anchor this work into the organization, a reference group of representatives from all municipal departments and from the City Council was formed. One of the most important selection criteria for the reference group members was that they had an interest in transports and purchasing that that they had some knowledge and competency within these fields.

4.2.2 Do

Värnamo chose to outsource the operation of the UCC and they therefore needed to develop a tender in which they stated criteria for operating the UCC. Environmental performance was one of the most important criteria (followed by safety and economics) when evaluating different entrepreneurs for the UCC. Värnamo used the purchasing criteria recommended by the Swedish Environmental Management Council, and they (among other things) stated that best available technique should be used in vehicles (tyres, engines, fuel).

The reference group was an important constellation during the do phase for dissemination and for internal cooperation. Furthermore, there was a strong political support for this project. No external resources have been used for developing the concept or for training the staff and politicians.

4.2.3 Study

After about one year of operation, the Värnamo municipality goods' transportation system was considered as running efficiently. All parties have expressed satisfaction over the new solution. The investment for developing an UCC and a more coordinated approach to the municipalities transports were budgeted about 6,5 MSEK and it was estimated that Värnamo would save 1 MSEK with this new system. Evaluations show that the UCC has been successful from an economic perspective and there have been no increases in transport costs for the purchasers/units.

This work is continually evaluated. The municipal logistics' manager visits each delivery point (145-150 units) once a year in order to get an understanding of what improvements that are needed. For the same purpose, he also participates in a wide range of meetings for examples purchasers, janitors, kitchen staff and other municipal internal actors to get the different actors' perspectives on the delivery and purchasing routines. The results from the evaluations and follow ups are communicated via the reference group and via internal reports to the city council. There is also continuous communication with the logistics company that is responsible for the deliveries of goods to the units.

Some of the difficulties that have been faced during the three years of having an UCC in Värnamo is the communication between receivers and the UCC. For example, in the summer time some schools and kindergartens close, and they sometimes miss to inform the UCC about this. There are also different preconditions in different units; some kindergartens are located in apartment buildings equipped with small kitchens and fridges. This means that they have difficulties in storing food for a whole week.

The UCC concept of Värnamo is, however, nationally recognized as a proactive and innovative approach and the UCC often receives visitors from other municipalities that are interested in developing a similar approach.

4.2.4 Act

After a few years of experience when it comes to having a coordinated approach to the municipality's transports, the system has matured and one of the main leanings, according to the logistics' manager is that it is important to involve all parties that are affected by this system from the beginning of the process. This is a corner stone for making this approach a joint process with engagement from all involved actors. The close cooperation with the distributors is also mentioned as a key for a well-functioning concept. Furthermore, the logistics' manager stresses the importance of allowing actors to test new approaches not knowing whether they will be successful or not, in order to find new innovative ways of solving problems.

The future development of this concept in Värnamo is, according to the logistics' manager, probably to involve other municipalities in the region for a broader and deeper cooperation. There are, according to him, potential large-scale benefits with a larger purchasing body. Furthermore, they see future cost-saving potentials in optimizing the routes (to decrease the mileage and decrease the drivers' time on the roads) and to increase the load factor.

4.3 The Katrineholm Case

As a result of a reorganization of the municipal organisation of Katrineholm in 2007, the divisions for food delivery and for transport (of letters) were merged. The merged divisions realized that a coordinated approach to transport would make their work more efficient. As a result, an UCC was established. The initiative is seen as an integral part (within existing budget) of the local authority's every-day business and encompasses delivery of food, letters (both internal and external) and parcels to some 90 receivers. The electronic purchasing system is connected to the UCC in order to further streamline the transports. Their facilities were not considered optimal for this type of activities once they initiated the development and implementation of the UCC, however they have adapted the premises during the development in order to meet the needs of the goods that are to be reloaded and distributed. There are three trucks and two caddy-cars that are used in the distribution of goods to the units of the municipality.

4.3.1 Plan

As part of the planning phase, the municipality engaged logistics consultants to evaluate the potentials in coordinating the municipal transports and by developing an UCC. Apart from that, the development of the UCC in Katrineholm has been much of an internal process with little external input. However, some logistics companies have, indirectly, set pressure or motivated Katrineholm municipality to establish an UCC, since they prefer to deliver their goods to only one place. This is done by giving discount on the transport costs. Another thing that has influenced the development of an UCC is the local authority commitment to decrease the internal deliveries with heavy trucks to schools and other units.

