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IDENTIFYING DOMINANT STAKEHOLDER PERSPECTIVES ON URBAN FREIGHT POLICIES: A Q-ANALYSIS ON URBAN CONSOLIDATION CENTRES IN THE NETHERLANDS

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Abstract. Cities' sustainability strategies seem to aim at the reduction of the negative impacts of urban freight transport. In the past decades, many public and private initiatives have struggled to gain broad stakeholder support and thus remain viable. Researchers and practitioners have only recently recognised stakeholder acceptance of urban freight solutions as a challenge. A first step in achieving convergence is to understand stakeholder needs, preferences and viewpoints. This paper proposes and applies an approach to identify the main stakeholder perspectives in the domain of urban freight transport. We use Q-methodology, which originates from social sciences and psychology, to record subjective positions and identify the dominant ones. We explain the approach, operationalise the method for the domain of urban freight transport and apply it to stakeholder groups in the Netherlands. We find four dominant perspectives, reflecting how stakeholders normally take positions in the urban freight dialogue. Important findings concern disparities between industry associations and some of their membership, divergent views about the expected role of public administration, and the observation that the behaviour of shippers and Logistics Service Providers (LSP) appears to be inconsistent with their beliefs. All these factors together can act as a barrier to the implementation of urban freight consolidation concepts. The Q-methodology is valuable for eliciting perspectives in urban freight and is a promising tool to facilitate stakeholder dialogue and, eventually, convergence.

Keywords: urban freight transport; city logistics; stakeholders; perspectives; Q-methodology; urban consolidation centres.

Introduction

Because of trends such as urbanisation and individualisation, transport in most cities is expected to increase greatly. Cities' sustainability strategies are in large part directed at maintaining the positive effects and reducing the negative effects of urban freight transport (see e.g. Russo, Comi 2012). Efficiency in freight distribution plays a major role in the competitiveness of both freight carriers and in fact entire urban areas, in terms of income and employment. At the same time, increased efficiency at company level can translate into more emissions in the city, and even increase the demand for transport. For decades already, researchers and practitioners in the urban freight domain have been experimenting with various initiatives that aim to reduce costs and environmental pressure, for example with Urban Consolidation Centres (UCCs). Unfortunately, these initiatives have difficulties in becoming financially viable, and stakeholders are hesitant to participate (Allen *et al.* 2007). The reasons for this include not only the poor payback for carriers and shippers (Browne *et al.* 2005; Van Duin *et al.* 2010) under conditions of unrestricted city access, but also public decision makers' general lack of understanding of the supply chain perspective (Dablanc 2007). Clearly, stakeholders' different perspectives on how to deal with more sustainable urban freight activities are a barrier to generating serious stakeholder participation (Van Duin 2012). Questions concerning

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these perspectives include the following: Who are the main stakeholders in the urban freight system? What individual perspectives exist on urban freight policies? Can we aggregate individual perspectives into a limited set of dominant perspectives in a way that makes it feasible to consider these perspectives when measures are being designed?

In this paper, we introduce a method to formally identify the dominant stakeholder perspectives in Dutch cities and answer the above questions. The method we propose is Q-methodology, which is used frequently in social sciences and psychology. Section 1 introduces Q-methodology and explains how it can be used to elicit perspectives on urban freight policies. Section 2 describes the approach to data acquisition and analysis for the case of urban freight consolidation policies in the Netherlands. Section 3 presents the dominant perspectives identified. Last section draws conclusions and provides recommendations for further research.

1. Identifying Stakeholder Perspectives

There is general agreement on need to recognise and adequately understand the concerns of different stakeholders in order to successfully implement city logistics policies. Stathopoulos *et al.* (2012) applied a stated preference analysis for different freight policies among various stakeholders, showing significant disparities. Ballantyne *et al.* (2013) conducted 74 semi-structured interviews amongst city logistics actors over a five-year period and presented an approach to systematically describe the interests of all relevant actors and stakeholders. A similar approach can be found in Van Duin (2012), who developed a framework for the methodological integration of stakeholder perceptions and attitudes in logistics concept design. He proposed to measure differences between actor perceptions using metrics (Bots *et al.* 2000) derived from sociometric analysis, like sociograms (Scott 2012), sociographs (Lindenberg, Stokman 1983) and resource dependency (Ostrom 1990). Österle *et al.* (2015) established an extended urban freight stakeholder consultation process to elicit stakeholders' views, to investigate perceived problems and to find a consensus on how to improve the urban freight system. The process ensured that city stakeholders accepted and committed to the city logistics strategies formulated during the consultation process, namely: changes to the Limited Traffic Zone regulation, the use of an UCC and hybrid electric truck adoption. Bjerkan *et al.* (2014) measured the perceptions of stakeholders towards mobile depots and night/evening deliveries, using an action learning approach to reach common ground for measure implementation. Macharis *et al.* (2012, 2014) applied multi-criteria scoring analyses with actor-dependent weights. The multi-actor multi-criteria analysis helps to achieve an understanding of the problem along with a definition of the various alternatives, the different stakeholders and their objectives. A new multi-actor approach that explicitly recognises actor-specific viewpoints is the Participatory Simulation Game (PSG). A PSG is an effective alternative for collecting information about stakeholders' interlaced behaviour, using an agent-based model (Anand *et al.* 2016). The social-technical system specifications (De Bruijn, Herder 2009) of value networks can be evaluated with real-time information and real-time participation assuming predefined governance structures. By bridging an agent-based simulation model with human players, one can create an environment in which players take decisions based on underlying rules that are consistent and comprehensible. The gaming experiments support advanced governance-process designs with a higher expected level of acceptance by all stakeholders. A recent example of a PSG-based study is described in Gatta and Marcucci (2014).

Q-methodology is an approach that can help us to understand actor perspectives. In social sciences and psychology, Q-methodology is a proven method to explore diversity in perspectives. In the urban freight literature however, there are no applications of the Q-methodology. Q-methodology uses factor analysis and clustering to systematically elicit individual and shared perspectives (Stephenson 1953; McKeown, Thomas 2013; Brown 1993). The reason why this method is so applicable for this problem is the absence of the need for hypotheses on the shared perspectives (Donner 2001). This fits well with the aim of searching for unknown opportunities or barriers related to logistics chains. Several applications of Q-methodology can be found in the literature, for example in Van Exel, De Graaf (2005), Ellis *et al.* (2007), Akhtar-Danesh *et al.* (2008), Kroesen, Bröer (2009), Cuppen *et al.* (2010), Giannoulis *et al.* (2010), Tielen *et al.* (2011), Van Hooft *et al.* (2015), Sleenhoff, Osseweijer (2016), all related to research issues where a variety of stakeholder perceptions exist.

