

Longitudinal study on urban freight sustainability initiatives: Two cases from Sweden

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Abstract

A wide range of initiatives has been proposed and tested in different cities around the world with the common goal of making urban freight more sustainable. This paper studies two cases of consolidation initiatives in which the property owners play an important role together with other stakeholders. Empirical material for the cases was collected and analysed using an Actors-Resources-Activities (ARA) model within an Industrial Network Approach (INA). The study describes the main stakeholders (actors) of these two cases, their organisation and operations, resources and activities, the inter-organisational relationships. The purpose of the analysis was to understand how resource constellation and activity patterns in the cases get affected and change when new consolidation schemes are implemented. The analysis of the schemes showed that the resistance to change (referred as heaviness of the existing resources and developed interdependencies of activities) indicates the points in the network where changes are difficult to realise. The research demonstrates that property owners and policymakers could be the outside influencers that could help to overcome these factors – the heaviness of the resources and interdependencies of activities – that exist in business network of urban goods deliveries and thereby facilitate transition to more sustainable urban freight.

Keywords: urban freight, property owners, stakeholders, sustainability, Industrial Network Approach, Actors-Resources-Activities model

1. Introduction

Our society's awareness about the importance of urban freight – both in terms of its benefits to the economy and its unintended environmental externalities – has grown over the last few decades. Researchers and practitioners have introduced a wide range of sustainable urban freight initiatives² that could lead to a more sustainable organisation and practice of urban freight. Many pilot projects have been launched and innovative solutions have been tested to respond to and mitigate the challenges produced by freight transportation, like excessive traffic congestion, security impediments, harmful vehicle emissions, and noise. However, the implementation to scale of the majority of such initiatives has not been realized yet, and many are abandoned after the pilot project period expires or when the funding ends (Quak et al., 2016). Despite the promise of many such initiatives, significant changes in the urban freight system remains difficult to achieve.

A lot of research in urban freight has been dedicated to such groups of stakeholders as the transporters and goods receivers (e.g. retailers, offices, restaurants and so on). These stakeholders can make changes to achieve more sustainable urban freight systems (Browne et al., 2017; Holguín-Veras & Sánchez-Díaz, 2015; Holguín-Veras et al., 2016; Sánchez-Díaz et

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² Projects, solutions, policies, collaborations

al., 2016). However, some groups of stakeholders have more power than others to influence the system. It is interesting to note that some influential stakeholders have rather remote relations to urban goods deliveries, as they are not good senders or transporters, nor are they goods receivers. And yet, these stakeholders can influence how goods are ordered, transported and delivered to the goods receivers, and in general, how the goods receivers arrange their physical inbound and outbound flows. These organisations have been grouped together and defined as “influencing organisations” (Brettmo & Browne, 2020; Brettmo & Williamsson, 2020). Examples of influencing organisations include: i) property owners (for example, owners of commercial properties like office buildings and shopping malls); ii) public procurement organisations that group city and local authorities together in terms of their purchasing activity; (iii) private sector companies such as facility management companies that may work for a range of businesses providing purchasing services and also providing out-sourced activities such as cleaning and catering; and iv) organisations that bring local businesses together, for example, Business Improvement Districts (BIDs) (ibid). This paper focuses on and further explains the influence and role of property owners in the urban freight system.

Property owners often engage in the sustainable development of their properties (Brettmo & Sanchez-Diaz, 2021), viewing such efforts as a way to improve the attractiveness, competitiveness, profitability, and future market value of their properties. Many property owners are aware of the negative externalities produced by excessive urban freight, including the adverse effects on their properties. Moreover, property owners often have sufficient resources (physical, financial, and administrative) and tools to influence their tenants and induce them to arrange their goods flows in a more sustainable way (Brettmo & Sanchez-Diaz, 2021).

The consolidation of goods flows in a broad sense is one of the main topics in city logistics, and its importance has only grown with the increased deliveries of e-commerce. Such consolidation measures include both establishing physical consolidation centres and similar establishments or the consolidation achieved by organising the goods flows in different ways (using, for example, bundle procurement, demand planning and other supply chain strategies, or consolidation of the flows by transporters).

This paper conducts a longitudinal comparative study of two collaboration projects in Sweden that are engaged in consolidating activities of goods deliveries. Each case has a different set of actors, but property owners take an active part and play an important role in both. The goal is to explore the role that property owners can play by applying different approaches to collaborating with other stakeholders to foster sustainable goods consolidation initiatives. The empirical data was collected and analysed by applying an Actor-Resource-Activity model within an Industrial Network Approach (INA) methodology. The aim of this research is to: i) obtain a deeper understanding of the organisation and operation of these two consolidating projects; ii) analyse the inter-organisational relationships between the actors; iii) identify key resources and activities in the projects and their inter-organisational relationships; and iv) identify which of these resources and activities were critical for project implementation. The analysis provides insights for the implementation of similar projects in a wider context of urban freight settings.

The rest of the paper is organized as follows. The next section summarises the literature relevant to the research topic themes. Case selection, data acquisition and analytical framework

are discussed in the methodology section. A description of the empirical data collected and compiled from the cases is presented in the results section, followed by an analysis of the business networks conducted by applying the ARA model framework. Common ground and primary insights from the cases are given in the discussion and conclusion section, followed by final remarks found in the paper's last section.

2. Themes from previous literature

2.1. Consolidating goods deliveries in urban freight

As mentioned in the introduction, consolidating deliveries is one of the main topics in the urban freight literature. One of the consolidation initiatives that has received a lot of attention from practitioners and researchers is the establishment of urban consolidation centres (UCC). The type of UCC can vary, but the concept implies the establishment of an accessible logistics hub for those goods that are designated for usually heavily congested urban areas to facilitate the last-mile deliveries (Kin et al., 2016). UCCs provide several social and environmental benefits such as decreasing traffic congestion and harmful emissions. However, despite such significant social benefits very few UCCs have been reported to be successful (i.e. financially self-sufficient) over a longer period (Holguín-Veras et al. 2020a; Marcucci & Danielis, 2007; Quak et al. 2020).

One problem is that the high start-up and running costs of UCCs make their financial viability questionable (Kin et al., 2016). In many cities there is also a lack of space to establish such hubs, and an unwillingness to change their business models among transporters (Holguín-Veras et al., 2020a). Another primary difficulty is scaling up these projects and attracting a sufficient number of participants for financial feasibility. The social cost-benefit analysis (SCBA) of the privately-initiated UCC in the Belgian city Antwerp shows that a sustainable business model for UCCs is possible by scaling up the operations by significant volumes and using the economies of scale (Kin et al., 2016). The longitudinal study of Binnenstadservice UCC shows that their business model had to undergo significant transformations over the years. The UCC had to change their customer focus from smaller goods receivers (shopkeepers) to bigger retailers and logistics service providers (LSPs), establishing franchising in several cities nationally to scale up the project, and adding additional services that could bring additional value for the customers and increase their willingness to pay, while establishing a common platform for financial and information flows (Quak et al., 2020). A universally viable business model for UCCs is yet to be found, and it seems that supportive incentives or regulations may be required as well (Holguín-Veras et al., 2020a).