4.3.2 Do

The head of unit for food and transport service is coordinating the UCC in Katrineholm. The City Council of Katrineholm decides the budget and goals for the UCC and the UCC report their progress to the City Council on a regular basis. The UCC has grown step by step to what it is today (2012), however there are no further plans on expansion. The purchasers order their goods in the electronic system and this is, as mentioned earlier, connected to the UCC. Due to the step-wise introduction and their approach to depart from already existing structures and routines, there have mainly been smaller adjustments to their former activities and there has been no special training.

4.3.3 Study

Cost-cutting and increasing safety is the main reason for establishing the UCC in Katrineholm. The environmental perspective has not explicitly been in focus. The implementation of a UCC and of coordinated transports has led to fewer heavy transports to the receivers, better coordination of the municipal purchasing and ordering of goods. There has been less wastage of goods and the need for storage has decreased. Katrineholm is, among many municipalities, regarded as a good example when it comes to their UCC approach and they often host study visits for other Swedish municipalities.

So far, there have been no evaluation or formal follow up of the coordinated approach to transports, and one reason given for this is that the UCC has evolved within the already existing activities of the municipalities and is regarded as every-day business. However, there is continuous informal personal contact between the coordinator of the UCC and the purchasers, the departments and politicians where results and improvement ideas are communicated and discussed.

Katrineholm experienced that it was difficult to limit the approach to food and letter and not to expand to other product groups (this was not clear when planning the concept). They claim that this system would be complicated and difficult to run and administer if it would grow to a larger scale system. The quittance system has also been a problem when it comes to who is responsible for the goods at what time. For example, if a parcel is missing, how do you know where in the transportation process it was lost and with which actor the responsibility lies.

4.3.4 Act

The municipality of Katrineholm experiences that one of the strengths with their approach is to depart from already existing structures, budgets and activities when developing their UCC concept. However, the coordinator of the UCC experiences that the planning phase for the UCC in Katrineholm should have been more thoroughly planned. For example the premises for the UCC has not been optimal for this kind of activities, and a lesson learnt if developing a similar concept in the future is that the planning needed to be more long term and the politicians needs to express a clear vision with such an investment. Furthermore, the communication and dissemination of the UCC initiative should have been better in the planning phase, presenting the vision and the changes in purchasing routines that the implementation of an UCC implies.

Some of the future potential with the UCC in Kartineholm identified by the coordinator is cooperation with other neighboring municipalities that could lead to large scale benefits, decreasing mileage and cost and to cooperate with the county council. Furthermore, the UCC coordinator in Katrineholm thinks that the municipality may need to consider whether the UCC should be owned and run by Katrineholm municipality in the future or whether it should be run by entrepreneurs.

5. Concluding discussion

5.1 Drivers and outcomes

Municipalities has, as stated in chapter 1, an important role in contributing to a more sustainable society and by influencing and coordinating transports is one way of doing this. The studied cases have to some extent different approaches to doing this, but they also show several similarities. For example, all describe positive outcomes from the establishment of the UCCs, which also is in line with how the outcome from UCCs is commonly presented in literature (e.g. Browne et al., 2005 and 2007; BESTUF, 2007). The main result is decreased number of deliveries to the receivers which has led to increased security and decreased emissions. The UCCs in the studied cases are seen as permanent solutions that are to be further developed rather than a test project. Furthermore the municipalities in this study have all revised their purchasing routines in the process of making the ordering process more efficient and this has for example led to better overview of the stocks, the needs and the use of products in the municipal departments. This is one example of synergies from the establishment of the UCC. Synergies are also found in the way the municipalities combines different city logistics measures (i.e. technological, logistical and policy measures). The municipalities set requirements on environmental performance of the trucks used and this along with policy decisions on when and where to drive the trucks, which is connected to both environmental and security aspects, contribute to positive effects on several areas. Of course there are challenges and problems with UCC approaches as well. This study shows that mainly one person at the municipality that possess the detailed information and contacts concerning the coordinated approach to transports and this is of course an obvious vulnerability of the initiative.

This study is limited to the UCC approaches in three municipalities (that differ in size, approach, what product groups that are included, and in terms of ownership of the UCCs) and it is therefore impossible to draw any general conclusions on which approach that is the most efficient. To do that, further research is needed. On the other hand, Swedish local authorities are very different in their organization, structure, regional context and their way of doing things due to their self-governance, which means that there might be impossible to predict that anyhow.

It is interesting to reflect on municipalities drivers for establishing UCC:s and more coordinated approaches to transports. Two of the cases in this study claim that the environmental aspects have been the main priority in the development of the UCC (one of them has an EMS, the other does not have an EMS), however security and cutting costs are the main arguments for establishing the UCC in the third municipality.

