Urban freight policy maturity and sustainable logistics: are they related?

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Abstract

Problems associated with urban freight are well known and documented in the academic literature, particularly with regards to the impact on air quality and general intrusion of public space. As a defining principle however, urban freight has generally been left solely to operate on free market principles, with policy interventions generally being solely 'problem' focused. Given the underlying economics of freight transport, and particularly the cost advantages of road-based transport, intervention by public bodies is clearly a critical issue, however to date has received limited attention in the urban freight research literature. The aim of the current research is to examine if there is any relationship between the extent of local authorities' freight policy development and the success of a policy driven (green) urban freight pilot initiative. This is based on five city case studies located across Northern Europe and uses an adapted form of Kiba-Janiak (Res Transp Bus Manag 24:4–16, 2017, https://doi.org/10.1016/j.rtbm.2017.05.003) five stages of 'city maturity' with regards to urban freight policy development. Each city's policy framework is mapped onto one of these states of maturity. The success of the pilots in each city is then matched against the maturity of the policy framework. Taken at face value, the results show little correlation between the two, and hence the success of any initiative would appear to be independent of the policy framework. The real issue however is found to be low urban freight transport policy maturities within the case study sample, specifically a lack of tactical and operational functions, i.e. the ability to actually do something. The concern at the more general level is that what this leads to is policy stagnation.

Keywords: UFT policy maturity, Last mile logistics, Urban consolidation centre, City logistics, Cycle logistics

Introduction

Issues associated with urban freight transport are well known and well documented, and primarily surround the impact on air quality, climate change and intrusion of public space. Quak and Tavasszy (2011) for example highlight that urban freight impacts negatively on the three sustainability P's of planet, people and profit. The planet, or natural environment, is negatively impacted through polluting emissions, people through adverse effects on public health, noise, road accidents, visual intrusion, stench and vibration and finally profit as a result of traffic congestion and decreasing city accessibility. In terms of interventionist measures to mitigate against such externalities however, Akgün

et al. (2019) highlight that despite evidence of increased awareness of these problems, local authorities generally do not possess the necessary competence or knowledge to manage or even influence the urban freight sector. To that list one could further add the resources or political backing to do so.

Nevertheless, it is in these very areas that policy (in theory) has the potential to heavily influence the market and steer it in a direction where it begins to address, and ultimately resolves, many of these issues. This could be achieved through the implementation of what is generally known as the concept of city logistics, but as highlighted, to date little progress has been made in this direction.

In some senses what follows is an explorative paper, the aim of which is through a case study approach to examine if there is any relationship between the extent of a local authority's freight policy development, i.e. urban freight transport (UFT) policy 'maturity', and the success of a policy driven (green) urban freight pilot initiative. The main question to be addressed is the degree to which the prevailing policy framework impacts on the success or otherwise of the pilot. One key issue identified in the literature is a lack of laboratory and field experiments in the general area of sustainable supply chain management (e.g. Carter and Easton 2011), and a complete absence of the impact that policy and its associated measures can have on such initiatives. As such, the current research goes some way to addressing some of these important issues, or certainly at the very least contribute to the research agenda in this area.

What follows is a discussion of some of the issues of urban freight transport policy that have been identified in past research, before an overview of the idea of 'city logistics' is given. An assessment is then made of UFT policy maturity in five case study cities and results of the pilot projects presented. The paper closes with a general discussion of the findings before the main insights gained from the research are highlighted.

Urban freight transport policy: 'problem solving' rather than an active policy

Freight transportation, unlike public transport, tends to be viewed as a free market good, and consequently in terms of either policy or regulatory intervention, this historically has been very limited. As an example, Lindholm and Browne (2013) showed that urban freight transport is not a priority in many Swedish cities. Similar results were found by Witkowski and Kiba-Janiak (2014) with regard to Poland, where only a minority of cities (38%) had any policy provisions that partly related to freight transport. Even in these instances, the vast majority tended to be problem focused, hence most measures related to regulations concerning access to city centres.

Lindholm and Blinge (2014) similarly state that local authorities have traditionally focused on public transport, car usage and other modes of transporting people, and even go so far as to highlight that from a local authority perspective, at best freight seems to be somewhat 'uninteresting' (Rodrigues 2006) and at worst completely neglected (Sjöstedt 2007). The authors add that the main reason for such a lack of policy is that freight is largely a derived demand, and hence is primarily driven by consumer activity. As such, the local authority has very little, if any, control over the activity. A further facet however is that whilst passenger transport is high on the political agenda, this is not the case with freight, a fact reflected in the construction of public body administrations. In a study of Dutch local authority transport departments, Ruesch and Glucker (2001) found that 1 in

4 had no responsible entity for goods transport issues, and even where such an 'entity' was found, in almost half of these cities this consisted of the equivalent of less than one part-time member of staff. Lindholm and Blinge (2014) found the issue to be even more acute in Sweden, with more than 2 out of 5 cases having no such entity or skills in the subject area.