Technically, Q-methodology is an application of factor analysis. Whereas normal factor analysis (also referred to as R-methodology) searches for correlations between variables across a sample of subjects, Q-methodology looks for correlations between subjects across a sample of variables. Therefore, Q-methodology provides a foundation for the systematic study of subjectivity, a person's viewpoint, opinion, beliefs, attitude, and the like (Brown 1993). In a Q-study, groups of respondents are confronted with a group of statements and asked to rank these by the degree to which they agree with these propositions. The statements are derived from a substantive framework using scientific literature, structured interviews and other sources. The Q-study produces clusters of respondents that produce a similar ranking of statements, giving an indication of which factors are or are not found important and allowing the underlying reasons for the perspective to be derived. Provided the sample of interviews is representative of the population, the Q-study may also provide a lead to the population's expected behaviours and attitudes (Van Exel, De Graaf 2005).

Watts and Stenner (2012) critique the Q-methodology. They argue that the input of subjective data to produce objective structures reduces validity. Also, the

presence of objective structures demands a great deal of the interpreting researcher. Brown *et al.* (1999) suggest that the researcher's interpretations can be verified by returning them to participants for follow-up interviews. However, researchers should return the perspectives only to those participants with a significant factor loading in the factor array. To further enhance accuracy and efficacy, some Q-researchers conduct interviews during the Q-sort process, asking participants to comment on their choices. All these additional research activities were carried out during the application of our Q-study. In the field of city logistics, the main contribution of the Q-methodology is to understand and clarify the stakeholders' subjectivity by identifying their main perceptions of UCCs. Q-methodology research can be easily and quickly executed (within six months).

In operational terms, a Q-study comprises the following stages (Brown 1980, 1993):

- *Q-set*: The first stage builds a theoretical framework of the relevant domain discourse. Literature study and exploratory interviews are needed to feed the discourse framework with a collection of propositions or statements. These are mostly taken directly from statements in the literature or literally from the stakeholder's mouth. The raw material is reduced by deleting any double, redundant and irrelevant statements. When the statements are being selected, it is important to take two factors in consideration: coverage and balance (Watts, Stenner 2012). The Q-set needs to represent the opinions of the population in a comprehensive way, i.e. without important gaps. In addition, the Q-set may not be biased towards some specific viewpoints or opinions. Finally, the statements are edited, assigned a random number and printed on separate cards that are used for ranking.
- *P-set*: The next stage concerns the selection of the P-set, i.e. the respondents who will rank the statements. All parties who are expected to have an original view on the topic need to be included in order to record as many individual perspectives as possible.
- *Q-sort*: These parties are asked to complete the ranking that provides the input for the analysis. The Q-sort is introduced by a short problem description underlining the necessity for this research. After the ranking, additional questions are asked to reveal the motives behind the choices, to check whether the statements are complete and whether the list of respondents is complete.
- *Q-analysis*: This involves the analysis of shared and diverged perspectives, and searching for dominant factors. This automated procedure provides the key output of the Q-study: the dominant perspectives across the entire group of respondents.
- *Interpretation*: This stage aims to uncover the emergent meaning of the obtained factors, with a policy-oriented view on the diversity in perspectives towards urban freight policies. The detailed description of the perspectives may provide leads to promising solutions and convergence in acceptance because of a similarity in attitudes. Additional, retrospective interviews may be held to explain and understand the Q-sort.

The next section describes the application of the Q-methodology in the case of urban freight consolidation policies.

2. UCCs in the Netherlands

UCCs, as a policy measure, have been applied in many cities around the world. A UCC is a logistics depot on the outskirts of the city, from which bundled deliveries are made into the city centre, preferably using low-emission vehicles. A UCC can theoretically reduce the costs of 'last-mile' distribution by 70% (Quak, De Ree 2009). It can also assist in achieving sustainability goals by decreasing the number of vehicles entering the city. Despite the theoretical advantages of UCCs, most initiatives were terminated within a few years (Quak 2008) because of limited usage, the cost of the additional transhipment, drop back of the initial governmental subsidies, wrong location choice, wrong type of vehicle and/or bad organisation of the UCC (Browne *et al.* 2005; Marcucci, Danielis 2008; Van Duin *et al.* 2010; Wolpert, Reuter 2012; Olsson, Woxenius 2014). To understand the reason behind low volumes, it is important to understand this variability in perspectives towards UCCs among stakeholders in the urban freight domain.

2.1. The Q-Set

As the first step, all important statements were recorded and listed, leading to 85 statements. From the literature on urban freight consolidation (Browne *et al.* 2005; Marcucci, Danielis 2008; Van Duin *et al.* 2010; Wolpert, Reuter 2012; Olsson, Woxenius 2014), a wide range of statements could be identified relatively easy. Customer scenarios were used to identify how urban consolidation could contribute to each stakeholder's business model value propositions and the trade-off that stakeholders would have to make in their decision to participate or not. Subsequently, existing initiatives were explored to identify how these customer scenarios perform in reality. Exploratory interviews were held among stakeholders in the field in order to support the scientific literature with underlying ideas and perceptions of the sensitive issue of interfering in their activities. We approached stakeholders from the urban freight domain only, allowing sector-specific language to be used, gathered from the literature, and interviews with logistics experts (see list of interviews at end of paper). The concourse (dialogue) is reduced by merging these statements into statements that cover the whole aspect and by deleting overlapping or redundant statements. Furthermore, it is important to be aware that the final set, called the Q-set, should not exceed 60 statements in order to be manageable (Brown, 1980). This has the effect that only the most divergent statements remain in order to cover the whole discourse

on the topic. When the statements are being formed, it is important to ensure that they are understandable for the whole group of respondents, called the P-set. Still, it is very important to be sure that each statement extracts the right information. According to Brown (1980), this is more a process of cosmetics than plastic surgery, suggesting that it relies on the researcher's interpretation of what constitutes a proper statement. Mostly, statements are used that come straight from respondents' mouths in the exploratory interviews. When the set was reduced in our study, 57 statements remained. The ranking of the statements was piloted to check whether there were missing or redundant statements. The Q-set identified is shown in Table 1.

