SURFLOGH WP 5/6 PILOT PROJECTS AND BUSINESS MODELS

Sustaining the last freight mile. A Critical Literature Review

SURFLOGH
SMART • URBAN • FREIGHT • LOGISTICS • HUBS

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1.0 Introduction/Overview

This literature review is composed and drafted in line with the requirements of Work Package 5 of the Surflogh project, specifically deliverable No C.5.1.2, “Research learning from prior pilots”. With the agreement of the Directorate however, this was combined with the literature review requirements of Work Package 6 (identification of business models for urban freight flow hubs), hence the whole exercise was undertaken by SEStran/Edinburgh Napier University.

The objective of the literature review is to identify and examine the academic research that has been carried out in this subject area, and through that pinpoint both the type of research that has been undertaken and the main findings/issues that have come out of these studies which either have a direct or an indirect relevance to last mile freight business models/operations. As such, this covers a broad range of research literature, particularly given that last mile logistics needs to be viewed in the wider context of the whole supply chain as well as local supply side conditions. The issues to be covered therefore, are many and varied.

Furthermore, this review has been constructed to not only inform all project partners of the main research studies that has been carried out in the area of last mile logistics, but also to provide a more general knowledge base for the Surflogh project as a whole. As such, what is reported goes considerably beyond the traditional literature review. As will become clear in subsequent sections, the report begins by giving an overview of the main issues that have been studied and the type of research that has been carried out in the area, before the main themes that emerged out of the whole exercise are presented. What should be noted is that within these sections, there may be areas of crossover, hence simply because a particular piece of research appears under one particular title, this does not mean it solely relates to that subject, as it may have implications for other topics. This should be however at a relatively minor level. In some senses, in such exercises this is inevitable, as it can only be overcome by a high level of repetition that would result in a very unwielding document.

To place in context, figure 1.1 illustrates where the literature review ‘fits’ into the overall methodology for the research to be carried out in WP6.

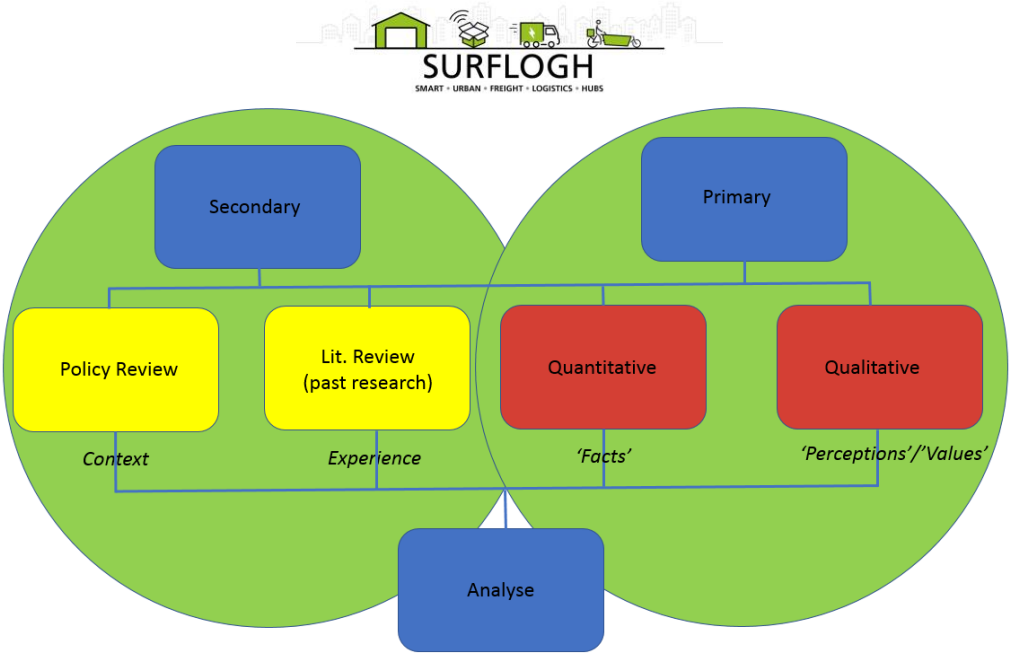

Figure 1: Summarised overall research framework, Surflogh, WP6, Business Models

As stated, many of the main findings coming out of the literature review will now also feed directly into Work Package 5 with regards to the establishment, development and operation of the pilot projects.

1.1 Research Literature Inclusion Criteria

Inclusion criteria has generally been very open. Whilst this may suggest a fairly unstructured approach to compiling the literature review, literature was sought and reviewed using key word searches and through a snowball approach (i.e. directed from other papers) until it was found that much the same material was being covered and very little, if anything of real value, was being gained from the review of further papers. This is generally consistent with past experience and general approaches to literature reviews, as summarized in Figure 2.

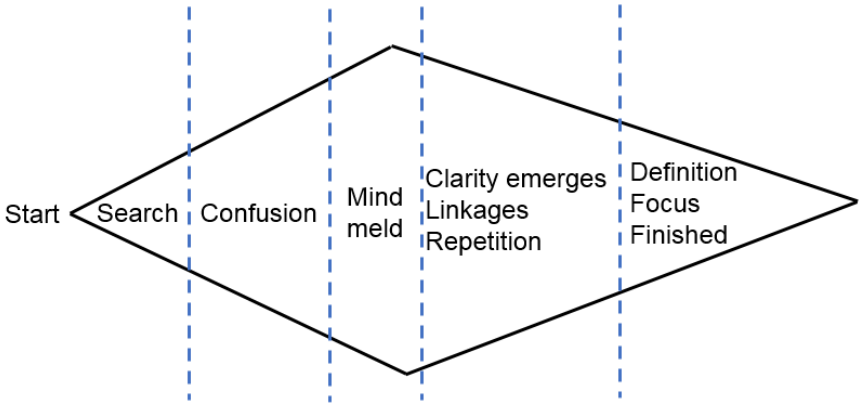

Figure 2: The literature 'diamond', summarised process of literature review (authors' own concept).