The last point is particularly significant, as what it clearly demonstrates is a lack of knowledge and expertise in public authorities with regards to urban freight issues. Dablanc (2007) makes the astute observation that this lack of interest is compounded (or the cause of ?) local public policies regarding freight that are scarce and out-of-date. At the time of writing, the author noted that the previous twenty years had seen very little, if any, change in direction with the same regulatory measures used for largely the same purposes. Furthermore, these had been primarily focused on addressing 'problems' rather than attempting to steer or direct what is essentially a key economic activity towards a more balanced and enriching outcome. Cherrett et al. (2012) reinforce this view, adding that public authorities have been hampered in policy development by a lack of a system of on-going public data collection, beyond bland traffic counts, with regards to urban freight operations. This typically results in authorities having limited insights into urban freight patterns when attempting to develop suitable strategies and policy measures.

One issue not directly identified in the literature, but undoubtedly a major factor, is that with a problem focused policy framework, what this has created in many locations is an overall outlook of regulatory negativity, and certainly one not consistent with active city logistics or key stakeholder buy-in. Stathopoulos et al. (2012) for example, in a study of three stakeholder groups (policy makers, carriers and retailers), found little support for policies targeted at addressing some of the issues with urban freight. Across all categories support was less than 50%, and even that 'high' figure was from the policy maker group itself, underlining the general lack of interest within this body. Responses from retailers were even lower and averaged 21% across all categories, whilst carriers were particularly anti, with a level of support that ranged from 33 to 0% and averaged a mere 15%. One clear reason for such anti views is that it is difficult, if not impossible, to convincingly present any positive benefits for the main stakeholders that come with such policy initiatives, added to the fact that in many respects what is being traded is economy for quality of life. What this represents therefore is another barrier to future policy development beyond the 'problem solving' focus.

The concept of city logistics

In many senses, at the other extreme to a 'problem' solving approach is the idea of city logistics, which concerns the public and private planning and management of urban logistics. Benjelloun et al. (2010) for example suggest that the city logistics concept has emerged as a comprehensive approach aimed at attempting to mitigate the negative impacts of urban freight transportation without penalizing many economic, social, administrative, cultural, tourist and other activities. From an overall perspective however, this should be considered as an idealised view, or certainly at best a long-term aim, as to some extent there must be a trade-off between one or more of the issues highlighted. In a similar vein, Cardenas et al. (2017) define the concept of city logistics as

focusing on the inter-dependencies between citizens' welfare, the logistics system and the public administration of urban logistics policies. According to the authors, it refers to both the decision-making process and the implementation of policy measures. Taniguchi (2014) describes city logistics as "the process for totally optimising the logistics and transport activities by private companies with support of advanced information systems in urban areas considering the traffic environment, traffic congestion, traffic safety and the energy savings within the framework of a market economy". Whilst not explicit therefore, the role of the public sector would be to monitor and regulate the main externalities associated with urban freight in order to achieve a more optimal balance between economic and social needs.

To put the above into perspective, the situation in most locations at present is the free market solution, which Cowie (2017) argues is a consequence of an almost perfectly competitive market and thus represents (financial) economic efficient outcomes. As a result, any regulatory factor, policy or any other form of interventionist measure which seeks to change that situation must inevitably come at an economic cost. In many respects, there are no simple solutions, but it would be expected that from a broader society perspective, any such intervention should result in a more desirable (public) outcome. It also suggests that if there were other more efficient supply chains mechanisms, then operators would be employing such measures. Ultimately therefore, alternative approaches must be uneconomic, certainly without any form of policy intervention. The practice of city logistics, as defined in this review, therefore needs to be far more proactive than it has been, to the point where it directly impacts on the basic economics of urban freight transport, and as stated, then achieves a more optimal balance between economic and social needs. As highlighted in the introduction however, there is a distinct lack of evidence or practically based insights into the impact that policy and its associated measures can have on freight policy initiatives, hence such a view remains purely theoretical in its outlook.

Methodology: primary and secondary research

In terms of the methodology employed in the current research, this is almost entirely qualitative in nature, an overview of which is given in Fig. 1.

In terms of the overall approach taken, the research has elements of both action research and to a lesser extent, grounded theory. In the former case, the research has been an integral part of the process of instigating, or at least attempts at instigating, change in terms of last mile logistics, and as such the perspective has been to attempt to draw out salient points from ground level developments. This consisted of an iterative process of plan, act, observe and reflect (Bryman 2001). Grounded theory (Glaser and Strauss 1967) on the other hand is where, through inductive research, theory emerges from the research process, and hence bridges the gap between theoretical foundations and empirical research. Whilst perhaps overly grand in the current context, what is sought through employment of the methodology are key insights into the issues being examined.