2.2. Scaling up of urban freight initiatives

Despite the wide range of urban freight solutions proposed by researchers and policymakers, significant changes in urban freight remain unrealized (Quak et al., 2016). Researchers have proposed different theories explaining the state of the art in urban freight, and how freight systems can be transformed or improved (Gammelgaard et al., 2017; Holguín-Veras et al., 2020a; Holguín-Veras et al., 2020b; Holguín-Veras et al., 2015; Le Pira et al., 2017; Marcucci et al. 2017). Quak et al. (2016) introduced the theoretical notions of Shared Situation Analysis (SSA) and Joint Knowledge Production (JKP) into urban freight research. Given the complexity of stakeholders and their multi-vector and often contradictory interests in urban freight (Ballantyne et al., 2013; Marcucci, Le Pira, et al., 2017), each stakeholder group lacks

an objective picture of the overall situation in the network, and thus acts solely on their nearest interests and inertia (i.e. the traditional way of doing things). Thus, the system of urban freight is overly chaotic and has too many constraints to allow major change to happen (Quak et al. 2016).

According to the SSA theoretical framework, each system is characterised by different levels of maturity. If the system is not mature enough, it is unlikely that significant changes will occur. The higher the maturity level, the higher the likeliness that the system will change (Kurapati et al. (2012) in Quak et al., 2016). For the urban freight branch of the transportation system, the maturity of the system means it has reached a high level of awareness among the stakeholders. This maturity suggests that the different stakeholders should not only possess knowledge of the industry beyond their own interests, but also that they may share a similar vision of the future development of urban freight and have some functioning communicating channels between them.

To increase the maturity of the SSA model, it is proposed to supplement the original SSA framework with one more component, the Joint Knowledge Production (JKP) (Hegger et al. (2012) in Quak et al., 2016). JPK is a collaborative creation of knowledge and practices involving academics, practitioners from the industry, and policymakers. JPK helps to bring together input from research and science with practical experience from the industry, and implications from the policymakers (Quak et al., 2016). The combination of SSA with JPK could lead to considerable change in the urban freight system (Hegger et al. (2012) in Quak et al., 2016; Kurapati et al. (2012) in Quak et al., 2016).

It can be argued that a lack of SSA maturity and interactions among the stakeholders can inhibit the scaling up of sustainable urban freight initiatives. This research shows how property owners can be the stakeholders that act as enhancers of SSA maturity among the stakeholders, and in doing so to encourage and foster sustainable urban freight collaborations and consolidating initiatives.

3. Methodology

3.1. Case selection and case description

This research is designed as a study of two consolidation initiatives where the property owners play an important role. Some stakeholders participate in both initiatives, however the start-up and implementation of these initiatives differ, and that is why it is interesting to compare them; the research is designed as a longitudinal comparative study, and this is what the paper reports on. Both initiatives (Älskade stad and Urban Services) engage in consolidating activities of goods deliveries in Stockholm, Sweden. The Älskade stad scheme has expanded to other cities, however, in this paper, only the scheme established in Stockholm is analysed. Both cases are collaboration projects that include different stakeholder groups. The cases were selected due to the following criteria:

- Involvement in urban freight, and in particular in consolidation activities in urban freight
- Involvement of property owners as key stakeholders
- Viability of the projects, as they are not pilot projects or externally-funded projects with a limited time-frame

- Cases have been developed over 6 to 8 years (2014-2016 to 2021) to achieve the goal of a longitudinal study

3.2. Data acquisition related to cases

Interviews were chosen as the primary data collection method, complemented by secondary data including one report (Elander et al. 2017) and power point presentations shared by the interviewees. As a starting point, the main stakeholders participating in the collaborations were identified. A number of interviews were conducted with representatives of the main stakeholders in both collaborations between 2016 and 2021. In total, 14 face-to-face and videoconference interviews were conducted with representatives from 10 organisations. The list of interviews, including the roles of interviewees, and the time and type of interview are summarized in Table 1. The interviews were semi-structured to encourage people to talk freely while following the structure of the interview guide. The main topics discussed were respective consolidation schemes, including detailed information about the processes and operations, participants, milestones and development of each scheme, motivation to participate, main challenges and issues, and lessons learned. Some interviews were followed by study visits to see the premises (logistics hubs), employees and vehicles. Some parts of the interview guide contained the questionnaire that was constituted by applying the Actor-Resources-Activities (ARA) model³ (Håkansson et al., 2009). The questions were formulated to obtain data on the actors, resources and activities involved in each case. The interviews were recorded, transcribed and analysed using the ARA model framework.

Table 1. The list of respondents for the case of Älskade stad

Organisations	Respondents
Stockholm Stad, Traffic Agency (Trafikkontoret)	<i>Strategic planner, working with urban freight questions:</i> One face-to-face interview (October 2020) One informal discussion during the conference Multiple e-mail correspondence <i>Freight strategist:</i> Attendance at the presentation followed by discussion (January 2020)
Bring, transport company	<i>Nordic Director Home Delivery:</i> One videoconference interview (September 2020) Multiple e-mail correspondence
Ragn Sells, waste management company	<i>Head of Region City Services:</i> One face-to-face interview (February 2020) Attendance at the presentation followed by discussion during the conference (May 2017)
Vasakronan, property company, Malmö	<i>Head of Retail, Malmö, also chair of the board in BID in Malmö – City i Samverkan:</i> One video-conference interview (June 2020)
Vasakronan, property company, Stockholm	<i>Head of Retail, Stockholm:</i> One video-conference interview (August 2020)
Vasakronan, property company, Gothenburg	<i>Head of Retail, Gothenburg:</i> Two face-to-face interviews (October 2017, February 2020)

³ The description of ARA model will be given in the analytical framework section

Table 2. The list of respondents for the case of Urban Services

Organisation	Respondents
Urban Services JV	<i>CEO Urban Services:</i> One face-to-face interview (May 2019) Multiple e-mail correspondence One videoconference interview (February 2021)
Catena, logistics property company	<i>CEO Catena, Head of the board of Urban services:</i> One face-to-face meetings (February 2017) One video/conference interview (June 2020)
Fabege, property company	<i>Director of Urban Development:</i> One face-to-face interview (November 2017)
Ragn Sells, waste management company	<i>Head of Region City Services:</i> One visit for interview (February 2020) Attendance at the presentation followed by discussion during the conference (May 2017)
Servistik, logistics company	<i>Former site manager at Servistik, currently site manager at Urban Services:</i> One face-to-face meeting (May 2019)

3.3. Analytical framework

The two cases studied in this paper describe interactions and relationships between multiple companies. As a result, it was decided to apply the Industrial Network Approach (INA) for data collection and analysis. According to INA, the business environment (a company, group of companies, branch or industry, or a business activity) should be seen as a business network, where different companies are interconnected by business relationships (Håkansson et al., 2009). INA helps clarify the dynamic business relationships to answer the question why things function as they do. The INA is very wide and has many aspects and sides, but for this study, the focus will be on the Actors-Resources-Activities (ARA) model (Snehota & Håkansson, 1995; Håkansson et al., 2009).