The area of the 'diamond' represents the level of the unknown, hence we start by not knowing what we don't know. As the process continues, then what we don't know very quickly becomes apparent, and a general state of confusion is created, particularly given the apparent contradictory nature of the research that is being reviewed at the early stages of the exercise. This can at times become almost overwhelming (i.e. information overload), hence leading to 'mind meld'. As the process continues however, similarities are identified and linkages made, a better understanding is gained, much of the literature can be analysed rather than simply reviewed and a clearer picture emerges where key differences may exist or broad similarities are present. As such, the unknowns are either resolved or become 'knowns'. As the process continues further, then the marginal 'gains' in terms of knowledge to be gained from further readings reduces, almost to the point of zero, at which point the exercise can be considered to be complete (all that is then required is to keep up to date with the incorporation of subsequently published research).

In practice therefore, the literature search followed an iterative process which was continued until very little more could be gained from continuing.

In terms of specification of formal inclusion criteria, it was considered following Johanson and Björklund (2018) and only include papers that had been peer reviewed. Whilst in a certain sense this would provide a control over academic quality, in practice it was found that much useful material, either directly or indirectly, was found to be contained in non-peer reviewed articles, specifically those published in Research Procedia, which is a compendium of conference papers. It was therefore decided to set no specific limits on articles that were included, but rather include those that would provide an overview of the full range of the type of research that has been carried out in final mile logistics, and then extract from that the key themes that were of relevance to the SURFLOGH project.

1.2 Dates

Of those included in the 'formal' review, these date from 2005 to present (i.e. 14 years), although as will be noted later, most are in the latter part of that period.

1.3 Geography

The global literature was searched for papers published in English.

1.4 Literature word searches

Urban Consolidation Centre

- Joint delivery systems
- Ancillary services

Freight Consolidation Centre

City Logistics

Sustainable Supply Chain Management

Urban Logistics Box

Freight Quality Partnerships

Freight transport policy

- Limited traffic zone
- Loading time restrictions
- Loading bays

Urban freight transport planning

Last mile delivery/consolidation

Urban logistics business models

Cycle logistics

Search engines used were ScienceDirect; IngentaConnect and ABI/INFORM, although due to the snowball approach, papers from other databases have also been included.

1.5 The literature in context

This review has sought to identify literature which improves our understanding of the major issues surrounding the provision of urban freight logistics, hence has not been solely restricted to last mile consolidation measures. Nevertheless, the literature on sustainable city logistics is extensive - Lagorio et al (2016) for example identified a total of 298 such papers – and even that figure cannot be considered to be exhaustive. Furthermore, the issues surrounding commercially sustainable business models (WP6), whilst in practice only three specific papers were identified, the reality is that the underlying issue (commercial sustainability) relates to economic viability, stakeholder engagement, marketing of sustainable city logistics, the role of IT systems, and the role and impact of policy and more generally local authority engagement. As such, much of the literature review constituted selecting bits and pieces from a large range of sources, hence the theme based approach taken.

A large element of the literature also focuses on mathematical modelling of last mile consolidation measures. Indeed, Johanson and Björklund (2018) in their literature review included 29 such papers out of a total of 50. Whilst in our own review we have included 14 (out of 60) such papers, our experience suggests that the value of these papers can in some cases be very limited, as in many instances the results of the model have been in complete contradiction of both our own primary research results and the experience of others as reported in the literature. Such papers therefore were only included where it was felt they made a real contribution to the creation of the knowledge base, which in most cases meant that they also contained some other perspective, such as the impact of policy or commercial viability, rather than simply estimating a model.

One last comment is that whilst a 'target' of including 60 papers in the review was initially set (and completed), the practicalities were that after around 25/30 papers had been reviewed, with the odd notable exception, very little was actually gained from inclusion of subsequent papers. More will be commented on this later in this report.

2.0 Structural Literature Review

Before the issues arising out of the literature are presented, a summarised form of a systematic literature review (SLR) is given. An SLR is defined as "the searching, selecting, appraising, interpreting and summarizing of data from original studies" (Crowther and Cook, 2007, p493), and in this context is used to give an overview of the methods and methodologies that have been employed in last freight mile research, and to identify the main themes under which these have been carried out. Other data, such as year of the research and the type of research data used are also presented.

Table 2.1 Structural Literature Review

Topic		Type		Research Data		Year		Focus		Method	
UCC	30	Review	11	Primary Quants	21	Before 2011	9	Supply Side	27	Desktop	20
Urban Freight	19	Primary	28	Primary Quals	7	2011 to 2014	20	Retailers	2	Survey	12
City Logistics	7	Feasibility	4	All Secondary	32	2015 to 2018	31	Environment	2	Interviews	10
Cycle Logistics	4	Case Study	9					Policy	19	Pilot	4
		Secondary	4					Economic	9	Observation	1
								Delivery	1	Theoretical/Simulation	6
										Modelling	8
	60		60		60		60		60		60

Most papers reviewed specifically concentrated on urban consolidation centres (UCCs), which in this context is used as a generic term to cover any measure that attempts to consolidate deliveries over the last mile. As a consequence, this need not necessarily relate to a specific hub, as it also includes other actions such as urban logistics boxes. That said, the reality is that the vast majority did involve such a hub. Urban freight on the other hand covers the more general area of issues surrounding freight deliveries, with most of these papers relating to policy. City logistics in many respects should be taken as a subset of urban freight, but in this context it specifically concerns the more general area of urban freight management, hence includes both policy and the private sector and the interaction between the two. Finally, four of the papers specifically related to the use of cargo bikes, as this is one of the key points of interest for the Surflogh project.