The research was carried out over the period March 2018 to June 2022, and with reference to Fig. 1, began with a literature review focused on the role and general issues
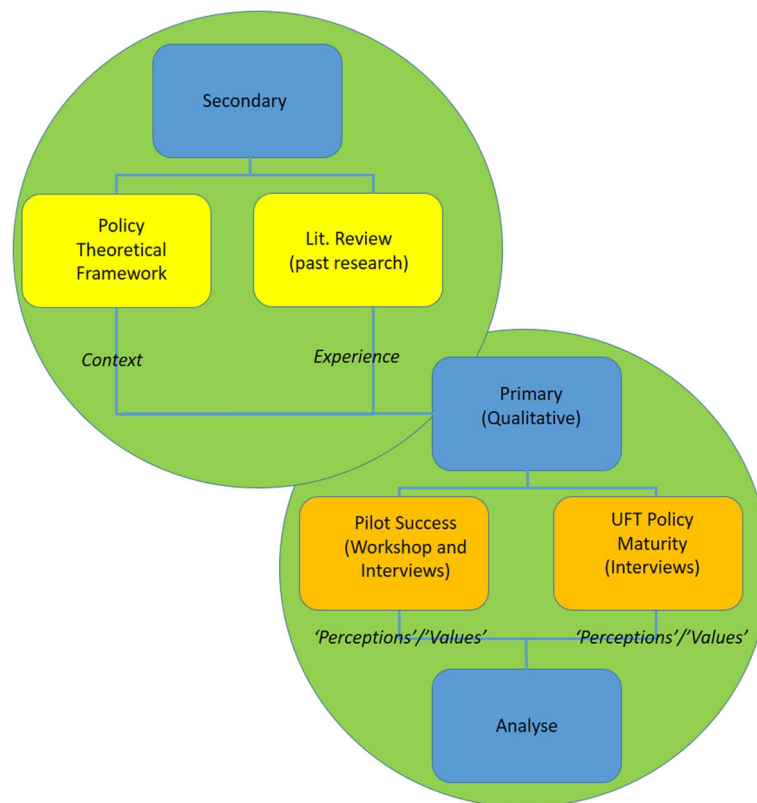
Fig. 1 Overview of methodology

surrounding policy in the area of urban freight transport (UFT)[1]. This was then complemented by the construction of a theoretical framework based and adapted from the ideas of Kiba-Janiak (2017) in terms of a city's level of UFT policy 'maturity'. Five case study cities were then selected using a non-random sampling method, specifically purposive sampling (Mason 2002). This approach was adopted because, given the aims of the study, a key requirement was that participants in the case studies needed to have views and experiences concerning the phenomenon in question (Robinson 2014), in this instance specifically policy interventions with regards to urban last mile logistics. A second reason for this approach was the need for the researchers to have continual access to key informants over the course of the study. As a consequence, all cases studies had some form of interest in urban freight issues and at the outset had the intention of establishing a pilot initiative.

Regular informal discussions therefore with participants took place from the outset of the pilot initiatives, followed by a series of more formal in-depth (face-to-face) interviews in March 2020. These established the level of urban freight transport (UFT) policy 'maturity' in each case study city. In terms of the criteria to use to evaluate 'pilot success', these were determined by a Delphi panel workshop held in

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[1] This was actually part of a far more extensive literature review into the whole area of last mile logistics, see Cowie (2019).

June 2022 immediately followed up with face-to-face interviews. More details on all aspects of the research are given later in the paper.

Assessing urban freight policy maturity

Whilst a number of urban freight transport frameworks have been developed with regard to defining some form of 'taxonomy' of city logistics projects and interventionist measures (e.g. Benjelloun et al. 2010; Aditjandra and Zunder 2018), little exists in the form of the overall context from which such policy initiatives may be formed and subsequently implemented. In the more general political science literature there does exist a number of theoretical models of policy development, such as the Linear Model (Lasswell 1951); Stages Model (Grindle and Thomas 1991); and the Streams Policy Model (Kingdon 1984). All with perhaps the exception of the last mentioned however relate to the development of specific policy priorities in given policy areas; in this case however the issue runs deeper and specifically relates to the development of a whole policy area in its entirety.

It is in this respect that it was decided to adapt and use Kiba-Janiak (2017) five-stage model of UFT policy maturity. As the author argues, the whole planning and implementation of freight transport within a city can be considered as a process, albeit a major one, but a process nonetheless, and hence the concept of process maturity would appear to be an appropriate context from which it can be viewed. In general terms, process maturity is an indication of how close a developing process is to being complete. Whilst several models exist, one of the more commonly used is the Capability Maturity Model Integration framework (Software Engineering Institute 2010). This breaks down process maturity into five levels, ranging from (a low) of 'Initial', to (a high) of 'Optimising'.