The ARA model is a research tool that identifies the main actors, activities and resources (and the relationships between them like actor bonds, activity links and resource ties) that constitute the studied business network. Application of the ARA model helps clarify business network functioning and development, as well as how the relationships started, and how they have changed and adjusted during interactions, and over time.

In this study, two business networks are analysed: the Älskade stad collaboration and the joint venture Urban Services. The key actors, resources, and activities in each case have been mapped and analysed. Further, the resource constellations and activity patterns in the business networks were compared before and after the projects' implementation. The rationale behind this choice of analysis is the hypothesis that the long-term viability and self-sufficiency of urban freight initiatives depends on a developed resource and activities infrastructure and the way it evolves during interactions and over time. As noted earlier, many initiatives appear to end when external funding ceases. From the ARA model's perspective, this means that the resources and activities have not adapted enough to continue to run without external support. In these two collaborations, the initial premise was to avoid any kind of external funding, so the projects should be financially self-sufficient and running in the longer term perspective.

The goal of this study is to identify the changes in resource constellations and activities patterns of each of these projects compared to their previous setup. This analysis helps identify which resources and activities are crucial in terms of long-term viability and success so that they can be considered while attempting to implement a goods consolidation scheme.

While studying the resources and activities in the considered business network, it is important to focus on two important attributes – *the heaviness of resources* and *interdependencies of activities* (both heaviness of resources and interdependencies of activities are the specific terms of the ARA model within INA approach). Short definitions of these attributes are summarised in Table 3.

Table 3. Definition of heaviness of resources and interdependencies of activities (adapted from Håkansson et al., 2009)

Heaviness of resources	The attribute created by past investments into the resources (in forms of financial costs, administration and management efforts, time, relationships). Existing resource constellations impede the emergence of new resources in the network, for example, the acquisition of more advanced technologies.
Interdependencies of activities	The process in which the activities in the network adjust to each other for better performance, and become interdependent with each other over time. Interdependencies prevent changes to some activities or the introduction of new activities, impeding the implementation of innovations and the general development of the network.

It is important to pay attention to both the heaviness of the resources and the interdependencies of the activities in the cases analysed. Heaviness of the resources and interdependencies of activities represent constraints in the business network that could make it hard to implement changes, innovations or the acquisition of new practices and technologies. Identifying these constraints helps to ensure that efforts to foster change can be focused in the most effective way. These efforts could include financial investments, administrative support, improved communication, surveillance and knowledge support.

4. Results

The results are presented as a consecutive description of the two cases including the timeline of the projects' development with the main milestones.

4.1. Älskade stad

Älskade stad is a cross-industry collaboration project between different stakeholders that aims to decrease freight traffic, noise and emissions in urban areas in Sweden. The collaboration started in Stockholm, where the main stakeholders are Ragn-Sells, Bring, Vasakronan, Martin & Servera, and Stockholm Stad.

The project started by political initiative of the city councilwoman Ulla Hamilton, who was responsible for transportation in Stockholm in 2011-2014. Different stakeholders were invited to discuss possible business models of urban freight sustainable solutions. Ragn-Sells, Vasakronan volunteered to participate from the very beginning. Stockholm Stad (Trafikkontoret in Stockholm) took the project manager role from the beginning, organising

the meetings and moderating the discussions between potential stakeholders. They also provided administrative and regulatory support to the project during the project development phase and during the operations. The collaboration took the name Älskade stad (Beloved City) and it is a neutral trademark that can be used by different actors for their environmental communication work.

The collaboration and first operations started in Stockholm. Ragn-Sells acquired their first electric special-built low-speed vehicle designated for operations in 2016. At the same time, the local hub was prepared for operations. The most difficult part was to find the transporter that would join the collaboration, and finally after a long series of internal negotiations, Bring agreed to join in 2017. The operations started May 14th, 2017, and initially included the area of three zip codes in the city centre. Later, the area was expanded to six zip codes, including the area of Old Town (Gamla Stan) in Stockholm. Martin & Servera (the wholesaler for restaurants and commercial kitchens) joined this collaboration during spring 2019. The main milestones of the collaboration development are presented in Table 4.

Table 4. The milestones of the Älskade stad collaboration development

2013	Initiation of discussion about the collaboration; potential participants from different industries were invited to participate in a series of meetings, organised by Trafikkontoret in Stockholm Stad.
2013-2016	Work on collaboration development: finding partners that were willing to participate, working out the sustainable business model, concluding legal agreements
2016	Acquiring the first electric special-built vehicle and opening the city hub, both by Ragn Sells.
2017	Starting of the operation of Älskade stad in Stockholm
2018	The Old Town (Gamla Stan) area was added to the project area
2019	Operation of Älskade stad started in Malmö Martin & Servera company joined the collaboration in Stockholm
Future development	
From 2021	Future expansion to other cities

Looking at this collaboration from the project development perspective, it could be said to have followed the following phases: concept, inception, operations and expansion. To date, the collaboration Älskade stad has expanded to Malmö in Sweden, but also to Norway, and has resulted in a similar collaboration, Elskede By, in two cities, Oslo and Trondheim. There are ongoing discussions about starting up Älskade stad in other cities in Sweden, and abroad. This study focuses only on the collaboration Älskade stad in Stockholm, which is further described below.

In Bring terminal in Västberga the goods that are directed to the designated area are sorted. Älskade stad trucks bring these packages to the city hub (Älskade stad terminal – samlastningscentralen), where they are sorted and re-loaded on electric vehicles for the last-mile deliveries, distributing the packages to the final customers. The average number of packages processed is approximately 500-600 parcels per day. Along the same route, while distributing the packages, the drivers collect different types of dry wastes (recyclables) from the goods receivers (different commercial establishments like offices, retailer shops,

restaurants) and bring them to the city hub. Later, at the city hub, the wastes are consolidated, compressed, and taken by fully loaded heavy-duty biogas vehicles out of the city to the waste management terminals for further handling.

Since central Stockholm is very congested and some streets are very narrow (in Gamla Stan, for example), Ragn Sells uses specially designed electric vehicles for the transportation. These low-speed vehicles can be lowered to the pavement level and loaded from the side, which saves street space, time for handling and makes them more convenient for the drivers to operate. The vehicles make it possible to collect several types of dry wastes during one trip, unlike big traditional waste-collecting vehicles that can collect only one or two types of recyclables during one trip.