In terms of the type of research carried out, only just under half were found to have any primary research element, and of those most were quantitative based. Furthermore, a large number were found to be either purely review, being based on either secondary data or case study focused (i.e. studying an existing case at arm's length). In terms of the period covered, over half have been published in the last three years, and very few found from before 2011. Whilst this undoubtedly reflects the 'currency' of more recent literature, it does nevertheless suggest that more recent years have seen far more papers published on the topic.

In terms of focus, the review found two key areas, 'supply side' and 'policy'. The former is any issue that relates to the supply of goods in the urban freight market, hence ranges from specifically last mile consolidation through to industry demand for/use of shared urban freight terminals and the major challenges (in the generic sense) facing UCCs and so on. Policy and also economic (both in a general sense and in a viability sense) featured highly as these are two areas where a specific interest lies in the Surflogh project, particularly any potential connections between the two.

In terms of research methods used, this very much reflects the secondary element of most of the research carried out in the subject area. Whilst not apparent from the raw figures, but over half involved no primary research, but even a large element that do are mainly based around quantitative interviews many of which have been highly structured, in other words, very limited in focus. For example many of these were undertaken as part of a stated preference survey, hence very limited in scope. There is however a strong argument that in order to develop any form of understanding of the topic, what is required is in depth qualitative interviews, and of all of the studies included in the review this only occurred in five such cases.

Furthermore, in some senses the structural review tends to give a slightly false picture of the extent and type of research that has been carried out. At an earlier stage, it became apparent that very little primary research, and particularly of the qualitative variety, has been undertaken. This then in turn guided the review to look specifically for papers of that type, hence in that (numerical) sense this 'gap' appeared to be filled, however the reality was that for most of the papers which were subsequently reviewed, very few made a significant contribution to the knowledge base. The consequences of this will come out in the review that follows.

3.0 Main Issues Identified From The Literature Review

The literature review searches located 60 studies, with the vast majority of these being peer reviewed. Rather than 'review' individual papers, these have been organised under five main topic areas which emerged from the exercise. Specifically these are:

- Economic viability
- Business Models
- Policy
- Partnership Working

Each of these is considered in the following sections.

4.0 Economic Viability

A key requirement of the SURFLOGH project is the identification of successful business models (WP6) through the establishment of pilot sustainable urban freight hubs (WP5), and hence of particular importance in the literature review is to attempt to identify the key factors that lead to the establishment of successful urban freight hubs as well as the critical influences that either lead to or impinge upon their commercial viability. The literature review therefore starts with the key factors surrounding economic viability.

4.1 Background

Olsson and Woxenius (2014) highlight that the poor state of the economy in the 1970s, led to a heightened interest in the operation of UCCs at that time, particularly in the United States. Due to the high level of duplication performed by companies involved in freight deliveries, what this suggested was that there may exist the possibility of consolidating these into a small number of consignments, and hence reduce the number of freight vehicles being used, thereby saving costs. Early studies pointed to potential cost savings due to consolidation over the last mile. For example, Parson's study on Chicago, cited in Ogden (1992), estimated for the collection and delivery of freight below 450kg between cities, the use of a UCC for the last mile would produce savings in the order of 3.5% over conventional freight delivery channels. In a similar type study, in Los Angeles savings for deliveries below 230kg were estimated to be of the order 5.6% (Ogden, 1992).

With hindsight, these savings may be considered to be of relatively small scale, and also pre-date the major development of the Parcel and Courier Services (PCS) sector. As a consequence, this would suggest that any cost savings arising from last mile consolidation would be even lower today. Furthermore, whilst the 5.6% figure is for total savings, in reality this would be 'shared' between a high number of individual providers, which would have the effect of reducing the real value further. Hence, once divided the savings would be marginal. Olsson and Woxenius (2014) highlight that in most early studies on UCCs, it was found that the additional terminal handling and documentation costs would often consume any of the estimated benefits, the reason being that goods that could be consolidated will be consolidated in due time, while those that remain will not be consolidated due to the economic realities (Horwood, 1958). Furthermore, Hicks (1977) highlighted that in such situations it is time and not cost that tends to be the critical factor, and hence generally speaking firms were not willing to wait for vehicles to fill to capacity, but would distribute on the basis of need.

Nevertheless, more recent research by Janjevic and Ndiaye (2016) investigated the cost relationships of urban consolidation centres for their users, and in particular, the authors undertook a comparative analysis between using own account vehicles and a UCC. This was based on an underpinning model of the two scenarios, and applied to a case in Brussels. Whilst this could be evaluated over a number of critical issues, the base line scenario suggested that use of a UCC could result in cost savings of up to 20% of the total cost, hence suggesting that the supplier would be better off abandoning their own account service and using the UCC. At face value, this suggests that UCC are commercially viable entities. This however represented the best case, and existed in the highly unlikely situation where there was only one delivery during a run. When this rose to seven, cost savings fell to 3%, and beyond seven the supplier was cheaper using own account. Given the potential demand for UCC services would only come from the small independent retailer sector, hence would involve multiple deliveries,

this tends to suggest that UCC are not economically viable. There is also the Ogden (1992)/efficient market argument, that if UCCs are economically viable, then why do we not have any UCCs? Furthermore, why have the vast majority of pilot projects that have been established over the years all terminated at the project end?