Consistent with this, Kiba-Janiak's (2017) model of UFT freight policy maturity has five levels, ranging from low to high maturity. In many senses however, what these differing stages reflect are different levels of intervention in the market by the relevant authority, hence an authority with a more 'mature' state of UFT policy development will have higher levels of intervention, the ultimate aim of which is to optimise the complete system/process. Table 1 therefore outlines the main factors typical of each level and reclassifies and develops the basic ideas to reflect degrees of market intervention:

In order to place the case study cities in the above framework, questions were derived from the key issues identified by Kiba-Janiak (2017) complemented in several specific areas with additional frameworks from other authors. Specifically, the key themes were:

- the role of UFT in strategic policy documents;
- level of policy actions (Stathopoulos et al. 2012);
- levels of stakeholder engagement (Lindholm and Browne 2013);
- levels of public finance for specific UFT initiatives;
- level of public awareness of such initiatives.

In the course of each interview, the overall framework was outlined to participants and the key characteristics at each of the levels highlighted. Discussions then centred

Table 1 Levels of urban freight transport (UFT) policy maturity

Title	Maturity	Engagement	Key elements
Pure Market	Low	Minimal	Minimal involvement, lack of staff with related responsibilities and expertise, no data collection, policy mainly focused on passenger, freight policy only relates to restrictions. Minimal mention of UFT in strategic documents. Generally, left to the market
Policy Appeasing	Low/Medium	Irregular	Unambitious aspirations for freight in strategic policy documents, lack of relevant expertise or experience in the subject area, no data collection, limited implementation of UFT related projects beyond the restrictive level, limited engagement with key stakeholders. Policy actions primarily driven by external pressures
Policy Focus	Medium	On Going	Clearly determined goals for UFT in strategic policy documents, although generally lacking at the tactical level. Ad-hoc data collection, no formal body to engage with key stakeholders. Lack of specific UFT related freight projects, those that exist are more focused on better use of public space
Aspirant	Medium/High	Proactive/Strategic/Core	Continuous high level of tactical engagement, if lacking in a degree of co-ordination, improvements in the planning and implementation of specific UFT measures, involvement in UFT focused initiatives on a regular basis. Has a formal stakeholder forum
Proactive	High	Taking Initiative/Strategic/Core	UFT a key strategic objective, regular data collection, high level of expertise in UFT in the public administration, reflected by broad experience in the implementation of regular and co-ordinated UFT projects, decisions made in collaboration with key UFT stakeholders through a formal body e.g. a freight quality partnership (FQP)

around these components and identifying relevant examples. Interviews ended with an assessment by the participants of the level of UFT policy maturity present in their cities. The results of these are presented below.

Groningen

UFT policy maturity assessment: policy focus (medium)   Basis for assessment: In 2014, the municipality of Groningen signed the National Green Deal Zero Emission City Logistics (GD-ZES). Three years later the Groningen Urban Logistic Focus Group was established. This meets three to four times a year under the chairmanship of the Municipality and consists of representatives of the local business association (Groningen City Club), other trade and business associations and the University of Groningen. Through this forum, the city council drew up and signed the Groningen Sustainable Urban Logistics Covenant in 2018. This sets out how the signatories will work towards a liveable, safe, accessible and attractive city centre, with emission-free city logistics as the ultimate target by 2025. That apart however, the interviewees highlighted that since its inception, very little that has been discussed at the forum has fed into policy development. As regards specific policy actions, these almost exclusively consisted of a regulated central area with

a time window (5.00 a.m.–12.00 a.m.) for logistics, the area of which was considerably expanded in 2022 and will become the Zero Emissions Zone from 2025.

Mechelen

UFT policy maturity rating: policy appeasing (low/medium)   Basis for assessment: Due to the Belgian constitution (i.e. a federation), policy in the area of urban freight is largely driven by the Flemish Government and Mechelen City Council. The main policy instrument in this area is the Flemish green deal on sustainable urban logistics, which was introduced in April 2019. Despite this, the existing regional and national frameworks regarding urban logistics could best be described as rather unambitious, if in existence at all. As a result, often cities aim for higher goals than are expected from them, and the participants highlighted that this was certainly the case for Mechelen. What this leads to is the setting of targets that are largely unattainable, and hence lack any real commitment or ambition in attempting to achieve them. There does exist a central area of the city where vehicles that are heavier than 10 tons and/or longer than 11 m are banned at all times. Enforcement however is perceived as an issue, and given the low chance of being caught, offenders may simply view the resulting fine as a business expense.