Table 1. Statements in the Q-set

No	Statement
1	Active stakeholder participation in the development of sustainable solutions for city logistics is needed to maintain stakeholders' position in the market
2	Only if an organisation has an independent position, and is not in competition with other operating transport companies in a region, could his organisation be installed as a city distributor
3	The use of a UCC can only be beneficial for transport companies with Longer and Heavier Vehicles (LHVs) operating in long-distance transport
4	If competitors together hire a third-party service provider for city distribution, it is impossible for them to create/maintain a service advantage, as all goods will be delivered in the same way at the same time
5	If the municipality provides financial support, then I would like to be first city logistics distributor for the city
6	If a carrier obtains cost reductions by using a UCC, the carrier will share this benefit with the other supply chain partners
7	If a suitable concession candidate is selected by a municipal procurement procedure to deliver all the goods to the inner city, it will evidently be cheaper than in a market scenario, because of higher volumes
8	A UCC operating with zero-emission vehicles is an attractive solution
9	If a freight carrier has a neutral position, if it has sufficient volume to deliver at low costs and if it is located well, it can be beneficial for other carriers to deliver the goods to this carrier instead of delivering the goods themselves into the city centre
10	If a municipality constrains freight operations within the city, the market will find solutions to work around these restrictions
11	If restrictive measures are raised for entering a city, I will make use of other logistics services that are not affected by these measures
12	If bundling of goods at the edge of a city leads to cost savings, then we can consider reducing goods damage checks and accept a higher risk of additional handling
13	If it becomes more problematic for carriers to enter a city with conventional vehicles, they will be more willing to pay for third-party alternative fuel delivery services, instead of making their own investments in new vehicles
14	Improved product availability is much more important for consumers than cost reductions
15	Sustainability justifies extra handling for bundling, leading to higher cost in logistics processes
16	Introducing a third-party service provider for delivering to the city causes much work and additional transition costs; therefore it will never lead to a viable service
17	A distribution centre where goods are consolidated before they enter a city is a good alternative to avoid high last mile costs
18	A good solution for sustainable city distribution should (1) fit the needs of the receiving customers, (2) create economies of scale and (3) stimulate zero-emission technology
19	A clean and safe inner city guarantees a nice shopping environment, which leads to more sales and therefore also more labour and income for all
20	A Logistics Service Provider (LSP) operating within and outside the city, with an exclusive access permit to the inner city, is unfair competition
21	A shipper is a good customer of a UCC, because he can determine exactly what needs to be handled by the UCC
22	The shipper is the actor who can freely choose urban delivery via a UCC. Therefore, a shipper can make the difference
23	A carrier who uses a UCC (and therefore operates sustainably) should be preferred over a carrier who does not make use of a UCC
24	A carrier who does night-time deliveries with silent trucks should be allowed to continue its practice instead of being forced to bundle the goods with others at busy hours
25	A warehouse at the edge of a city could reduce or eliminate my own storage space, making it available for other purposes

End of Table 1

No	Statement
26	A warehouse at the edge of a city with same-day delivery service offers new perspectives for the local shopkeepers
27	A warehouse at the edge of a city facilitates the procurement of logistics services
28	A shopkeeper could pay more for fewer deliveries, as the shopkeeper can reduce his personnel costs
29	One's own LSP or dedicated transport is important to a carrier or retailer for visibility and marketing purposes, and provides a competitive advantage over those companies who do not have it
30	If a municipality constrains entrance to a city, it should facilitate alternative services; otherwise, access would become too difficult
31	Additional services such as stock-keeping facilities and dedicated delivery services make a UCC an attractive partner
32	Stepwise introduction of constraints for urban freight transport is a proper measure, because the market can anticipate and slowly adjust to new measures
33	Bundling of goods is mainly interesting for small deliveries
34	Early adopters of urban freight sustainable transport should definitely be supported. However, this will not imply that other parties should receive less support or should be more constrained
35	Today, a network of linked UCCs has too low volumes to become financially feasible
36	Supporting the early adopters of sustainable transport may imply that other, perhaps even better initiatives will be left with reduced chances or even no chance of getting started
37	Allowing many local carries to gain access to the inner city is better than one monopolist carrier, because keeping up competition will keep price levels low
38	Outsourcing unprofitable city logistics services to companies that have already been operating in a region is a good alternative solution
39	Moving stocks to the edge of a city is only a favourable option if it does not lead to additional stock locations in the total supply chain and if no additional handling activities are needed
40	Obligatory usage of a UCC or a new third-party LSP to enter the inner city is unfair competition
41	Being the first one who is fully sustainable is good as it provides the benefits of first mover advantages
42	Today's consumer appreciates a green image of a product or service. Therefore, this consumer accepts a slightly higher price
43	Costs for sustainable deliveries of urban freight should be proportionally allocated among all stakeholders involved
44	Delivery of goods to a shop at a fixed time is a necessary condition for many shopkeepers. Because of this, it is necessary for a UCC to guarantee delivery times
45	Today, consumers prefer a sustainable image more and more. Therefore, it is not an issue if the price of a product rises a bit because of sustainable operations
46	Restrictions on entering the city should be introduced in a stepwise manner, strictly accompanied by the introduction of privileges to entrepreneurs who invest in sustainable solutions (bonus–malus system)
47	One should consider how much more can be improved when finding solutions for urban freight transport, beyond what the market has already done so far
48	Besides vertical cooperation in logistics chains, horizontal cooperation is a necessary condition to develop efficient and sustainable city logistics processes
49	Unfair competition can be avoided by starting a local procurement procedure, to select the carrier with the cleanest and cheapest logistics services
50	Time benefits that can be obtained by using a UCC cannot be seen as benefits for my company because the time saving cannot be transferred into monetary savings
51	One company outside the city and another inside the city together form an obstacle for city distribution. Only if the same company offers both services can we speak of a good solution
52	Shippers are willing to pay for sustainable transport, because this leads to sustainable products and services
53	Carriers are willing to pay for sustainable transport, because this leads to sustainable products and services
54	Implementation of access restrictions for a specific zone leads to outsourcing of the distribution activities to the carrier who has the concessions for this zone
55	Sufficient consolidation volumes and a neutral (independent) LSP are seldom found together in practice
56	Continuing with an existing logistics network with a basic volume has a greater chance than establishing a completely new organisation for urban freight distribution
57	Shopkeepers are willing to pay for sustainable transport, because this leads to sustainable products

2.2. The P-Set

The P-set included all actors that have a direct impact on the use of a consolidation centre: shippers and receivers, LSP and municipalities. In our study, a specific city was not chosen, and therefore more municipalities were interviewed to identify the main perspectives on implementing UCCs in the Netherlands. To allow for a broader view on the system, we added industry associations and experts on urban consolidation. The selection of stakeholders is representative of most European cities (Macharis *et al.* 2012; Stathopoulos *et al.* 2012; Ballantyne *et al.* 2013). In this study, real-estate owners are not part of the selection, because they are not directly related to UCC implementation. Their role is passive; sometimes they can help in providing subsidies for sustainable transport. The interviewed persons within the actor groups are all heavily involved in urban freight transport, i.e. logistics managers, logistics experts from practice and councillors with an urban freight portfolio. Table 2 presents an overview of the stakeholders surveyed.