4.2 Establishing A Critical Mass versus the Paradox of the UCC

One factor that becomes clear from the literature, is that in the vast majority of cases key to success in a UCC project is the ability to create a critical mass in terms of the retailer base, with reference to the size of the operation. Morganti and Gonzalez-Feliu (2015) for example found that the establishment of a Food Hub in Parma was dependent a number of critical factors, one of which was signing up a sufficient number retailers to ensure financial viable. Key in this instance was a sector focus, hence food, but as sub-divided into independent retailers and hotels, retailers and other catering.

Triantafyllou et al (2014) highlight that the critical success factors for UCCs include the ability to secure a high level of retail participation (in order to obtain a critical mass), and this should enable the UCC to operate without any external funding, or put another way, along market principles. Alternatively, the UCC operator could obtain public sector financial support either as part of an EU project, or more directly from the local authority. In terms of critical factors, the authors found these to be reciprocal, hence a lack of the creation of a critical mass led to increased public funding. The authors also found that achieving financial sustainability was more likely in the case of single site UCCs, as a single party is responsible for financing the UCC. This compares to an area wide UCC, where securing financial support tends to be voluntary and there is no one body responsible for financing the UCC.

One major issue acting against the establishment of a critical mass is what could almost be termed the paradox of the UCC. As highlighted by Olsson and Woxenius (2014), in the case of transport for larger firms, which would mainly represent retail chains, terminals are 'efficient' (in whatever terms that is defined) because relatively large trucks are used and are often fully loaded (Browne and Allen, 1998). Under such circumstances, there is little if anything to be gained from the use of an UCC. This fits in with Allen et al (2000) division of the urban supply chain system into three categories, namely centralised goods supply systems (where businesses receive goods from a single point of dispatch), decentralised goods supply systems (where businesses receive goods from several points of dispatch which could include a variety of different suppliers), and finally a hybrid goods supply system where a significant proportion of core goods deliveries from a centralised supply system, with this being supplemented with goods received through decentralised networks. The first of these, centralised goods systems, are likely to be larger stores that belong to a retail chain. Based on the Dutch experience, research by van Rooijen and Quak (2010) would suggest that in terms of the percentage of stores that belong to this category, this accounts for around 75% of the sector. Browne et al. (2005) also argue that, from a logistical view, the major potential beneficiaries of an UCC are independent and small retailers combined with operators making small multi-drop. Improvements therefore are seen to lie outside of centralised goods system, assuming that the current provision is inefficient in the distribution of goods (van Duin et al, 2010). It has also been established however that transport carriers are unwilling to use UCC facilities. For example, two surveys (Regan and Golob, 2005; Holguín-Veras et al., 2008) both found a very low willingness on the part of carriers to participate in UCC

initiatives, less than 20% in both cases. Reasons for such small numbers are unclear, but almost certainly relate to the need for an extra handling in the supply chain, the loss of control over the last mile and finally the very low, if any, cost savings to be made from the use of such services. What this results in is a major barrier to entry on the supply side of the market, coupled with a small percentage of retailers on the demand side who could realistically benefit from using a UCC.

All of this points to the paradox of the UCC, which would basically be that of the elements of the retail sector that could actually benefit from the use of consolidation services, this tends to be a small proportion of the whole potential market and in the majority of cases is insufficient to constitute a critical mass. This is reinforced by Browne et al. (2005)'s literature review on pilot projects undertaken up to that point in time. The authors stressed in particular the difficulties of UCCs to reach a critical mass of users necessary to make the centre an economically viable solution. One interesting facet identified by Marcucci and Danielis (2008) was that businesses with frequent, differentiated and high volume deliveries were less likely to use UCC services. This was also found to be the case for larger (independent) retailers, but the two groups probably have a high degree of cross over. Taken together however, this underlines the paradox of the UCC. These are the very retailers UCC are aimed at, as the use of a UCC would consolidate deliveries and hence have a significant impact on reducing delivery traffic and the externalities associated with it. Furthermore, from a commercial perspective, 'capturing' such retailers makes the task of establishing a critical mass considerably easier, and yet these are the very retailers who are less likely to use a consolidation service. This therefore makes the job of establishing commercial viability far more difficult.

As noted above, Ogden (1992) highlights that if there are profits to be made, then why is no one doing it? Rijsenbrij (2005) also adds that despite technological advances, it is still difficult to transport perishable goods via an UCC, as they often require uninterrupted delivery chains. Time sensitive goods, such as those found in the PCS sector, are difficult to consolidate. The many stops for deliveries in this segment consumes considerable driver time, and it is the time available during a driver's shift, rather than volume or weight, that tends to restrict the load utilisation of vans (Arvidsson, 2013). In this sector, effectively what most carriers do is operate their own consolidation operation. Research by Olsson and Woxenius (2014) suggests that this may not be consolidation by geographical area, or consolidation by economic agent, but rather a combination of both elements. Hence, a truck load is consolidated through a combination of deliveries to both retailers and final customers, such that the final mile may represent different types of operation in different geographical areas. What all this means therefore, is that 'urban deliveries', whether these be central, radial or peripheral, should not be viewed as a single entity, but rather is an activity that is made up of a whole variety of different supply chains, and of those then the areas where UCCs can be of real value, appear to be very limited.