Borås

UFT policy maturity rating: policy appeasing (low/medium)   Basis for assessment: In terms of local traffic regulation, the main affected parts in Borås are central areas that are regulated as pedestrian zones. Some intersections with other streets are walking speed areas, and a few "regular" streets (with pavements, parking lots, loading bays etc.). The pedestrian zone regulation means that only authorized traffic is allowed to enter (i.e. residents, deliveries, emergency services), although in some parts, time windows apply. The main strategic policy document is 'City of Borås Vision 2025', but in the course of the interview the participants highlighted that it was a strategy that lacked any meaningful actions at the tactical or the operational levels, Good Goods (the pilot project), seemed to be about it. There is no formal stakeholder group, hence no dialogue with any stakeholders, and in some senses the whole policy framework came across as being dated.

Edinburgh

UFT policy maturity rating: pure market (low)   Basis for assessment: Very little mention of freight in the major strategy document 'Transport 2030 Vision', in fact arguably even less than in its predecessor, 'Edinburgh Local Transport Strategy 2014–2019'. Policy tends to be 'problem focused', with interventions centred on traffic management issues rather than developing the concept of city logistics. The participants highlighted that whilst several stakeholder groups do exist, e.g. through three Business Improvement Districts (BIDS), engagement is fairly limited re urban freight issues. The only major development would appear to be the city centre low emissions zone (LEZ) as a result of the national government's Transport (Scotland) Act 2019, which requires heavy and light goods vehicles to meet Euro 6 emission standards. Whilst introduced on 31st May 2022, enforcement of the zone will not begin until 1st June 2024.

Table 2 Case study cities level of UFT policy maturity

City	UFT policy maturity (quals, local authority officials perceptions)		UFT policy maturity (quants, researchers applying strict criteria)	
	Level	Description	Level	Description
Edinburgh	1	Pure Market	1	Pure Market
Mechelen	2	Policy Appeasing	3	Policy Focus
Groningen	3	Policy Focus	4	Policy Aspirant
Drenthe	2	Policy Appeasing	2	Policy Appeasing
Borås	2	Policy Appeasing	3	Policy Focus

Reflections

During the course of the interviews, and in reflections later, the researchers felt that a number of the local authority officials may have under assessed their city's level of UFT policy maturity; this was particularly true in the case of Groningen, and to a lesser extent Borås. In some senses this was 'confirmed' by an at arms length purely evidence based assessment of each city, hence of the discussed issues, at what maturity level was there clear documentary evidence for. Along with the initial participants ratings (quals), these are shown in Table 2.

As seen from Table 2, such an assessment would have clearly put Groningen in the Policy Aspirant category, and both Mechelen and Borås at the Policy Focus level. Nevertheless, what these differences undoubtedly reflect are deviations in what can be perceived 'on paper', and the actual reality that lies behind that. As a result, the local authority officials perceptions are believed to be an accurate reflection of the reality, and hence the ones used in this research.

The Pilots

In conjunction with the above, five pilots were studied across the five cities, and these are shown in outline in Fig. 2:

All were part of a larger co-ordinated programme examining ways of greening last mile urban logistics with the specific objective of identifying viable business models. The basic details of each pilot are outlined below:

Edinburgh, Scotland

Cycle logistics. The Edinburgh pilot was established through a collaboration between the Regional Transport Partnership, SESTran, and the cycle logistics operator Zedify, through their licensee Pedal Distribution Logistics Ltd. The pilot was an expansion of the latter's existing operations in Glasgow and sought to use the experienced gained there in developing the Edinburgh market. The business model was founded on the basis of 'complementarity' of urban freight operations, hence in simple terms rather than compete with existing logistics providers in the city, work in partnership. An agreement was therefore reached with Fedex to deliver the courier's smaller items from a hub located to the west of the city centre. As such, this represented the
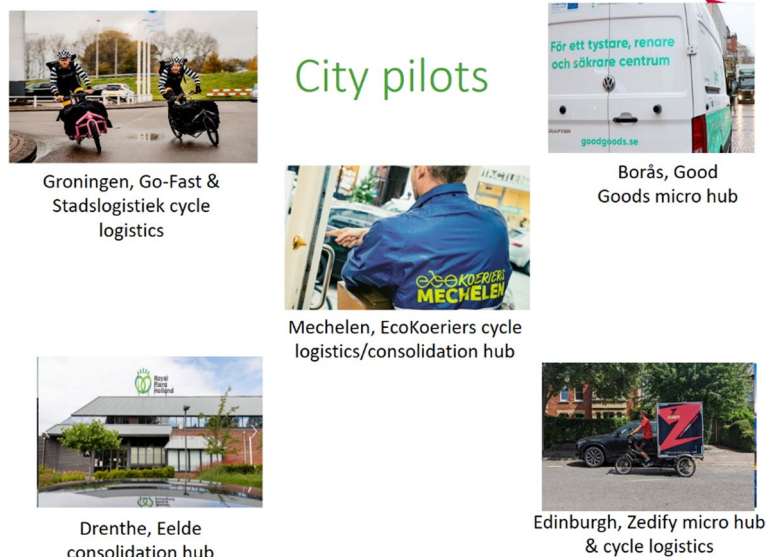
Fig. 2 Case study pilot projects

backbone of the business, to which other elements/markets could be developed, such as the localisation of freight (see below). Operations began in July 2018.