Altogether the Älskade stad collaboration is financially self-sufficient. Bring reimburses to Ragn-Sells the costs for the last-mile distribution of the packages. There was no separate legal entity created for the Älskade stad collaboration. The relationships between the parties and the responsibilities for different operations are regulated by different legal agreements between the participating organisations.

The work of Älskade stad contributes to the sustainability of goods transportation in different cities. Elander et al. (2017) conducted the study on the validation of the transport scheme that is used by Älskade stad and they report a 73% decrease of CO₂e/kg for transportation as a result of the consolidation activities. The authors of the study confirm that this scheme produces less noise in the city, and overall contributes to a more liveable urban environment (Elander et al., 2017). Älskade stad won the Transport Sustainability Award (Transportföretagarnas hållbarhetspris) in 2017 and the Pingvinpriset (Stockholm city sustainability award) in 2018.

4.2. Urban Services

Urban Service is a joint venture company that was started to provide local complete logistical sustainable solutions for the organisations and residents located in Arenastaden, Sweden. The joint venture was established by four organisations: Fabege, Catena, Ragn-Sells and Servistik. During the annual logistics conference (Logistiktrend) hosted by Catena in May 2017, the stakeholders announced the establishment of the joint venture. The initial idea proposed by Fabege was to transform the area around Arenastaden to a better place and provide additional services to customers. This idea was supported by other stakeholders (Catena, Ragn-Sells, and Servistik) that have similar views of the future of city logistics and property development. Arenastaden is an area of special interest for Fabege, since the company owns the major share of properties there (around 80%), and the rest 20% is owned by another big property owner, the Unibail-Rodamco-Westfield in the form of Mall of Scandinavia.

Arenastaden is a city area comprised of a big shopping mall, The Mall of Scandinavia (MoS), a number of office buildings, and several residential buildings, resulting in 100.000 sqm of retail premises, 30.000 working spaces and 4000 residential buildings. The number of visitors the area attracts more than 1.000.000 per month (May 2019). The area is growing, and an expansion is planned by building a number of office and residential buildings, some of which are already under construction. The ambition of the collaboration was to decrease the number of freight trips by 70% by the time the scheme is fully implemented and operated. Urban Services conducted a transportation survey in 2019 that shows that approximately 3000 freight

trips are made to the area per week. According to the freight analysis made by Urban Services, in several years this area is going to generate up to 5000 transport trips per week. Such growth is expected given the increase in employees and residents filling the buildings that are now under construction. The expected growth of e-commerce is taken into consideration as well. Preliminary calculations in the report show that the estimated savings from the scheme would be approximately 180.000 freight trips per year.

The collaboration has the high ambition of providing the best possible logistics solutions to the businesses, employees and residents in the area. The collaboration has gone through several phases and is still under development. The first phase started on June 1st of 2018, and covers the consolidation of those goods designated for the receivers located in the Mall of Scandinavia. Urban Services accept the goods on behalf of their customers, and stores them at one of three hubs, located at facilities under the mall. Urban Services notifies the goods receivers (tenants) that their goods have arrived. The tenants can choose to pick up the packages themselves or have them delivered by Urban Services for an additional fee. The tenants are satisfied with the services provided because they have the flexibility to choose the service level for the goods deliveries depending on their current situation (for example, the number of available employees, or availability of storage at their retailer spot). As the next step, in 2020, the customers (office tenants) outside the mall were added to the scheme. The number of such customers is around 20 organisations as of January 2021, and is growing. Today the hubs used for the storage of the goods are located at Mall of Scandinavia facilities (including the underground facilities and ground floor facilities). The property owners of the mall, Unibail-Rodamco-Westfield, permit some of the space at these hubs to be used to handle the goods designated for receivers located outside the mall, at the office buildings in the neighbourhood.

During the next phase, there are plans to establish an additional city hub (samlastningscentralen) that would be managed by Urban Services. This city hub is planned for 2023-2024, depending on approval and permissions from the municipality and other regulatory authorities. The size of the city hub is expected to be around 2000-4000 square meters. Urban Services will manage the goods designated for the customers in the area, sorting and handling these goods in compliance with the service contracts of goods receivers (for example, arranging just-in-time (JIT) deliveries to certain customers, providing the possibility of storing the goods for some customers). The goods from the city hub will be distributed to customers, and on the way back the returns and dry waste will be collected. The revenues will come from different sources: payments from the customers, waste collection fees, and revenues from the transporters that are expected to pay for their last-mile deliveries. The majority of the buildings (offices and eventually residential properties) in the area will be included in this service scheme. Offices will be given unique places in this scheme, because they will be provided with additional services such as courier services, and bundle procurement.

Viewing Urban Services from a project development perspective, it has gone through the following steps: conception, inception, and operations, while the latter is still under development. Full operations and expansion are expected to be completed in the future. The main milestones of the project are presented in Table 5.

Table 5. The milestones of Urban Services collaboration development

2016	Initial discussion of potential collaboration started at Fabege
2017	Joint venture “Urban Services” was created
2018	The CEO of Urban Services was appointed
2018	The start of Urban Services operations at Mall of Scandinavia (Phase 1)
Future development	
2023-2024	Building and introducing into operations the city hub of Urban Services (Phase 2) Implementation of new waste management scheme Introduction of new set of services to businesses: JIT deliveries, storage service, green logistics service with CO ₂ report Agreement with transporters on the last-mile deliveries

5. Analysis

This section describes the analysis of the empirical results of the two cases. As mentioned, the results were analysed by applying the ARA model. For that, the mapping of actors, resources and activities was conducted and summarised in Table 6 (Älskade stad) and Table 7 (Urban Services). Within the construct of the ARA model, both cases, Älskade stad and Urban Services, are seen as business networks. The web of actors, constellation of resources and the activity patterns of these business networks are identified. Later, any changes in the resource constellations and activity patterns due to new schemes or implementations are identified and explained.

5.1. Case 1 Älskade stad

This section contains an analysis of the resource constellations and activity patterns in the business network Älskade stad. The mapping of actors, resources and activities is summarised in Table 6. Further, the resource constellations and activity patterns before and after the implementation of the Älskade stad scheme is conducted and explained using such notions as heaviness of resources and the interdependencies of activities. A schematic visualisation of the Älskade stad scheme is presented in Figure 1, showing the main actors, resources and activities, the physical flows and the hub in the scheme.

5.1.1. Changes in resource constellation in the business network after Älskade stad

By introducing a new scheme, the last mile was taken from transporter Bring (and its subcontractors) and given to Älskade stad. The revenues obtained by Bring for transportation services are shared with Ragn-Sells as a reimbursement for last-mile deliveries. Technically, in the new setup, Bring is giving away both some physical flows and financial revenues. However, Bring had been using subcontractors for last-mile deliveries before the scheme, but the goods were delivered under the Bring trademark. The resource structure has changed, requiring a reconfiguration of their routes and the capacities freed by delegating the final deliveries to Älskade stad. To make it work, changes to the resource structure of Bring had to be implemented (legal, administrative, organisational, and physical), which required additional investments from the company. The problem was that in the past, the company had to dedicate a lot of investments into establishing their old scheme (like assigning of physical flows, establishing relationships, regulating financial flows). The “weight” of these past investments, which can be seen as a countervailing force to the changes, can be considered as an example of heaviness of the resources in the business network. Together with the necessity of new

investments, this heaviness of the resources can act as a potential impediment to the implementation of the new scheme.