5.2 Communication and knowledge transfer

The development of UCC in the studied municipalities is mainly an internal concern when it comes to collaboration and training. Having that said, the municipalities have had discussions and communication with logistics companies and other stakeholders to get an understanding of their perspective and to communicate the changes that will come with the UCC. One of the municipalities states that a key to their success is the close collaboration and communication with the internal actors and with the LSP operating the UCC. The lack of this is mentioned as a barrier for the development in another case. All cases agree that it is important to have a continuous communication with stakeholders (mainly internal but also with suppliers and the LSP:s running the UCC) at an early stage of the planning process to anchor and to get an understanding of the local conditions at the delivery points and of the stakeholders' needs and concerns. This is much in line with what Gustafsson and Hjelm (forthcoming) discuss when it comes to the importance of designing approaches that are adapted to the local contexts and to the local users in order for initiatives to be effective.

Knowledge is transferred in different ways and in different phases of the establishment and operation of the UCC, and even if the municipalities in the study gives the impression of these processes being mainly municipality internal when it comes to development and implementation, there are some examples of external knowledge transfer too (see table 3).

Table 3. Examples of knowledge exchange and involved actors in different phases of the initiative. The number of cases in this study in which the example has been identified is presented within brackets.

Phase	Examples of knowledge exchange
Plan	Knowledge transfer from the logistics industry (2) Transport analyses made by external consultants (3) Inform and educate receivers (3) Dialogue with LSPs (3)
Do	Report and discuss progress/experiences from implementation with reference group (1) Joint learning between LSP and municipality on the functionality of the UCC approach (2)

Survey	Broad communication and joint identification of areas for improvements (2)
Act	Study visits from other municipalities, logistics companies, consultants etc (3) Tries to involve other municipalities in the initiative (3) Tries to involve other receivers in the initiative (3) Tries to involve other shippers (goods types) in the initiative (3)

The feedback loop in the PDSA cycle is important in order for learning and knowledge transfer. The process of developing an UCC can be seen as maturing process (compare with table 2 in chapter 3.1). This is especially evident in the case of Katrineholm where they have a step-wise approach to the development of the UCC. However, they have a different approach with a more outspoken focus on the internal processes involving mainly one unit. The planning phase constitutes the foundation for the operation of the UCC and is of utmost importance, and the municipalities in this study have had different approaches to the planning. While Kartineholm and Borlänge had a flying start, Värnamo did thorough analyses and plans. It is impossible to estimate which approach that is the most efficient based on the outcomes in this study, however based on the impression from the learnings in Katrineholm, they would have wished for a more thorough planning that includes a more long-term development of the UCC.

5.3 Future development/potentials

Future development of UCC concepts is to increase the scale to gain more economical benefits (and perhaps environmental). The studied cases have already started to reflect on this by for example including a larger number of receivers, municipalities, types of goods. There are however several challenges or potential drawbacks with large systems. For example, different product groups need different techniques for handling. Furthermore, if the UCC is operated by the municipality and thereby locked with one specific UCC, there could be problems with storage areas etc. If everything, including the operation of the UCC is purchased through procurement processes, there are more possibilities for flexible solutions when a new tender period is entered.

This study has provided valuable insights to how municipalities can and do contribute to more sustainable city logistics. Information exchange and knowledge transfer is described as very central in order to succeed with city logistics both by the studied municipalities and in literature (e.g. OECD, 2003; Lindholm and Thalenius, 2006). However, few studies have provided insights to how and when this exchange is carried out. Our findings show the importance of this exchange within all phases of the initiative and that the PDSA can be a good tool in order to systemize and evaluate the information exchange taking place in different phases. Our study also highlights the importance of the internal information exchange, something that is not that widely discussed within the city logistics literature.

The journey has just begun and, as described above, the municipalities have identified several ways to develop their initiatives. One area that only to a limited extent has been addressed is the possibility to introduce more value added services in the UCC. This is an area that can provide several large scale advantages according to literature (e.g. van Rooijen and Quak, 2010; McKinnon et al., 2010). As the initiatives continue to grow, these advantages are also growing larger and can provide several economical benefits for the municipalities. Furthermore, the responsibilities for the

municipalities do not end with their own transports. Municipalities can also influence the goods flow of others within the city. Examples can be found in e.g. Europe such as the Italian city Lucca, there the municipality charge all vehicles entering the city centre and at the same time implemented an alternative and attractive solution, an UCC for all goods flows to the city. It is time also for the Swedish municipalities to start planning for this step. However, further research is needed in order to design potential initiatives suitable for the Swedish market.

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