Eelde, Drenthe Province, The Netherlands

Using funds provided by Drenthe Province in the north of the Netherlands, a pilot consolidation centre was instigated in partnership with the Royal FloraHolland (Eelde). The freight hub was officially opened in June 2018, with the short term aim to focus on final mile deliveries to the city centre of Groningen, but medium term aspirations to quickly expand as a logistics hub for the whole of the Groningen-Assen region. The hub was also seen as playing a central role in the Green Deal signed by the region to realise zero-emission city logistics by 2025. The business model could best be described as 'the intercept' model, in that point-to-point one drop deliveries coming from the south could be intercepted en route and consolidated over the last mile into Groningen city. For this purpose, a 3.5t van was leased over the period of the pilot, and ample warehousing space provided by Royal FloraHolland (Eelde).

Borås, Sweden

The Borås pilot was established through a partnership between the municipality of Borås, Borås City Merchant Organization and the local real estate owners' association. They joined forces with local transport company Stures Åkeri and the municipal company Borås Energi och Miljö in order to establish a pilot project under the independent brand of "Good Goods". The proposed business model, certainly from the perspective of urban freight logistics, can probably best be described as 'consolidated duality', where deliveries are consolidated over the last mile (through a micro hub), and the vehicle used in a dual-purpose mode to collect dry waste from the same clients. As a package, this should reduce the (combined) cost to the client.

A micro hub was established to the west of Borås city centre and an electric van leased, and consistent with Stures Åkeri AB existing business for DHL in the city, focus was exclusively on small consignment deliveries. It was nevertheless hoped that this would enhance the opportunities to achieve significant consolidation effects from other operators and PCS providers. Operations began in October 2019 with the collection of dry waste added six months later.

Groningen, The Netherlands

In the search for smart city logistics applications, the municipality of Groningen and local companies Go-Fast Fietskoeriers and Stadslogistiek joined forces in a pilot project entitled 'Local and Incidental Flows'. Go-Fast bicycle couriers made an inventory of potential stakeholders, in order to connect paying participants with the aim of creating a profitable city logistics service. The focus was on providing delivery services to local companies within the city of Groningen as well as a large part of the wider municipality. The business model was established on the basis that it gives clients the opportunity to develop the local economy through the distribution of products emission-free and hence would enable Go Fast to bundle thin flows and distribute local products. This would remove the expense and time of utilising more elongated supply chains in order to develop the client's business, and as such would provide 'the only mile'. In many respects, this basic business model was established on the basis of seeking to develop the 'localisation of freight'.

Mechelen, Belgium

The pilot project in Mechelen in Belgium was established through a partnership between the city council, ODTH First class logistics and ECOkoeriers, a locally based cycle logistics company. The proposed business model for the Mechelen hub in many senses reflected 'the add-on' model (Gassmann and Frankenburger 2014) most commonly associated with low cost airlines. In that case, the customer purchases the basic service for a relatively low price, and then pays extra for any other services associated with the journey. This model can easily be transferred to the area of last mile logistics, and indeed the academic literature continually makes reference to the fact that an advantage of last mile consolidation is that urban consolidation centres (UCCs) can offer other logistical services (see for example van Rooijen and Quak 2010; Benjelloun et al. 2010; Browne et al. 2005). In the case of the Mechelen hub, a charge was made for the actual delivery (but publicly funded in the pilot stage, hence 'free' to the end user), but a range of additional (fee paying) ancillary services offered, specifically stock holding, labelling and order picking.

Delphi panel: defining/rating 'success'

When it comes to defining and hence rating 'success' of the project initiatives outlined above, this becomes problematic, if for no other reason than these were all established as 'pilot' projects on the basis of trialling and thus seeking to identify 'successful business models'. Nevertheless, a number of 'objective' quantitative measures could be applied, hence as an example, sales revenues compared. Furthermore, such data was available to the researchers. The problem however is that all pilots were small scale in nature, hence

again using revenue levels as the example, these were all at low levels, irrespective of the relative position. As such, this is not a measure of commercial 'success'. Furthermore, in this context the 'success' of a pilot should not be solely restricted to identifying an actual business model but also a potential business model in the future. In other words, not solely based on commercial criteria, but rather at a wider level on the basis of where actual and potential commercial markets are identified as a result of the pilot. As a consequence, this needs to be examined across a range of mutually agreed criteria, which will not only include commercial objectives but to a lesser extent wider social and environmental factors.