Table 2. P-set selection of respondents

Name	Stakeholder
Region Arnhem-Nijmegen	City region
I&L Logistiek	LSP
PostNL	LSP
JBM Koeriers	LSP
Bode Scholten	LSP
Veldhuizen transport	LSP
Municipality of Utrecht	Municipality
Municipality of Delft	Municipality
Municipality of Amsterdam	Municipality
Municipality of Nijmegen	Municipality
Municipality of Breda	Municipality
Lekkerland	Retailer
Hema	Retailer
Daka Sport	Retailer
EVO	Shippers' association
TLN	Trucking association
Binnenstadservice	UCC
Cargohopper	UCC
Technische Unie	Wholesaler, building sector

One could argue that the selection of participating stakeholders is not equally distributed. Note that this will not influence the identification of the perspectives. If a perspective is different, it will be identified from the scores (see also section 3).

2.3. The Q-Sort

The respondents were asked to rank the 57 statements in terms of agreement with their opinion, on a scale of 1 to 11. The interviewees were asked to fit statements into a normal distribution template, forcing them to make concessions about statements and ranking in extremes (see Fig.).

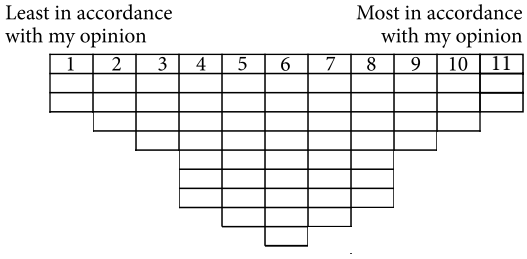

Fig. Q-sort distribution table
(1 – most disagree, 11 – most agree)

2.4. Q-Analysis

After the Q-Sort, the analysis was executed with PQ-METHOD 2.35 software (Schmolck 2014). The standard procedure is to perform a centroid factor analysis and a rotating using Varimax method (Kaiser 1958), identifying factors with at least one significant loading of a respondent. The centroid factor analysis process extracts factors from the data matrix. The method assumes that each item is invariant (i.e. correlated at 1.00 with itself as represented by the use of 1 in the diagonal). The first principal component that can be identified shows the highest variability in the data (Ho 2013). Then the factor rotation Varimax is carried out. From the perspective of individuals measured on the variables, the Varimax method seeks a basis that most economically represents each individual. This means that each individual can be well described by simple structures as linear combinations of factors (Ho 2013). Both methods are well described in Brown (1980). The factor loadings are represented in Table 3. The limit for statistical significance of a factor loading is calculated as the multiplier for the desired level of statistical significance divided by the square root of the number of statements in the Q-set (multiplier: 3.29 for $p < 0.001$).

Table 3. Factor loadings generated with the Varimax method

Q-sort	Stakeholder	Loadings			
		1	2	3	4
1	Gemut	0.6362X	–0.0389	0.0336	–0.0815
2	Gemam	0.7006X	0.1932	0.1650	0.0929
3	Gemdel	0.3392	0.1779	0.3740	–0.3653
4	Gembred	0.7025X	0.1221	0.1326	–0.938
5	VNG	0.5617X	–0.0305	0.3458	0.1045
6	EVO	–0.0751	0.0524	–0.0594	0.5248X
7	TLN	0.0650	0.4594X	0.2409	0.3404
8	MaxBSS	0.445	0.0424	0.0615	0.5874X
9	ELILBSS	0.3876	0.1022	0.4615X	0.0010
10	Simloos	0.4901X	–0.0653	0.2368	0.2701
11	Postnl	0.5783X	0.2516	0.0382	–0.0642

End of Table 3

Q-sort	Stake-holder	Loadings			
		1	2	3	4
12	Veldhtr	–0.1461	0.3805	0.1929	0.4266
13	Pettjalm	0.2594	0.6042X	0.0631	0.0906
14	TU	0.1982	0.6572X	0.0595	–0.0972
15	Eguis	0.6246X	0.2862	–0.0774	0.3679
16	Unilever	0.1789	0.1466	0.7665X	0.0103
17	Hema	0.0364	0.5373X	–0.1412	0.1888
18	BodeSch	0.0859	0.3558	0.2681	0.2065
19	Daka	–0.0091	0.0317	–0.4801	–0.0948
20	Strarnh	0.7350X	0.0617	0.0903	–0.0311
21	GemNijm	0.5313X	–0.2249	0.3645	–0.0126
22	Lekkerl	0.1432	0.4564X	0.3917	0.0426
23	JBM	–0.1063	0.5503X	0.1715	–0.1054
% expl. var.		18	10	7	6
Note: The p-values with X are the defining variates (loadings that exceed 0.43, $p < 0.001$).					

The method shows that four factors explain 41% (=18+10+7+6) of the total variance, which is above the required 35–40% (Watts, Stenner 2012). These four factors are the four dominant perspectives that emerge from this group of stakeholders. We discuss the dominant perspectives in more detail in the next section.

3. The Dominant Perspectives

To interpret the perspectives from the factors, two methods are applied: interpreting the statements in the value scheme that receive the highest and the lowest score on each factor (–5, –4, 4, 5) and interpreting the statements that distinguish most between one factor and the other factors. Additional interviews are used to explain them and to keep close to the interpretations of the results according to the actors' perceptions. In addition, the differences and similarities are described by the use of the correlation matrix and the most distinguishing statements.

The four dominant perspectives on urban freight consolidation that emerged after the analysis were the following:

– need for public action;
– awareness of barriers that prevents UCC use;
– need to build on large players;
– need to empower small players to collaborate.