4.3 Overly Focus on the Last Mile

Whilst it is has long been recognised that urban freight transport problems are complex and compounded, hence one solution for one actor forms the basis of a new problem for another (Browne and Allen, 1999), this logic appears to be forgotten when the issue of UCCs are considered. In this case what gets overlooked is that large volumes of freight are already consolidated in terminals as part of the freight operator/forwarders' business, hence a UCC would constitute a second tier of

consolidation. As a consequence, this may substantially limit the possibilities under which it could be used. Put another way, research into UCCs tend to almost exclusively focus on 'consolidation' at the point of delivery, and hence overlooks consolidation at the point of origin. Following this argument, then as load consolidation improves progressively at the delivery end, at some point this will virtually meet itself coming the other way. Most of the practical experience to date would tend to suggest this happens relatively quickly, even ground zero in many cases. Finally, there is the issue of PCS operators, who generally operate a fixed capacity system and mop up any remaining business that may be left. Given that an UCC requires a critical mass, this leave very limited opportunities to develop such a client base.

Focus on the (specific) last mile also produces what could almost be termed a chicken and egg issue, certainly with regard to existing urban logistics in the form of small road hauliers (SRH). Olsson and Woxenius (2014) carried out a survey of SRHs in Gothenburg, to examine the feasibility of establishing a UCC in the city (two to be precise, one to the north and the other to south of the river). What they found was that a high number of SRHs had very high load factors, with close to 70% having load factors of 70% to 100%. Maes and VAnelslander (2012) found similar results in Belgium, where freight intermediaries confirmed that for last mile deliveries, the majority is outsourced, mainly to SMEs with a limited number of vans and trucks. One reason that drives load factors is very high competition levels within the road freight industry (Cowie, 2018), thus in order to maintain a sustainable business, high utilisation is key. This in itself represents consolidation. As noted above, loads were made up of a combination of city centre retailers, suburban home deliveries and other intermediatory deliveries, hence 'consolidation' was not exclusively over the last mile, but did include it. Such is the delicate nature of profit margins however, that removal of that aspect of the SRHs operation (through for example a UCC), would probably render the SRH economically unsustainable. This would also explain the extremely low stated demand levels for any form of consolidation facility found by Regan and Golob (2005) from local and short haul truckers in California, i.e. they already consolidate. Putting all of these issues together, this would suggest that key to success in urban freight logistics is in consolidating over a diverse range of deliveries rather than consolidating based on a final destination area, such as a city centre.

4.4 Little Knowledge on cost Structures

Marcucci and Danielis (2008) highlight that the lack of knowledge on the cost structure and as a consequence, a failure to understand the potential demand for the UCC services, is one of the main causes of failure of many European UCC schemes which proved economically unsustainable once public funding became unavailable or insufficient. This is perhaps an over simplification of the issue, and would be perhaps be more applicable to understanding why UCC schemes tend to fail. The argument being, understand that issue better, and we may progress knowledge in this whole area further. They go on to state that research based in Italy, tends to suggest that UCCs are more likely to be successful in certain supply chains, namely packages, dry products, home deliveries, and that part of hotel recreation and catering that does not include fresh products.

4.5 Low Number of Deliveries

Surprisingly, several studies have tended to suggest that the actual number of deliveries to the retailer sector tends to be low. As an example, Johansson and Björklund (2017) used a primary survey of retailers in two Swedish shopping malls to explore the possibilities for these retailers to use UCC services. In a sample of 72 shops, the 'average' number of deliveries per shop per day was one. If true, then this considerably reduces the possibilities for delivery consolidation. To take the ultimate example, if a UCC service was based on providing a delivery a day, then the level of consolidation (at the retailer point) would be zero. This would not prevent consolidation on the operator side, although it may again limit possibilities. The issue of low deliveries was not only confirmed by Faccio and Gamberi (2015), but they found even longer intervals between deliveries. Analysis undertaken on retailers across four areas in North Italy, found an average delivery interval of just over 5 days, hence suggesting that deliveries may be as low as almost one a week. Other figures presented by the authors perhaps suggests that this may be a significant over-estimate, but even if this is the case the research still reinforces the idea of a low number of deliveries. The wider issue related to this is the critical mass needed to establish a UCC, where this is a function of the number of retailers times the volume of items. If the findings of the two cited studies represents a more wide spread situation, then the creation of a critical mass becomes very heavily weighted towards simply the number of retailers. It would also remove one of the perceived major advantages of a UCC, as consolidation factors would tend to be very low.

4.6 Top down and bottom up models of UCCs

An overlooked but key work in the area of the last freight mile is the research undertaken by Morganti and Gonzalez-Feliu (2015), in a case study on the establishment and operation of a Food Hub in Parma, in which the authors note that public authority support and the implementation of access restriction policies seem to have been necessary to enable Parma's UDC to reach a viability threshold. Importantly, the authors highlight that such measures were taken by creating a strong partnership (Tavolo di Concertazione) among trade associations, logistics companies, transport operators, suppliers, producers and local retailers, and this then allowed the local government to define and implement an effective scheme that optimised all stakeholder needs. This was primarily pursued through the adoption of principles that closely mirror Elvington's idea of the triple bottom line (Elvington, 1999). The authors themselves recognise that key to success lay in the progression of collaboration, consensus-seeking and communication between stakeholders at a preliminary stage of a project. Importantly, they highlight not only the outcome of the collaboration, but the process of engagement that was followed in achieving these aims. The whole innovation was based on the concept of the FH (food hub), and the authors highlight that this led to the revitalising of the role of the wholesale produce market. What this perhaps underlines is that the specific project has not attempted to impose a logistical framework that is radically different from what already existed before it was implemented, but rather was one that was built on and developed from what was already either

wholly or partially in place. In some ways, this represents a 'bottom up' rather than a 'top down' approach, and is one characteristic that would clearly distinguish it from less successful projects. One further element which almost certainly contributed to the success of the initiative was that it was targeted at a specific sector (food), and that sector was of a sufficient size that allowed a critical mass to be created.