Table 6. Mapping the Älskade stad network according to the ARA framework

Actors	<p>Inside the collaboration: Vasakronan, Ragn-Sells, Bring, Stockholm Stad, Martin & Servera</p> <p>Outside the collaboration: goods receivers, parking management, politicians, the manufacturer of electric vehicles, researchers (their report)</p>
Resources	<ul style="list-style-type: none"> -Electric vehicles (owned by Ragn Sells) -City hub (owned by Vasakronan, rented by Ragn Sells) -Biogas trucks (owned by Bring and Ragn Sells) -Infrastructure for parking and charging the electric vehicles (owned by Stockholm Stad, available for Älskade Stad) -Employees (the drivers, who are also the ambassadors of the collaboration) -ICT systems (two different systems owned by Ragn-Sells and Bring respectively) -Legal agreements (between all parties) -Trademark Älskade stad (shared by the parties) -Administrative support (Stockholm Stad) -Human resources <ul style="list-style-type: none"> • Knowledge, data collected and experience (also from the previous projects) • Good communication and relationships, trust between the main actors • Common values (for example, the valuing of sustainability)
Activities	<p>Operational activities:</p> <ul style="list-style-type: none"> - packages are delivered to Bring terminal in Västberga - packages for Älskade stad are sorted and loaded on biogas vehicle - packages are transported to the City hub - at City hub, the packages are sorted and loaded on electric vehicle - the driver of the electric vehicle decides on the optimal route and delivers the packages to goods receivers - dry wastes are collected during the same route - dry wastes are delivered to the City hub - dry wastes are consolidated and compressed in the City hub - dry wastes are transported to Västberga terminal <p>Organisational activities:</p> <ul style="list-style-type: none"> - Prior to operations: <ul style="list-style-type: none"> ○ Establishing the scheme and the flows, and how operations should be run ○ Concluding the legal agreements ○ Obtaining necessary permissions ○ Acquiring of electric vehicles ○ Establishing the City hub ○ Education of the employees ○ Choosing the common trademark Älskade stad - Working on the expansion of the scheme, including more transporters and more streets, cities, countries - Management meetings, 3-4 times a year - Media coverage, education and promotion

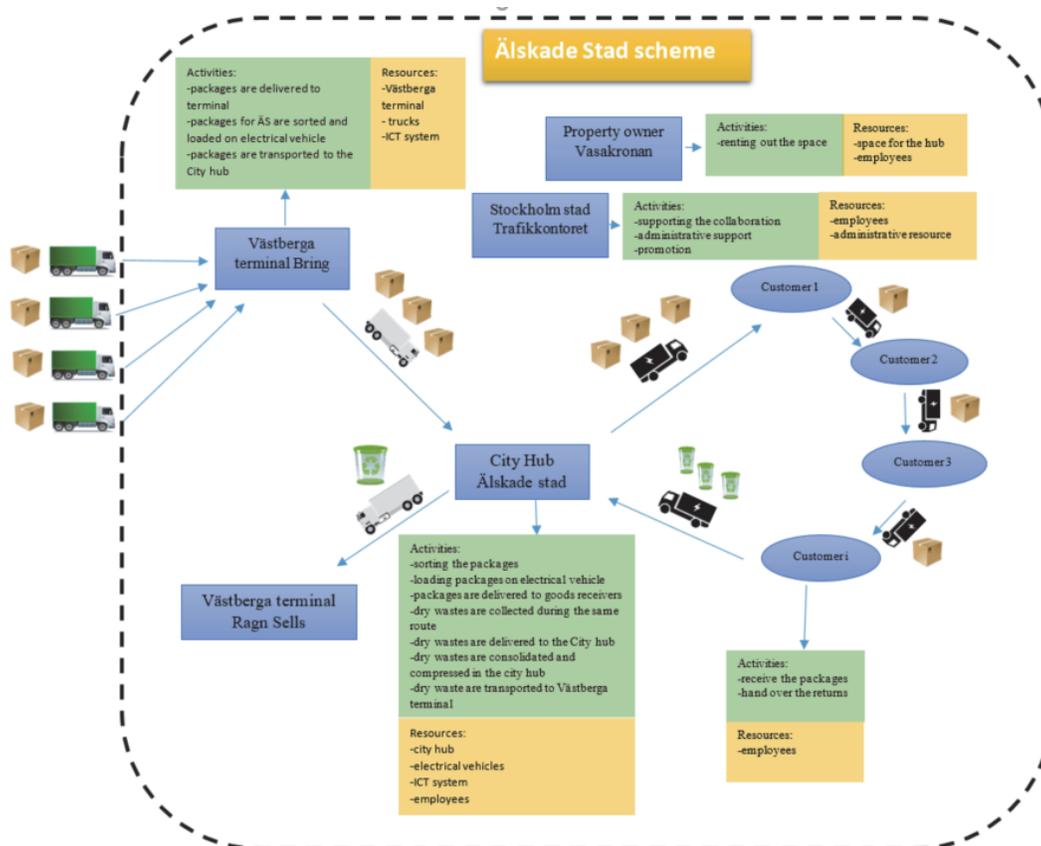


Figure 1. Visualisation of the scheme Älskade stad in Stockholm

Considering the example above, it is obvious that challenges to accepting a new *goods delivery strategy* can be explained by the heaviness of the resources in the network described. That is why the implementation of Älskade stad scheme took several years and required a lot of effort and commitment from the stakeholders. The example of the heaviness of the resources described above is a typical situation when transporters are invited to participate in similar consolidating schemes, and it can be the reason why both the establishment and the longevity of innovative and more sustainable goods consolidating schemes are difficult to achieve. It also addresses why large-scale changes in the transport industry are slow and difficult to attain. The rest of this subsection includes three examples where heaviness of resources can be identified as a challenge in terms of implementing a new scheme.

Heaviness of resources can be identified as an issue when one looks at the changes of Älskade stad's waste collection scheme, which is more flexible than traditional systems, and different types of wastes are collected during the same visit. However, additional handling is required at the city hub, where the wastes are sorted, compressed and reloaded for further transportation outside of the city. Naturally, the arrangement of the new and quite different waste collection scheme required reorganising operations, and rearranging flows, and required additional investments (financial, organisational, and administrative). Here, the existing resource structure had accumulated a certain heaviness, which creates barriers to change. This is another

example of a network's resource constellation where the heaviness of certain resources plays a role in limiting development.