In the remainder of this section, we discuss the statements that lead to these perspectives and the actors that are the main proponents of these statements.

3.1. Perspective 1: Need for Public Action

This perspective is represented mainly by local authorities. It assumes that there is more to gain within this domain than has been achieved in the past by the establishment of new market initiatives (derived from statement 47). Urban consolidation is not seen as a suitable solution only for transport companies with LHVs operating in long-distance transport (statement 3). This perspective focuses mainly on administrative parties' role in steering changes in the urban freight network to achieve a better environment for citizens and local retailers' economic activities (statement 19). This is also supported by the quotes in Table 4, which refers to the changing function of the city centre from a shopping area to a meeting point (D. Hoffmans 'Additional interview to the Q-sort' (Slabbekoorn 2014)). In addition, this perspective assumes that restrictions that interfere with traffic affect the behaviours of LSPs and therefore are considered inevitable in achieving sustainability goals (E. Guis 'Discussing Q-methodology results' interview (Slabbekoorn 2014)). A stepwise introduction of these measures (statements 32 and 46) can provide conditions where all stakeholders have the ability to invest in clean freight solutions when the time is ready. This is also endorsed by the quote that it is in the hands of the municipalities, but they should not try to get the maximum out of it in the beginning (E. Van de Poel 'Additional interview to the Q-sort' (Slabbekoorn 2014)). On the one hand, this perspective claims that restrictions will force the market to provide solutions (statement 10); however, proponents admit that it is necessary to invest in sustainable solutions at the same time (statement 46). In addition, shopkeepers are considered unwilling to pay for sustainable urban deliveries (statement 57), but maybe additional services like same-day delivery and offsite stockholding can provide new market perspectives for local retailers (statement 26). This perspective distinguishes itself at the point of costs, where costs are not positioned above social interests, which is contrary to the other perspectives (statement 15). In addition, transition costs are considered not high enough in relation to the efficiency and social benefits (statement 16). Here, the ambiguity of the local authorities can be observed, where the municipalities are willing to provide measures but at the same time are reluctant to provide subsidies to enable new solutions.

Table 4. Q-sort values for statements and supportive interview quotes defining perspective 1

Statements \ Factors		1	2	3	4
Highest and lowest score:					
57	Shopkeepers are willing to pay for sustainable transport, because this leads to sustainable products	–5	–5	–4	–3
3	The use of a UCC can only be beneficial for transport companies with LHVs operating in long-distance transport	–5	–3	–3	0
47	One should consider how much more can be improved when finding solutions for urban freight transport, beyond what the market has already done so far	–4	–2	–5	–2

End of Table 4

Statements \ Factors		1	2	3	4
40	Obligatory usage of a UCC or a new third-party LSP to enter the inner city is unfair competition	–4	1	0	–4
16	Introducing a third-party service provider for delivering to the city causes much work and additional transition cost; therefore it will never lead to a viable service	–4	3	0	–5
26	A warehouse at the edge of a city with same-day delivery service offers new perspectives for the local shopkeepers	5	0	–2	2
46	Restrictions on entering the city should be introduced in a stepwise manner, strictly accompanied by the introduction of privileges to entrepreneurs who invest in sustainable solutions (bonus–malus system)	5	–1	5	–3
10	If a municipality constrains freight operations within the city, the market will find solutions to work around these restrictions	4	5	0	0
32	Stepwise introduction of constraints for urban freight transport is a proper measure, because the market can anticipate and slowly adjust to new measures	4	0	0	–1
19	A clean and safe inner city guarantees a nice shopping environment, which leads to more sales and therefore also more labour and income for all	4	3	–1	–1
Most distinguishing statements:					
15	Sustainability justifies extra handling for bundling, leading to higher cost in logistics processes	0	–2	–3	–3

Quotes:
- 'A liveable inner city is the most important issue from a municipality perspective, environmental constraining could be the solution, but one should not force it to a maximum. Providing subsidies belongs to the set of potential measures' (E. van de Poel 'Additional interview to the Q-sort' (Slabbekoorn 2014));
- 'Liveability in a city is becoming more important because of the changing function of the inner city from a shopping environment to a place to meet'(D. Hoffmans 'Additional interview to the Q-sort' (Slabbekoorn 2014));
- 'Disruption innovation is needed instead of an evolutionary process' (E. Guis 'Discussing Q-methodology results' interview (Slabbekoorn 2014)).

3.2. Perspective 2: Awareness of Barriers that Prevents UCC Use

This perspective is shared mostly by the wholesalers; it is, however, also shared by the LSPs' branch organisation and a Cargohopper representative (*http://www.cargohopper.nl*). This perspective shows mainly that changing to urban consolidation is difficult, even if it is known that it can lead to greater efficiently. This relates mainly to the positive effects of visibility and marketing aspects attributed to the logistics chains (statements 29 and 44). In addition, handling risk and less control are valued more highly than cost efficiency (statement 12), and efficiency is not expected to be achieved outside the urban area (statement 27). On the other hand, when it is difficult enough or too expensive to go into the urban area, cheaper alternatives are sought (statement 11). This also became evident in the interviews additional to the Q-sort with wholesalers, as they intend to do pilots with urban freight initiatives in order to be prepared for future administrative interventions. As an example, a large retailer operates its own logistics services and mentioned the importance of visibility and service in the additional interview. When asked about their new stores in London (i.e. the city where road pricing is a very important part of transport costs), they could opt for dedicated transport or their own transport, but eventually chose the open network as it was much cheaper. This is supported by the expectation that entrance restrictions will cause changes in the market (statement 10). Currently, the respondents that represent this perspective think that consolidation is mainly of interest for small shipments (statement 33) and that differentiated shipment characteristics cause bundle difficulties (statement 16). In addition, this perspective claims that retailers are definitively not the party the money should come from (statements 57 and 28) (Table 5).