It was decided therefore to rate 'success' using primarily a qualitative rather than solely a quantitative approach, and specifically through the formation of a Delphi Panel/Workshop. This comprised of a mix of local authority officers who all had direct experience and knowledge of at least one of the pilots, as well as consultants and academics with expertise in the area of last mile logistics. A face-to-face workshop was therefore organised, and panel members invited. 15 participants attended the event, with the final panel being made up of 3 consultants, 10 local authority officers and 2 academics.

In order to bring the issues clearly into focus, a case study on each pilot was prepared prior to the workshop and distributed to each participant which outlined the policy context, the underlying proposed business model and the critical elements underpinning the operation of the pilot. In addition, panel members had access to information regarding the underling financial structure of each pilot, levels of freight flows, size of the customer base and the geographical areas served.

The task of the workshop was to agree upon the criteria against which the success of each of the pilot projects was to be assessed. As a result, five key criteria were identified and these are shown in Table 3. The workshop was immediately followed up by face-to-face interviews with two/three representatives[2] from the local authority attached to each pilot. For ease of assessment, and in consideration that there was nothing to be gained from applying a more sophisticated approach, it was decided to rate each factor on a simple scale of one to five, where five represented performance consistent with commercial outcomes, and one performance inconsistent with commercial outcomes.

Results

The results of the Delphi panel definition of success criteria and the outcomes of the follow-up interviews with regard to evaluating each pilot are presented in Table 3.

One overall observation from Table 3 is that in each pilot there is generally a high level of consistency across all of the assessed criteria. To briefly deviate into quantitative analysis, only the Mechelen pilot has a co-efficient of variation of greater than 0.5, whilst all of the others return values of 0.22 or less. In some respects, this may reflect the pilot nature of the initiatives, but probably even more so the fact that these were all start up enterprises. As a consequence, the success as such may be strongly related to achieving some kind of momentum in establishing the business, which then enables it to achieve more across a range of business activities, which are broadly reflected

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[2] For clarity, who had all been members of the preceding Delphi panel, hence party to the agreement of the assessment criteria to be used.

Table 3 Result of delphi panel analysis

Criteria	Description	Pilot assessment				
		Edinburgh	Mechelen	Groningen	Drenthe	Borås
Dependence on subsidy/ profitability	Assess on the basis of the importance of subsidy in the operation, high dependence = 1, low = 5	4	2	4	2	2
Market penetration	Extent to which the pilot has penetrated the potential market, note here this should be assessed on the basis of the independent retail sector, not the whole sector, 1 is minimal, 5 is high	3	1	3	2	3
Scalability	The extent to which the current operation could be scaled up, 1 is little potential, 5 is highly scalable	4	3	4	3	4
Identify a possible business model	Extent to which a possible business model was identified to pursue now or in the future, 1 for low, 5 for high	3	1	4	2	3
Longevity	Extent to which the pilot has the potential to survive beyond the current pilot phase as a commercial enterprise, 1 for low, 5 for high	5	1	4	2	4
Overall average:		3.8	1.6	3.8	2.2	3.2
Ranking:		1	5	1	4	3

in the agreed assessment criteria. Where momentum is not established however, the business simply stagnates (and at a low level).

As regards each criteria, beginning with dependence on subsidy, three out of the five were judged to be heavily dependent on subsidy, with the other two to a far lesser extent. In these latter cases this exclusively related to a contribution to start up costs, hence could not be assessed as entirely independent of subsidy (i.e. at a 5). Market penetration in all cases was generally low, and whilst this was judged in relative terms (i.e. due to the nature of the initiatives, none were 'expected' to dominate the market), all nevertheless had low customer bases. In the most extreme case (Mechelen), this consisted of only three stores that had signed up to receive some of their deliveries through the hub. Perhaps the most interesting criteria identified by the panel was the issue of scalability, as in terms of a pilot initiative, this is clearly an important consideration. In all cases, this was assessed to be at least at a reasonable level, i.e. no less than 3, with the three most successful pilots adjudged to have higher levels of scalability. This may reflect the fact that as highlighted, all had relatively low customer bases, and hence the potential to expand to some degree could almost be perceived as a given, although one factor that did come out in the interviews is that all pilots had reasonable access to the resources that would enable such scaling up.

Table 4 Five case study cities, UFT policy maturity and pilot success

City	UFT policy maturity		Pilot success
	Level	Description	Score
Edinburgh	1	Pure Market	3.8
Mechelen	2	Policy Appeasing	1.6
Groningen	3	Policy Focus	3.8
Drenthe	2	Policy Appeasing	2.2
Boras	2	Policy Appeasing	3.2