It is worth noting that changes in the waste collection scheme happened within one organisation (Ragn-Sells), and because of that, and because of its strong leadership and knowledgeability about waste management, the impact of the heaviness of the resources (reorganising the process, managing the city hub, acquiring electric vehicles) was possible to overcome. This example shows that the strong motivation and knowledgeability of the leaders in the project can successfully overcome the heaviness of the resources.

The greatest potential is when the actors perceive that the advantages of the new scheme will outweigh the heaviness (including additional investments) of the resources. One of the resources, owned by Ragn-Sells is, actually, knowledge about waste management best practices, and their experience in combining flows to decrease the amount of traffic and improve capacity use – the so-called last and the first mile (the last mile for packages and the first mile for waste collection). This is something that Ragn-Sells has practiced in many commercial establishments in Sweden. In the Älskade stad collaboration project, this idea was developed, extended and organised on the city street level.

An important role in this collaboration belongs to the property owner Vasakronan. Even if they are less involved in daily operations (than Bring and Ragn-Sells, for example), they provide the physical space for the city hub, and this resource is crucial for this scheme (and for similar consolidating schemes). Moreover, Vasakronan allows some of the space in the hub to be used for wastes from establishments owned by other property owners, which is not self-evident in this business branch. Arranging the space for the city hub requires a change of the current land use, for example, by withdrawing its use as a parking garage. Without their cooperation, the heaviness of this space resource could have slowed down the change to the new scheme as additional rearrangements and investments would have been required.

During their interviews, the representatives from Ragn-Sells and Bring expressed their opinions about the limits imposed by the current information and communication system (ICT) used, and the necessity to change to technology that would allow communication between the systems that are currently used by Ragn-Sells and Bring. Changing to another system would require significant technological and even structural changes for both companies, which would demand high investments. This is one more example of the heaviness of the resources in this business network.

5.1.2. Changes in activity patterns in the business network after Älskade stad

The delivery of goods to the receivers located in the city centre can be seen as an established activity pattern in the Älskade stad network. Over time, certain adjustments and eventually interdependencies of activities had developed. Changing to the Älskade stad scheme required changing many operational activities connected to the transportation and the delivery of goods, and waste collection, handling and transportation outside of the city.

Ragn Sells and Bring have experienced major changes to their activities while operating according to the new scheme compared to the old one, as these companies are the two most involved in operations. For Bring, several activities have changed, as the goods designated for receivers located in areas included in the Älskade stad scheme, are sorted out to a separate flow and are delivered to the city hub (sometimes by Bring, sometimes by Ragn-Sells). Here the

interdependencies that had been developed with the subcontractors that previously delivered the goods to the receivers had to be overcome. In addition, a new activity was added, in passing the goods over to another “transporter” – Älskade stad – for the final delivery to the receivers, operated by the employees from Ragn-Sells.

For Ragn-Sells, in the new scheme compared to the old one, many new activities were added as well, as they now not only collect the waste, but also distribute the packages to the goods receivers. Moreover, the employees operate a new type of vehicle – electric low-speed vehicles – which, in turn, have changed their established daily operating activities. During the interaction, new adjustments and interdependencies of activities appear to improve performance. For example, the decision on daily routes is made by estimating the best routes considering the required package deliveries and the current waste collection necessities at different sites. Interestingly, when a certain activity is incorporated into the network and old interdependencies have been overcome, this new activity becomes adjusted with other activities and new interdependencies are created. Here interdependencies created help the new activity to remain as the activity pattern.

Adding the city hub to the scheme added new activities to the network’s activity pattern, like the consolidating and compressing of the wastes, and then loading them on the bigger vehicles and transporting them outside the city to the recycling terminal. At this hub, the employees also have to receive the packages that come from the terminal in Västberga, sort them and reload them on the electric vehicles and plan the delivery route. Since these activities were not included in the old waste collection scheme, they had to be incorporated into the new activity pattern. With time, these new activities have become adjusted to each other to improve their performance and to create new interdependencies in the network.

5.2. Case 2 Urban Services

The mapping of resources and the activities of the business network for Urban Services are summarised in Table 7. The main actors in the collaboration are Fabège, Catena, Servistik, Ragn-Sells. An important actor in the network is another property owner, Unibail-Rodamco-Westfield. Since the project has not been fully developed yet, the resources have been conditionally divided into two categories: current resources and activities, and future resources and activities. The analysis of resource constellations and activity patterns compares existing resources and activities with those planned for the future (after full implementation of the scheme) while identifying where the transition to the new scheme may be impeded by the heaviness of resources and interdependencies of activities. The schematic visualisation of Urban Services is detailed in Figure 2, presenting the physical flows and the hub in the scheme, the main actors, the resources and the activities of the business network.

5.2.1. Changes in resource constellation in the business network after Urban Services

The idea behind the Urban Services collaboration is to organise and provide complete logistics for an entire area, which is different from the traditional way goods are delivered to the goods receivers in cities. However, from the ARA perspective, such a significant change in the network is not easy to implement or carry through, because of the heaviness of the resources and the developed interdependencies of the activities.