Table 5. Q-sort values for statements and supportive interview quotes defining perspective 2

Statements \ Factors		1	2	3	4
Highest and lowest score:					
57	Shopkeepers are willing to pay for sustainable transport, because this leads to sustainable products	–5	–5	–4	–3
25	A warehouse at the edge of a city could reduce or eliminate my own storage space, making it available for other purposes	2	–5	–1	4
28	A shopkeeper could pay more for fewer deliveries, as the shopkeeper can reduce his personnel costs	–2	–4	–2	0
12	If bundling of goods at the edge of a city leads to cost savings, then we can consider reducing goods damage checks and accept a higher risk of additional handling	0	–4	–1	2

End of Table 5

Statements \ Factors		1	2	3	4
27	A warehouse at the edge of a city facilitates the procurement of logistics services	–1	–4	–1	2
11	If restrictive measures are raised for entering a city, I will make use of other logistics services that are not affected by these measures	4	5	2	1
10	If a municipality constrains freight operations within the city, then the market will find solutions to work around these restrictions	4	5	0	0
33	Bundling of goods is mainly interesting for small deliveries	–1	5	0	0
44	Delivery of goods to a shop at a fixed time is a necessary condition for many shopkeepers. Because of this, it is necessary for a UCC to guarantee delivery times	0	4	–1	1
29	One's own LSP or dedicated transport is important to a carrier or retailer for visibility and marketing purposes, and provides a competitive advantage over those companies who do not have it	–2	4	–5	0
Most distinguishing statements:					
16	Introducing a third-party service provider for delivering the city deliveries causes much work and transition cost, therefore it will never lead to a viable service	–4	3	0	–5
Quote: 'If the same service and flexibility can be offered and costs are lowering, then it can be beneficial to make use of a UCC. However, current investments in the Netherlands will make this hard to realise' (L. Terpstra 'Additional interview to the Q-sort' (Slabbekoorn 2014)).					

3.3. Perspective 3: Need to Build on Large Players

This perspective is shared by a large producer that uses different LSPs and an LSP that is part of the BSS network (*http://www.binnenstadservice.nl* – a network of linked UCCs). According to this perspective, there is always a need for sustainable solutions in relation to urban freight distribution (statement 47), but it acknowledges the difficulties in redistributing costs, as willingness to pay is hard to find among shippers and retailers (statements 57 and 52). Bundling shipments at the edge of the city centre with enough volume by using the base volume of an existing network is seen as a promising initiative (statement 56). Therefore, this perspective advocates seeking parties that can provide this base volume. To make urban consolidation more attractive for LSPs, neutrality and a suitable location is necessary (statement 9). In addition, relatively efficient deliveries at night, which are not subject to the negative externalities of urban freight distribution, are considered to make a contribution to the efficiency of urban freight distribution when they are added to volume (statement 24). A stepwise introduction of restrictive measures for entering the city centre with conventional trucks and meanwhile stimulating measures for sustainable initiatives are preferred (statement 46). It should be noted that also the less innovative parties are stimulated instead of heavily penalised (statement 34). Visibility and marketing aspects via the logistics chain are subordinate to efficiency (statement 29); this is endorsed by representatives of a large producer who explain that cost-service is becoming more and more important, whereas sales dominated in the past (O. Simic and H. Loonstra 'Additional interview to the Q-sort' (Slabbekoorn 2014)). In addition, sustainability is not a reason for shifting to another way of dealing with urban logistics; efficiency is the main driver (statement 23). If costs are added in the logistics chain, they have to be allocated proportionally to each stakeholder in the urban freight domain (statement 43) (Table 6).

Table 6. Q-sort values for statements and supportive interview quotes defining perspective 3

Statements \ Factors		1	2	3	4
Highest and lowest score:					
47	One should consider how much more can be improved when finding solutions for urban freight transport, beyond what the market has already done so far	–4	–2	–5	–2
29	One's own LSP or dedicated transport is important to a carrier or retailer for visibility and marketing purposes, and provides a competitive advantage over those companies who do not have it	–2	4	–5	0
57	Shopkeepers are willing to pay for sustainable transport, because this leads to sustainable products.	–5	–5	–4	–3
52	Shippers are willing to pay for sustainable transport, because this leads to sustainable products	–3	–3	–4	–1
24	A carrier who does night-time deliveries with silent trucks should be allowed to continue its practice instead of being forced to bundle the goods with others at busy hours	–1	2	–4	1
56	Continuing with an existing logistics network with a basic volume has a greater chance than establishing a completely new organisation for urban freight distribution	1	2	5	0
46	Restrictions on entering the city should be introduced in a stepwise manner, strictly accompanied by the introduction of privileges to entrepreneurs who invest in sustainable solutions (bonus–malus system)	5	–1	5	–3

End of Table 6

Statements \ Factors		1	2	3	4
9	If a freight carrier has a neutral position, if it has sufficient volume to deliver at low costs and if it is located well, it can be beneficial for other carriers to deliver the goods to this carrier instead of delivering the goods themselves into the city centre	2	–1	4	0
Most distinguishing statements:					
23	A carrier who uses a UCC (and therefore operates sustainably) should be preferred over a carrier who does not make use of a UCC	3	0	–2	1
43	Costs for sustainable deliveries of urban freight should be proportional allocated among all stakeholders involved	–1	–1	3	–2
34	Early adopters of urban freight sustainable transport should definitely be supported. However, this will not imply that other parties should receive less support or should be more constrained	–2	1	3	–4
Quote: 'At this moment, the main focus of cooperation within the supply chain is on cost, service and logistics (in order to obtain a better control of cost). In the past, the main focus was more on establishing sales volumes' (O. Simic and H. Loonstra 'Additional interview to the Q-sort' (Slabbekoorn 2014)).					

3.4. Perspective 4: Need to Empower Small Players to Collaborate

This perspective is advocated by EVO and a BSS representative. It shows very clearly that one should not make it more difficult for parties than it is now. Restrictive measures (statements 30 and 46), concessions (statements 7, 49 and 37) or mandatory use of urban consolidation (statement 40) are not the solutions for the urban freight problems according to this perspective. The shipper can choose how its products are shipped and therefore a party that can bring changes (statement 22); this is also subscribed to by Prudon (M. Prudon 'Perception of BSS expert on urban consolidation' interview (Slabbekoorn 2014)), a BSS representative. Transferring stock to a UCC can provide opportunities for shippers or retailers to use their space more efficiently (statement 25). Difficulties in bundling different logistics chains are not seen as problematic (statement 16). Working from practical solutions and 'generating value instead of creating difficulties' is what this perspective sees as most promising. Stimulating local players can provide an opportunity instead of only stimulating the frontrunners in sustainability (statements 36 and 37) (Table 7).