These ideas in many ways are reinforced in the study by Taniguchi (2015) of a UCC in Yokohama (Matomachi district). There the author identified three success factors in its creation and operation, namely good leadership and enthusiasm towards achieving the desired goals; collaboration in stakeholders --- public-private partnerships; and a business model to maintain joint delivery systems. From the paper it becomes clear that what existed was a convergence of interests, hence those who would benefit, the retailers, owned a major asset (a car park) from which funds could be generated to support the UCC. Furthermore, all participants either directly saw the benefits of this or more generally believed that this was the correct action to take. The retailers had a direct incentive to improve the retail environment, and through the car parking charges, had a commonly shared financial resource to support such action. Importantly, it did not come directly from the primary business, i.e. retail revenue.

Van Rooijen and Quak (2010) cite Koehler (2004) in identifying a number of success factors that two city logistics projects in Nurmberg and Regenburg had in common. Specifically, they highlighted: restricted traffic conditions in the cities, mediator/scientific support in initial phase, integration of a freight traffic centre in the initiative, enforcement of regulations by local authorities, early involvement of all actors and collection of waste to utilise vehicles better by including the loads for the return trips to the freight centre.

The idea of a bottom up approach can also be viewed from the perspective of process theories of organisational development and change as outlined by Gammelgaard (2015) and applied to city logistics. The first, life cycle, is where city logistics are regulated by the municipality (a single organisation), and hence change occurs where new solutions outpace existing ones, hence we move from one life cycle to another. Under evolution, several models of city logistics exist, and the ones that adapt the best survive by natural selection. From a dialectic perspective, various independent organisations 'collide' into conflict, which is resolved by synthesis, i.e. a solution that captures the best of the diverging positions. Lastly, teleology, that is where an action has a purpose but where dissatisfaction with the current situation, e.g. too many vans, leads to new solutions being sought and decided upon by management.

This is a particularly good perspective from which to view the process of change and the types of conflicts which may arise or to identify the underpinning reasons for success. In this specific context, a bottom up approach would be very closely identified with an evolutionary process, hence it is a process where success is highly dependent upon linking into the existing logistic sector and providing a more efficient solution. The problem however is that it may be very time consuming (hence reducing the odds of successful completion of the process) and ultimately limited in capacity, hence what really needs to happen is that this needs to enter into a teleology state before any progress can be made. In simple terms, it needs policy.

The author's own research centred around the establishment of a UCC initiative in Copenhagen, which required a number of public-public and public-private partnerships to form in order to bring about the establishment of the pilot, if not ultimately a financially sustainable UCC. What the author outlines is basically common consent over the 'killer truck' debate and that this consent instigated the need for change and a resolution of the conflict between profit maximisation and traffic and emissions reduction (which ultimately was not resolved, profit maximisation won…). The public body (municipality) then took the initiative, however encountered considerable resistance through groupthink and parochial self-interest which prevented the seeking of new solutions (i.e. the teleological process). This was compounded by the lack of jurisdiction of the municipality to proceed any further. A 'freeze' state was then entered into before being resolved by the Danish national authority. It may be strongly argued however that one of the key reasons for its failure was that this was a classic example of a top down approach, where the whole scheme was driven by the public authority, and hence in reality lacked true 'partnership' working.

In terms of actual evidence for a 'bottom up' approach, given the general failure of the vast majority of UCC initiatives, very little exists. In an in-depth case study of three cycle logistics providers, Schliwa et al (2015) do recognise the importance of the sustainable ethics and prime motivations of the individuals behind business start-ups and the heavy financial reliance of these enterprises on PCS providers. They also highlight the need for a proactive role from the local authority as a facilitator to provide infrastructure and behavioural policies that enhances the viability of cycle logistics (rather than a partner in any business start up). All of these issues are consistent with the idea of building the business from the bottom upwards. Furthermore, their research strongly suggests that due to the heavy reliance on PCS providers, combined with the issue of 'private' goods, I.e. the inability to mix parcels from different couriers, means that future growth of such enterprises is inevitably tied into to the future growth of the prime contractor.

4.7 Cost is only one critical factor

One factor acting against the economic viability of UCC is the perception that introducing an extra handling stage into the process, can lengthen delivery times and reduce reliability. Evidence for this is very limited however, for example Verlinde et al (2014) found an 8% fall in reliability during the course of a pilot involving a mobile depot, although that may in part have been due to teething problems associated with what was a pilot. They also found a dramatic increase in operating costs, with deliveries and pick ups through the MD found to be double that of using conventional vans. This may be partly due to the low capacity (40%) achieved by the pilot.

NEED MORE STUFF ON THIS

4.8 Economic Viability and Ancillary Services

In the area of last freight mile research, continual reference is made to the fact that an advantage of last mile consolidation is that UCCs can offer other logistical services, such as stockholding, reverse logistics, labelling, etc (see for example van Rooijen and Quak, 2010; Benjelloun and Cranic, 2009; Browne et al., 2005). This however is a highly debatable point, as in the first instance it can be strongly

argued that this is not an advantage of a UCC but rather is true of any potential 3PL provider. Secondly, there is a very limited evidence base of actual 'success' with regards to UCCs in this area, some notable examples do exist, but these are few and far between and certainly until other examples emerge, should be regarded as the exception rather than proving the rule. Quak and Tavasszy (2014) for example outline the approach taken by the Dutch initiative 'Binnenstadservice' (BSS), in which the basic service, the last mile delivery, is offered free to retailers, but are charged for a range of ancillary services, which include storage, home deliveries, value added logistics (e.g. removal of clean waste) and possibilities for e-tailing. Whilst well established, the BSS still remains significantly subsidised, hence suggesting this does not provide a viable business model.