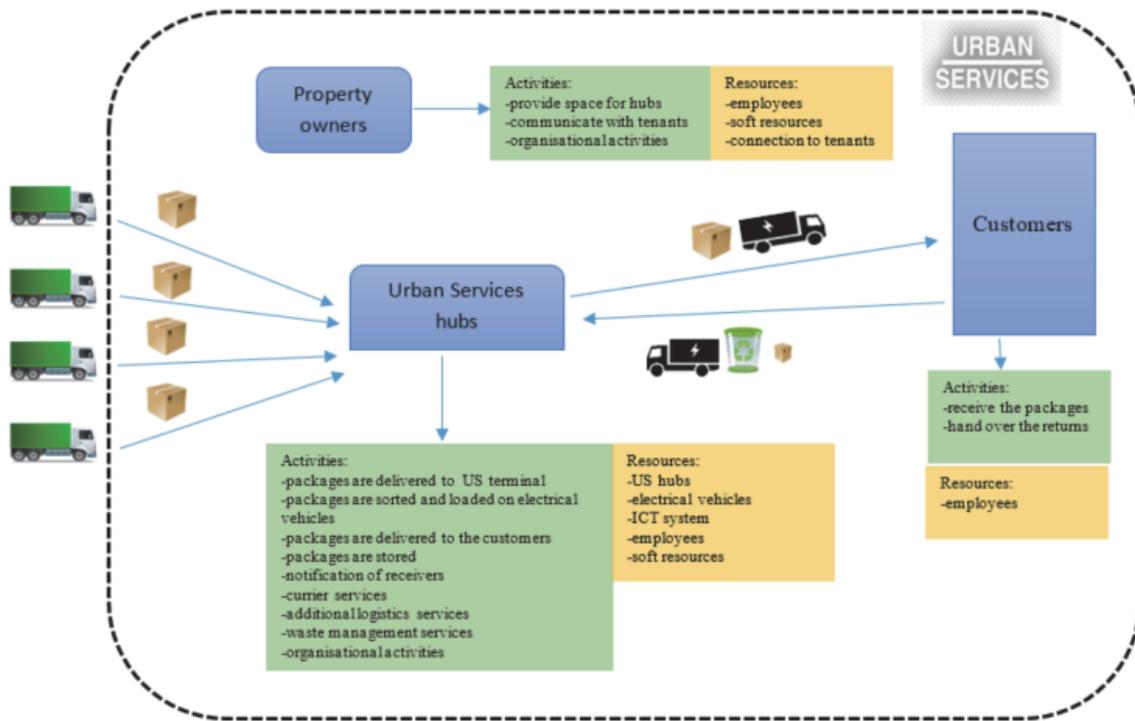


Figure 2. Visualisation of the scheme Urban Services

One of the important milestones in the collaboration development is the establishment of a new city hub and its introduction into operations (which is not have happened yet). Empirical data shows that the main challenge to the full scheme implementation obtain all necessary permissions from local authorities to build the city hub close to Arenastaden. Urban Services has already applied for a building permission at the municipality, but they expect that the whole process might take 2-3 years, partially because they intend to change one adjoined road to a one-way road. The construction, and the inclusion of the city hub into operations require significant investments, and the difficulties of realising projects such as this are aggravated by the existing constellation of resources (i.e. the traditional systems for the delivery of goods before the new scheme) and the heaviness of such resources. Changing traffic for the one-way road is another example of the heaviness of existing resources. The road (two-way road today) was an investment made some time ago, and as a functioning realization of that investment, changing it to a one-way road (and thus changing the traffic movement in the area) displays the heaviness of this resource.

After the new scheme is fully implemented, Urban Services expects to have as customers for their logistics services the majority of the office tenants in the area. The recruitment of customers is ongoing, however, the collaboration faces the following difficulties: existing contracts with logistics service providers, and the novelty of some services, which may require internal approvals and changing traditional thinking about the importance of sustainable transport services. Here the heaviness of existing resources is manifested in existing contracts with transport service providers and established or traditional concepts of logistics practices.

Table 7. Mapping the Urban Services network according to ARA framework

Actors	<p>Inside the collaboration (JV Urban Services): Fabege, Catena, Servistik, Ragn-Sells Outside the network: Rodamco-Unibail-Westfield, transport operators, tenants, residents</p>
Resources	<p>Current resources: Three underground hubs in Mall of Scandinavia, owned by Rodamco-Unibail-Westfield, used by Urban Services Employees (ca 10-15 employees) ICT system (MyLoc) Electric vehicles for goods distribution Joint venture Urban Services as a legal entity Human resources</p> <ul style="list-style-type: none"> • Knowledge, experience • Good communication and relationships, trust between the main actors • Common values (for example, the valuing of sustainability, common view on property development) <p>Future resources: The city hub (samlastningscentralen) ICT system that could communicate with transporters and customers Revenues from the transporters for the last mile</p>
Activities	<p>Operational activities: Goods acceptance at one of three underground hubs at Mall of Scandinavia (MoS) Notification of the goods receivers (located at MoS) about the arrival of the packages Storage of the packages Distribution of the packages (depending on the agreement with the customers on type of service provided) Distribution of packages for office tenants outside MoS Building logistics Courier services Waste management services</p> <p>Organisational activities (on-going and future activities):</p> <ul style="list-style-type: none"> - Planning to launch CO₂ footprint audit for each customer together with waste collection activities - Working on acquiring and establishing a new city hub and including it in operations - Working on concluding agreement with transporters on the last-mile deliveries - Working on creating the service portfolio for different customers (JIT deliveries, storage activities, courier services) - Establishing activity-based service fee - Acquiring more customers at Arenastaden

In the new scheme, another issue mentioned by the respondents is getting the transport companies “on-board.” The transporters, in order to support the new scheme, have to give up the last mile of the deliveries, and to give it to Urban Services, and to share some part of the revenues. To stay profitable, the transporters have to re-arrange their physical and even revenue flows. These changes require a substantial reconfiguration of existing resources, and additional investments are needed (financial, organisational and in terms of relationships). This is an

example of the heaviness of the transporters' resources, and how it can impede changes in the business network.

It is important to note that changing the contracts for waste management for customers (tenants, residents) also constitutes heaviness of resources. Since many organisations have already negotiated and enacted current contracts, the reaching of new agreements requires additional investments (negotiations, new relationships). Current contracts, which probably work well, could be considered a heaviness of resources.

5.2.2. Changes in activity patterns in the network after Urban Services

Changing to the new scheme proposed by Urban Services requires the changing of many current activities. As described above, activities conducted over time and through repeated interactions tend to develop into interdependencies, which tend to become an obstacle for change and innovation in the business network.

In the new setup with the hubs in the Mall of Scandinavia, the transporters do not need to hand over the packages to the final goods receivers; they hand over the goods to Urban Services, which handles the final distribution. Already the established activity patterns have changed with transporters no longer handing over the packages to the receivers, and with Urban Services assuming that activity. However, this change favours the transporters, because they do not need to spend time on this task and yet they still obtain the same revenue for the service they provide. For Urban Services the establishing of this scheme has required a lot of effort, and the establishment of a host of new, previously unassumed activities.

At the next phase of the project, it is expected that transporters will share some of the revenues for the last mile deliveries with Urban Services. As mentioned, the heaviness of the resources for the transporters is the need to change their activities and existing interdependencies of activities could be an obstacle for such a change. For Urban Services, this setup means the introduction of a range of new activities. Over time, these activities are going to be adjusted, and new interdependencies will be created in the future.

The challenges of the process of changing the waste collection procedures for the tenants and residents in the area shows an example of developed interdependencies of activities. Today there are established patterns of activities connected to waste collection. These activities have been adjusted over time and interdependencies have been created. To change to the new scheme requires the changing of not only resources but activities as well, and the overcoming of the existing interdependencies of activities that have developed, at least for those tenants that have to change to the new service provider, Ragn-Sells.

As mentioned, extra services will be provided for the tenants in the offices, like bundle procurement and sustainable logistics services customised based on the customers' needs and requirements (JIT, storage services, courier services). The idea behind this plan is that centrally organised logistics and the procurement (of standard goods) will make the delivery of these services possible in a much more sustainable way, for example, involving fewer freight trips and using environmentally friendly vehicles. Implementing such services would mean many changes of activities for the tenants, and difficulties connected to existing interdependencies of the activities connected to the acquisition of these new goods and services.