Table 7. Q-sort values for statements and supportive interview quotes defining perspective 4

Statements \ Factors		1	2	3	4
Highest and lowest score:					
16	Introducing a third-party service provider for delivering to the city causes much work and additional transition costs; therefore it will never lead to a viable service	–4	3	0	–5
49	Unfair competition can be avoided by starting a local procurement procedure, to select the carrier with the cleanest and cheapest logistics services	0	0	–2	–5
34	Early adopters of urban freight sustainable transport should definitely be supported. However, this will not imply that other parties should receive less support or should be more constrained	–2	1	3	–4
7	If a suitable concession candidate is selected by a municipal procurement procedure to deliver all the goods to the inner city, it will evidently be cheaper than in a market scenario, because of higher volumes	–1	–2	1	–4
30	If a municipality constrains entrance to a city, it should facilitate alternative services; otherwise, access would become too difficult	0	–2	2	–4
22	The shipper is the actor who can freely choose urban delivery via a UCC. Therefore, a shipper can make the difference	2	1	1	5
37	Allowing many local carries to gain access to the inner city is better than one monopolist carrier, because keeping up competition will keep price levels low	–4	1	0	4
40	Obligatory usage of a UCC or a new third-party LSP to enter the inner city is unfair competition	–4	1	0	4
25	A warehouse at the edge of a city could reduce or eliminate my own storage space, making it available for other purposes	2	–5	–1	4
Most distinguishing statements:					
46	Restrictions on entering the city should be introduced in a stepwise manner, strictly accompanied by the introduction of privileges to entrepreneurs who invest in sustainable solutions (bonus–malus system)	5	–1	5	–3
3	The use of a UCC can only be beneficial for transport companies with LHVs operating in long-distance transport	–5	–3	–3	0

End of Table 7

Statements \ Factors		1	2	3	4
36	Supporting the early adopters of sustainable transport may imply that other, perhaps even better initiatives will be left with reduced chances or even no chance of getting started	−3	−1	−2	3

Quotes:
- 'The shipper is the final decision maker in the logistics process' (M. Prudon 'Perception of BSS expert on urban consolidation' interview (Slabbekoorn 2014));
- 'The market should provide new solutions, maybe with the support of some privileges; however, raising constraints is forbidden' (R. Slotema 'Additional interview to the Q-sort' (Slabbekoorn 2014));
- 'One should not oppose new initiatives/ideas; however, one should try to collaborate and gain trust to bring it to a higher level. The development of alternative concepts is now hindered by the fact that they are opposed to each other' (M. Prudon 'Additional interview to the Q-sort' (Slabbekoorn 2014)).

3.5. Similarities and Differences between the Perspectives

Knowing the areas of consensus and conflict by determining the similarities and differences between the perspectives leads to a search for the implementation of participatory design principles and activities that may lead to the elimination of conflicts. In turn, this could lead to higher acceptance and commitment to eventual scenario(s) in the future (Focht 2002). It also helps to address controversial and sensitive issues that need to be addressed beforehand to become to a more tenable plan.

Table 8. Correlation between Factor Scores

Perspectives \ Factors	1	2	3	4
1	1	0.2774	0.3982	0.3104
2	0.2774	1	0.2764	0.1594
3	0.3982	0.2764	1	0.153
4	0.3104	0.1594	0.153	1

Table 8 shows the correlations between the factors and can be interpreted as the grade of consensus between the perspectives, i.e. the higher the correlation is, the more similarities can be found between the perspectives. From Table 8 it can be derived that the four factors differ significantly from one another. Nevertheless, Table 8 also shows that all pairs of factors are positively correlated; this indicates that there is at least some consensus between the perspectives.

The factors correlated in most of the perspectives (perspectives 2, 3 and 4) refer to the need to lower costs in the logistics chain instead of adding costs. All four perspectives agree with the point that extra services like same-day delivery and offsite stockholding will lead to a more attractive UCC, although providers need to lower their cost or even supply the service for free according to perspectives 2, 3 and 4. Another point of consensus between the perspectives refers to the power of the shipper to choose the way its products are shipped. In relation to this power, a shipper is considered a very suitable party to be the UCC customer, however again at lower cost than conventional transport. Subsequently, consensus is also found on the entrance restrictions by sanctioning the behaviour of stakeholders.

The highest correlation is found between perspective 1 ('Need for public action') and perspective 3 ('Need to build on large players'). Both are convinced that collaboration and creating volume in the logistics chain provides benefits for all players. They also agree that the local authorities need to take stimulating role to make it easier to shift towards sustainable alternatives, especially for leaders in sustainability. For instance, income from road tax can be used to subsidise zero-emission vehicles or the development of a UCC (bonus–malus system). Retailers, shippers and LSPs are not willing to pay extra for green logistics solutions; this means that resources need to be provided by a third party like local authorities or supported by a willingness to pay of the shopkeepers for the extra services linked to the UCC (Marcucci, Danielis 2008). Perspective 1 is represented mostly by local authorities; this means that there is room for financial stimulation when it comes to social interests. They differ mainly on the point that perspective 1 appreciates social interests above all. Perspective 1 claims that restrictions are sufficient to make a difference. Perspective 3, however, claims that a more comprehensive action plan is needed, including searching for volumes, equitable sharing of costs and benefits among the stakeholders, and supporting all stakeholders in becoming more sustainable.

The second highest correlation is between perspective 1 ('Need for public action') and perspective 4 ('Need to empower small players to collaborate'), although factor 3 and factor 4 show a very low correlation. It shows that they have consensus on different aspects than perspective 1 and perspective 3. Both perspectives (1 and 4) claim that the market plays a major role: perspective 1 shows that, if more restrictions are added, then the market will come up with a solution. Perspective 4 shows that no intervention is needed because it is up to the market to decide about solutions with or without stimulation to bundle goods more efficiently. This can also be shown with respect to their differences: perspective 1 perceives problems as the driving factor for change, whereas perspective 4 has a more solution-driven perspective.

Perspective 2 ('Awareness of barriers that prevents UCC use') and perspective 3 ('Need to build on large players') are also correlated. They are similar in how they positively value the effects of measures taken by the administrator. Nevertheless, they differ in the way a UCC is actually imposed on them. Perspective 2 shows a preference for the situation as it is now, because of the stress on the high value of visibility and marketing aspects via the logistics chain. Contrary to perspective 2, perspec-

tive 3 has a more open attitude towards a UCC. This perspective shows that, if a UCC is more efficient (right location, volume and neutrality) in the future, then it will become more attractive.