What is certainly true is that (in theory) UCCs may be well placed to offer such services, and hence the argument may be restated that one way to increase economic viability is for UCCs to offer other logistics services than simply last mile delivery. Thereby, the two issues become linked. Johanson and Björklund (2017) however astutely highlight that store personnel will tend to be far more sensitive to the costs of activities carried out by external actors than they are to the (hidden) costs of their own internal solutions for carrying out these activities. They may also be far less sensitive to the disruption to customer services caused by these in-store logistics activities. Taken together, retailers are likely to considerably undervalue the benefit to be gained from engaging such services, and consequently be willing to pay far less than the true value. A second issue is that staff costs in the very short run can be considered as fixed. Staffing levels in retailers are set at a point that optimises the primary function of sales, but this leaves considerable non consumer focused time. This then becomes available to undertake other supporting functions. Contracting these activities out therefore actually increases rather than reduces costs. In order to be a valid argument, cost savings need to be targeted at variable, not fixed, costs. The second related argument is the freeing up of store space to provide extra space to offer a larger range of consumables. This is not without its problems either, as the expansion in the product range on offer does not come at a zero cost, but rather requires an injection of working capital to support the effort. Why this become particularly critical, is that by definition the expansion must be on second level sellers, as the product range that is already on display is that range that best meets consumer demand. The marginal gains therefore are significantly reduced, and hence the whole proposition becomes less appealing from a retailer's perspective.

Consistent with these views, Marcucci and Danielis (2008) found that the use of tracking and tracing and warehousing provisions did not have a significant influence on retailers' decisions as to whether to use a UCC or conventional deliveries in their stated preference survey. This would suggest that even given the viability of this as a realistic option for operators, it would make little or no difference to the retailers' choice of using the UCC. Whilst the authors provide possible reasons for this, in this context it is important to highlight that these are the results of a statistical model, hence for the 'average' retailer it would make little difference, but this does not rule out the possibility that it will be attractive to some, even if this is very much a minority. Hence based on this evidence, whilst these can be put forward as an advantage, it is one that should be weighted very low, as it is one that is not attractive to the 'average' retailer. The wider issue therefore, of establishing a critical mass, becomes more difficult.

More clear-cut results on the issue were obtained by Paddeu (2017), who examined the benefits accruing to users of the Bristol-Bath UCC. In a survey, what she found was that only one retailer (5%) had used the short term stock holding facilities on offer and 5 retailers (24%) had made use of the recycling services (plastics and cardboard coming from packaging). Tellingly, eighteen retailers (86%) said they were not interested in receiving added services despite receiving all of their deliveries from the UCC. Gammelgaard (2015) on the other hand studied the establishment of the Citylogistik-kbh initiative in Copenhagen, based on a business model where the final mile was delivered free of charge, with cash being generated through the offer of ancillary services. Not detailed in the paper, but the whole project terminated after 21 months as it became clear it would not achieve the 3 year break even target, and in fact a considerably longer time horizon would be required.

5.0 Business Models

Whilst the issue of 'business models' very much fits under the general heading of 'Economic Viability', WP6 is specifically tasked with identifying the underlying business models with reference to the pilot projects, therefore the whole area is examined under a separate theme.

5.1 'Standard' Business Models

In fairly recent years, the business models approach has become very common to assessing 'economic viability' in all areas of business, and to a limited extent, this has also been true of the issue of urban freight consolidation centres. Björklund et al (2017) however highlight that few researchers have actually provided profound insights into the design of viable business models for UCC success. Nevertheless, the advantages of the approach is that it not only recognises the importance in identifying the underlying economic factors present in any business situation, which to some extent outline the 'whys' as regards the business proposition, but adds other important factors that lead to the 'conversion' of a potential business opportunity (i.e. the underlying economics), into a viable business commodity. These factors include human resources, marketing strategies, corporate image and key partners. Hence, if there exists an advantageous business opportunity, how is this converted into a successful business operation? What is the business model that would do that?

The real value in the business model approach is in its simplicity, certainly with regard to the dimensions to be examined, as this breaks down to four key components – who, what, how and why. One potential criticism of its application to the UCC concept is that it has tended to 'drift' from that fairly simple approach, and in the process has lost a degree of the real value in terms of an analytical tool. This is no better exemplified than by the use of the 'Business Model Canvas' (BMC) framework to evaluate a number of recent EU funded projects, in which the central question of identifying what it actually is that creates value, and how that is facilitated in the business operation, is lost in the rhetoric and added dimensions of the approach used. It also tends to break the whole business operation down, when what is really required is that it is should be joined up. Hence for example, 'a franchise' immediately suggests a single consistent approach to the business operation, whilst an 'add on' suggests a pay as you go type approach, but such well recognised business models are completely lacking from the UCC literature. In the current context, Cowie and Fisken (2019) highlight that the main problem with the application of the BMC framework is that it has been employed as an 'off-the-shelf' approach with little consideration of the context to which it is to be applied, and consequently has simply resulted in a box filling in exercise.