6. Discussion and conclusions

6.1. Common ground relating to these two cases

This paper studies two cases of collaborative initiatives that engage in urban consolidation activities. The consolidating schemes differ from each other in terms of operations, the set of stakeholders involved, and in terms of how they have been initiated and their final goals. However, at one level these cases are very similar. The results and analysis of both cases show that the main stakeholders involved in both projects possess comprehensive and far-reaching knowledge about their own businesses; have a good understanding of freight transport in general; and pay a lot of attention to the sustainability aspects of their businesses. The stakeholders of both projects show a high level of awareness of the importance of moving to more sustainable goods deliveries, and the necessity of looking beyond existing practices. The motivation behind these projects is not only to do the “right” thing, but also to be able to meet future requirements and stay competitive in the market. For example, the property owners in both cases (Vasakronan for Älskade stad, Fabege and Unibail-Rodamco-Westfield for Urban Services) are interested in increasing the competitiveness, attractiveness and commercial value of their properties in the future, and they are aware of the negative impacts of excessive freight transportation around their properties and in the surrounding neighbourhoods. Ragn-Sells is interested in securing their future material flows through their customers, and they have high awareness and knowledge of the goods delivery industry and its impact on the city. Bring as a transporter had to overcome the heaviness of the existing scheme, and to agree that the last mile is going to be operated practically by a recycling company (it is Älskade stad, but the employees come from Ragn-Sells).

All stakeholders had to challenge the status quo and existing practices of the goods delivery system. The respondents expressed their willingness to develop and to gain knowledge and experience about sustainable goods deliveries. The respondents are also actively presenting their business solutions and showing their sustainability efforts in different forums, like scientific and industrial conferences and workshops in the country and abroad. Many of them participate in different academia/industry collaborations and research projects (for example, HITS 2024). The respondents also pointed out their good relations with each other, including a sense of openness and trust. They also expressed a willingness to invest in resources (and overcome heaviness) when they know why to invest, what is the right way to invest, and what will be the expected outcome in the future. Examples are the acquisition of electric custom-made vehicles by Ragn-Sells, or the willingness of Bring to re-adjust their operations and to share revenues for the last mile deliveries, or willingness of Vasakronan and Unibail-Rodamco-Westfield to provide the space for the city hubs. It seems that the heaviness of the system (in terms of resources and activities) can be overcome when there is a high level of stakeholder awareness, knowledge, openness and trust. The administrative and project managing support provided to Älskade stad from Trafikkontoret in Stockholm was a resource that facilitated the mix of other resources, and helped to mitigate the heaviness of some of the resources and the interdependencies of activities described in the analysis.

Because Älskade stad and Urban Services can be considered established services, well-functioning and self-sufficient, they can also be considered successful and significant. Interviews shows that the main stakeholders have good knowledge and high situational awareness of the urban freight system and have reached the level of maturity that allows system changes to happen, as connected to the concepts of SSA and JKP mentioned in the literature

section. These cases also confirm the notion of JKP in terms of the necessity of collaboration between academia, industry and policymakers for effective knowledge creation and enhancement of SSA.

6.2. What are the main insights from both cases?

Most of the respondents expressed very similar ideas about what is required to reach more sustainable goods deliveries in the future. They point out the exceptional and important role of two main stakeholders: policy-makers and property owners. The engagement of policy-makers is seen as an important guarantee of a supportive attitude from the range of regulatory and municipal authorities involved during the development and operation of the initiative. It is a sort of warranty of security for the project's continuation, so that the other stakeholders do not end up investing their different resources in vain (*"The problem with such projects is that there is nobody to drive the project through, and it should be a person on the official level or a politician,"* waste management company).

Property owners are seen as important stakeholders (and influencers) that should be more proactive in engaging in goods deliveries questions and challenges. They should realise their key role (and the resources that they possess) and should in a way "dare" to demand more from their tenants and from the transporters who serve their tenants. One example is that they can provide space for city hubs (*"Many property owners have underground facilities that are not being used very efficiently,"* property owner 2). Property owners themselves expressed that they do not interact with the transporters and the tenants about deliveries as much as they could do (*"Normally we lease out our location and good luck with your logistics, waste and everything,"* property owner 1). At the same time, they agreed that in the future they are going to demand that their tenants to engage in more sustainable logistics (*"...to make it a condition that tenants work sustainably with freight and waste in the future,"* property owner 1).

Transporters as a group of stakeholders are seen as the most difficult to convince to collaborate, or to accept a new way of working. All of the respondents expressed concerns about the reluctance of transporters to change, and perceived their branch as generally conservative and difficult (*"The hardest part is to get the logistics companies to join,"* property owner 1; *"The transporters are really the hard part in such projects – they want to have their trucks driving around,"* property owner 2). At the same time, the respondents understand that the transporting industry experiences a lot of challenges and that their business climate is quite competitive. The analysis shows that to accept another way of working, transporters have to overcome a lot of heaviness of the resources and developed interdependencies of their activities. Moreover, their resources are limited because the industry is quite pressed by competition and low margins. Hence, there is not much room left to overcome heaviness of the resources, to rearrange their work practices and to adopt changes. The business models of the transporters are significantly affected when they get pressured to change to more sustainable deliveries (Brettmo & Williamsson, 2020). One suggestion from the respondents is that transporters have to change to a platform-oriented way of working, to collaborate and communicate more with each other and with other stakeholders, and that last-mile deliveries should be handled in a different way with regard to the impacts they produce on urban areas. The transporters should use their capacities in a better way, their margins should be optimised, so that transporters could be more resourceful and develop better capabilities to adopt innovations.

6.3. Final remarks

This paper studied two cases of consolidation initiatives where the property owners play an important role together with other stakeholders. The organisation and operations of these initiatives were mapped and analysed, along with a description of the inter-organisational relationships between the actors, resources and activities in these business networks, as well as identifying the crucial challenges for project implementation in terms of the heaviness of the resources and interdependencies of the activities. The heaviness of the resources indicates the points in the network where changes will be difficult to realise. Heaviness indicates the bottlenecks or constraints of the network (or system), and thus where additional resources should be directed, in the form of different types of support or subsidies like knowledge, funds, guarantees, administrative support, supervision, setting an example, enhancing communication with other actors, and so on. In the same manner, the developed interdependencies of activities can prevent the network from development, from acquiring new practices and technologies, and from innovating. Once again, if such interdependencies are identified, doing so can indicate where and what kind of efforts should be directed to support the project or change. However, the development of interdependencies of activities could also have an advantageous effect, when for example we want a new practice or activity to stay for good. It means that this new activity gets incorporated into the existing network and thus obtains a certain stability and acceptance by the actors, and gets interconnected with the resources and other activities.

A variety of solutions for more sustainable urban freight has been proposed by researchers. Ultimately, these critical questions are always at play: *who should take the lead to implement changes in urban freight?* and *how can ideas become actions that instigate lasting change?* This study, along with others, show that influencers like property owners can play a crucial role in the transition to more sustainable goods deliveries in cities. Property owners could be the outside influence that could help to overcome the heaviness of resources and interdependencies of activities that exist in business networks of urban goods deliveries, and which often act as barriers to change. Property owners' resources – including their future aspirations, and their relationships with their tenants and other stakeholders like service providers and transporters – put them in a unique position to be a fulcrum for large-scale changes in urban freight.

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