In terms of identifying a current or future viable business model, two could be considered as being entirely unsuccessful. Of the others, during the discussions it became apparent that with regards the Edinburgh pilot, whilst it had clearly identified a viable business model (complementarity), the success of the approach was dependent upon continued good working relationships with a small number of key partners, and hence this represented a degree of vulnerability. As regards the final criteria, longevity, there is almost a clear split 3:2 in terms of the potential to survive beyond the pilot stage. One issue however that did emerge in the interviews is that whilst in the case of Edinburgh and Groningen this was on an entirely commercial basis, for Borås this would continue to receive a degree of subsidy (which had been agreed at the time of the interview), hence in terms of strictly 'commercial' continuation, this may be questionable. Through the discussions however, it was felt that the willingness of the local authority to continue to fund the initiative represented a clear recognition of the value of the service being provided, for which it was willing to pay, hence in a business model sense rather than subsidy this simply reflected a valid revenue stream. As a final note in passing, for such projects a 60% continuation rate beyond the pilot stage represents a very high percentage, research elsewhere (Cowie and Fisken 2019) found that in previous consolidation/last mile initiatives, at the very most only 3% continued after the pilot phase.

Taken overall, what the above results clearly indicate is that the five pilots met with mixed success, with two being generally regarded as successful, one neutral, and two that clearly failed to make any real impression. A key consideration of the research is, can this be linked to the UFT policy maturity in each of these cities? Table 4 brings these results together.

The clear implication from Table 4 is that there does not appear to be any relationship between the level of UFT policy maturity and the success of the pilot. In fact it is almost ironic that the two most successful pilots were carried out in cities that, of the five included in the study, had the lowest and highest levels of UFT policy maturity.

Two points however need to be considered. The first is that in terms of UFT policy maturity, four out of the five cities were assessed as either pure market or policy appeasing, hence at relatively low levels. Only in one case, Groningen, did there exist a level of UFT policy maturity that included an element of a tactical function, i.e. had the ability to actually do something. Viewed overall therefore, this would suggest that the issue is more to do with low levels of UFT policy maturity rather than any association per se, and that at such levels the success of any freight related policy initiative is dependent upon situational factors that lie outside of the policy environment.

Nevertheless, there is some suggestion that at higher levels, this may have some influence. Again citing the case of Groningen, this had the highest UFT policy maturity and the (joint) most successful pilot. Furthermore, it was clear from the interviews carried out that the local authority had been very supportive of those behind the pilot.

Closing discussion and conclusions

Five case studies across four northern European countries were examined in a qualitative assessment in order to examine the relationship between the level of UFT policy maturity and the success of a pilot initiative aimed at greening last mile logistics. It was not expected beforehand that any clear 'evidence' of such a relationship would be found, but rather that some insights into the issue gained through the process of carrying out the research. As such, the main conclusion is that there appears to be no such relationship between the two in any form, however the deeper issue would appear to be low levels of UFT policy maturity found in the case study cities. Whilst these cannot be put forward as representative, such an overwhelming majority would nevertheless suggest this is not untypical, certainly in the European context.

At a more general level, this would strongly imply that the instigation of meaningful urban freight policy actions, as opposed to mere policy statements, only start at high levels of UFT policy maturity, specifically identified in this research as levels four (policy aspirant) and five (pro-active). Lower levels however are characterised by largely (unrealistic) strategic policy aims unsupported by tactical capabilities. The real danger is that in such cases this leads to policy stagnation, i.e. a vicious circle: low maturity reflects low priority, which results in few freight related skills/expertise in the public authority, hence unambitious and disjointed policy measures, little is achieved and hence little incentive or pressure to change. As a result, city authorities never mature to the high levels required to make any real difference.

The fundamental issue therefore would appear to revolve around increasing levels of UFT policy maturity, and in identifying the key processes and mechanisms through which this is achieved. On that note, at the time of the final write up of the current research it transpired that if the UFT policy maturity of Drenthe Provence was to be re-evaluated, it would be at a medium level (policy focus), i.e. it had moved up a level. It was also clear that this had been achieved almost by way of an iterative/snowball type approach, but one that nevertheless had required a concerted effort. This had resulted in a momentum being gained as regards UFT policy issues/initiatives, a significantly increased number of collaborative initiatives and a raising of the profile of freight transport within the authority; in some respects therefore, it had created its own virtuous circle. Clearly however, more research is required in this area, specifically with regards to generating a wider evidence base on the current topic and in identifying the key factors that lead to higher levels of city authority UFT policy maturity.

Abbreviations
BIDS	Business Improvement Districts
FQP	Freight quality partnership
UCC	Urban consolidation centre
LEZ	Low emissions zone

Author contributions
JC designed the research methodology, conducted all interviews, wrote the case studies, facilitated the Delphi Panel workshop and wrote the original (and edited the final) draft. KF assisted in the design of the research methodology, carried out project organisation and administration, contributed to interviewing and edited the final draft. Both authors read and approved the final manuscript.

Availability and data materials
All interviews were immediately written up afterwards as research notes. These as well as the minutes from the Delphi Panel workshop and the case studies are available on request from the corresponding author.

Declarations

Competing interests
The authors declare that they have no competing interests

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