The lowest correlation can be found between perspective 4 ('Need to empower small players to collaborate') and perspectives 2 ('Awareness of barriers that prevents UCC use') and 3 ('Need to build on large players'). This seems to be the most critical difference, as perspective 4 is well presented in the policy debate on urban consolidation. This can be found in the way perspective 4 perceives how urban consolidation should start. Proponents do not see difficulties in moving a stock-keeping function to a UCC and see only benefits for users. The users themselves represented in the other two perspectives (2 and 3) think that it is not easy to move a stock-keeping function to a UCC. According to them, it takes quite some effort to change to a new way of dealing with urban freight movements, and therefore they think that additional measures are needed. With respect to the latest point of raising additional measures, perspective 4 does not agree that this has any effect.

Conclusions and Discussion

In relation to the introduction of UCCs, the Q-methodology has proved to be a successful method for determining the difficulties and opportunities. Four dominating perspectives were found on the perceptions of the difficulties and opportunities of implementing a UCC. Regarding UCCs, some stakeholders take strong positions, causing difficulties in collaborating with stakeholders, which is, in the end, essential for the development of the urban consolidation concept.

Regardless of the growing demand for urban freight solutions, branch organisations are often tempted to stay with the situation as it is now. One reason is that a large part of the group they represent is affected negatively by the introduction of UCCs. However, the perspectives show that some of their members agree that the future perspective does not allow room for all freight movements as a result of the growing demand for transport in urban areas. None of the surveyed shippers is explicitly negative on the introduction of restrictive measures like the shippers' branch organisation is. As perspectives 2 ('Awareness of barriers that prevents UCC use') and 3 ('Need to build on large players') show, there are shippers that see advantages in urban freight distribution if efficiency improvements can be achieved. Branch organisations should also represent these views and acknowledge the need for intervention rather than autonomous development of the market. An important concern is that the branch organisations and their members should be better linked together. Regarding political support, branch organisations can fulfil two different roles:

- they represent the interests of their members in the development of UCCs knowing that there is no other alternative for increasing freight demand;
- they oppose UCC plans and wait for the moment when the freight-related problems become so great that restrictive measures are inevitable.

Many administrators have frequently suggested the introduction of restrictions on environmentally harmful vehicles as a solution to negative urban freight externalities. Some stakeholders, especially administrators, think that this is inevitable if the market to be incentivised to develop new alternatives. The main reasons are that these measures are not very costly, and, within the resources at administrators' disposal, relatively easy to implement. The other perspectives relate more to solution-oriented policies: perspective 1 ('Need for public action') shows that causing problems leads to a demand for solutions. Restrictions definitely have an effect on the behaviour of infrastructure users; however, a very select group of users will benefit from these restrictions. The question arises as to what the administrators' role will be. Their value propositions are liveability, accessibility and health for inhabitants. Reducing vehicle movements will contribute to these values, but governmental failure lies in waiting. It is not the intention to impose restrictions that will cause too many difficulties and raise transport prices that in the end will be passed on to retailers and consumers. A social cost-benefit analysis is needed.

Another point that needs consideration if city entrance charges are imposed is that then these charges are one way or another reinvested in the development of urban freight sustainability. The short-term agenda and the possibly limited view can lead to another cash cow for other value propositions. Transparency on these propositions is therefore very important to reveal politically motivated issues.

Knowing the negative externalities of urban freight consolidation centres, parties still justify the conventional way of organising urban deliveries. Both perspectives 2 and 3 concede that efficiency is most important in the end. However, the difference is that perspective 2 holds on to the normal organised logistics activities and reasons that service, visibility and marketing via the logistics chain is highly valued and even seen as a unique selling point. In relation to perspective 3, also represented by a shipping party, efficiency is nowadays not subordinate to this unique selling point only. A polluting truck standing in front of a shop, in the current social sustainability debate, is not very good publicity for that shop. Still, many shippers cling to that perspective; this is called justification behaviour. It describes how and when a person encounters cognitive dissonance, or a situation in which a person's behaviour is inconsistent with their beliefs, that person tends to justify the behaviour and deny any negative feedback associated with the behaviour (Festinger 1957). We think we already know the answer, but it needs to be explored whether this behaviour is justified regarding the positive effects of service, visibility and marketing, compared to sustainability and efficiency matters.

As stated in Ballantyne *et al.* (2013) conclusions, to successfully address urban freight transport issues, it is necessary for key stakeholders to perceive those problems and come to understand the elements involved, and this reinforces the need for a fully thought-out planning process. According to Ballantyne *et al.* (2013), local au-

thorities need to improve their understanding of urban freight transport within their sphere of influence, and this will lead to a more positive impact on day-to-day urban freight transport. In their study, Bjerkan *et al.* (2014) stated that they used explicit documentation of stakeholder perceptions relating to measures in urban freight transport. They referred to the findings of other studies that identified the conformity of stakeholder perceptions across borders and suggested certain commonalities in urban distribution chains otherwise characterised by coincidental organisation and ad-hoc management.

In our study, we clearly found significant variance among the perceptions rather than conformity in stakeholder perceptions. The use of Q-methodology has contributed to very interesting results. On the one hand, presumptions like differences between branch organisations and their members, and differences in views on restrictive measures, are confirmed without the use of hypothetical directions that steer the research in a specific direction. On the other hand, surprising elements are also revealed, like large-volume producers' willingness to participate in UCCs to make these a viable alternative, without imposing mandatory measures. This shows that Q-methodology is not only a useful method to elicit perspectives on social topics, but also applicable to more socio-technical problems where insight into perspectives gives rise to insight into difficulties of stakeholder participation.

As a discussion, this paper ends by addressing a critical remark made by one the reviewers on the application of the Q-methodology that the 57 statements show some sloppiness (in formulation), reiterations, biasness, vague logic and lack of relevance (for many stakeholders). In our opinion, the criticism is well-founded with respect to the formulation of the statements. However, the formulation comes straight from each interviewee's mouth. To avoid interference by the researcher, the statements are stated as they were formulated. The relevance for stakeholders is identified during the ranking interviews. If a statement is irrelevant, a score of zero is given, and in the analysis it is not a distinguishing factor for the specific actor. A critical comment is also given on the number of statements to be ranked. According to Brown (1980), a maximum of 60 statements is manageable. The ranking processes were supported and supervised by research assistants to check whether each statement was ranked seriously. In our experience, the strength of the Q-method clarifies the discourse on the sloppy perceptions of the stakeholders involved in a very efficient way and allows the identification of the most distinguishing perceptions. This supports our understanding of why and when new urban freight logistics concepts will or will not work.

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