Within the literature, there have been a number of studies that have attempted to identify 'the business model' associated with UCC initiatives, and the importance in doing so has been well recognised. For example, Bjorkland et al (2017) highlight that many UCC initiatives have not materialised due to problems with business model limitations, hence suggesting that identifying the underlying business model becomes the key to understanding the potential success of the UCC operation. As noted above however, as applied within the academic literature these have tended to use an off the shelf framework to break the operation down into component parts, rather than to join it up. As an example, Quak et al 2014 in a 'business model' evaluation of the Bentobox concept broke the main costs of the operation down into its component parts (e.g. personnel costs, training costs, maintenance, capital costs) , but failed to undertake any form of analysis that would categorise these

to allow the costs to be matched against revenue streams. This is a basic requirement for identifying profit streams, and then extending the analysis, the extent to which profit streams may match the value proposition to the customer and potentially identifying how that may be achieved, i.e. the business model. Furthermore, a further category was added to the BMC framework, 'externalities', which by their very nature have no financial value and hence how a business addresses externalities is completely irrelevant, or where it is relevant, i.e. part of the value proposition[1], it is already covered by the BMC framework.

Of more value is the work of Björkland et al (2017), in a case study analysis of 5 UCC initiatives, the authors identified seven critical elements in the business model, specifically the ability to scale up and down the UCC solution; an ability to continuously develop and adapt to a dynamic environment; the important entrepreneurial role of the initiator; the acknowledgment of society (public recognition?); ability to innovate new services; logistics and supply chain management competence; and the ability to take full advantage of advanced IT. Whilst some of these may be questionable, following the authors logic what becomes clear is the importance of human capital/resources (entrepreneurial role/logistics competence), the need for flexible working, and the importance of IT systems. Whilst implied, this would nevertheless also tend to strongly suggest that in order to be successful, UCC operators should be small in size, and be consistent with the idea of an owner, as opposed to a manager, controlled firm (Monsen et al, 1968).

Björklund and Johansson (2018) highlight a key area for future research in the area of UCCs is the need to design successful business models for UCC solutions. In the same article, the authors highlight a lack of primary research in the subject area. Putting these two together, then the issue would seem to be that through primary research there is a need to identify successful business models and the extent to which these are transferrable to other locations and situations.

One further issue from the literature however, is the actual definition of a 'business model'. As an example, Benjelloun et al (2010) use a 'business model' as one of the criteria in the development of a taxonomy of city logistics projects, however it could equally be argued that all the description does is outline the company form and the market situation facing it. In other words, standard mainstream economic theory, specifically the theory of the firm. Quak et al (2016) attempt to outline a business model for the Dutch initiative 'Binnenstadservice' (BSS), but tend to focus on delivery cost, and state '…the market will enable a change in the structure of trips by itself where the decrease in costs of the main carrier are greater than the increase in the costs of outsourcing (to a UCC) of the city tours (of deliveries). This assumes all logistics decisions are based on cost, which in practice, is not the only consideration. In both cited examples the basic who, what, how and why components of the business model framework appear to remain largely unanswered.

5.2 Social Business Models

[1] To clarify, 'externalities' on their own have no financial value, it is only where some form of financial benefit to the firm can be attached to these, that the issue of externalities then becomes relevant. Hence being 'green' may add some value to the business. This however would be generated through marketing promotions, corporate image, pricing strategies etc, i.e. issues already covered by the BMC.

Within the literature on UCCs, one extension of the basic business model has been to attempt to include external benefits, and hence the idea of a 'social' business model. Nevertheless, whilst Björkland et al (2017) state that the value proposition to society is another component that distinguishes city logistics business models from many others, they also highlight that how social and environmental components are considered in existing business models remains limited. In a similar vein, Bakos, Böna, and Foltin (2012) (cited in the above) note that external costs should be included in (business) models, yet how this is to be done remains unclear. All of these points overlook the basic idea that a business model is a business model, and notions such as wider social benefits are alien to such concepts, as the economist would identify these as externalities and hence an output/service for which the firm cannot charge. As such, it is not a part of the business framework/model. Where the confusion possibly arises, and in addressing Bjorkland et al (op. cit.) point as to how such issues should be included in the business model framework, the answer would be where only a financial value/revenue stream could be attached to it, i.e. where it represents a value proposition, which specifically could relate to any subsidy received in light of addressing negative externalities. The business model framework could then be used in the context of how that value (in the form of the subsidy) was generated. As such, this is a considerably underdeveloped area.

5.3 Cycle Logistics (as a business model)

Estimates of the potential of cycle logistics as a viable carrier in the urban freight market tend to suggest that it offers a great deal of potential. As an example, Lenz and Riehle (2014) suggest that cycle freight can form around 25% of city centre commercial traffic in the medium term, whilst Schliwa et al (2015) cite other studies that suggest this figure could be considerably higher, at around 51%. In both cases however no detail is given as to the evidence base from which estimates were derived, and both figures, particularly the latter, would appear to be extremely optimistic. Nevertheless, Schliwa et al (2015) do highlight a number of barriers, in particularly the issue of 'private' goods, customer confidence in the mode/professionalization of the sector and a lack of an active public policy in the form of a public-private partnership aimed at the encouragement of cycle logistics. The authors highlight that if these barriers could be overcome, then this could lead to significant development of the sector from where it is today.

As regards actual research on the issue of cycle logistics[i], little exists, in particular with regard to economic viability. This perhaps reflects the fact that as a viable logistics provider the concept can still be considered to be at an early stage of development, although one for a variety of reasons that is gaining considerable momentum. In a study based in Belgium, Maes and Vanelslander (2012) identified only 14 such providers, and even of these a high number were relatively recent start-ups. Furthermore, only one (Ecopostale) had any formal link with a recognised logistics provider (TNT), as most attempts at co-operation had terminated due to the tariffs on offer (from the providers) were below operators' costs. This suggests that where such services exist, these generally operate very much at the local level and to date outside of recognised logistical supply chains. This is reflected in the segments such services take place, which the authors found to be mainly postal/package services delimited by time constraints, hence very much point-to-point. Total market size was estimated to be €550k Euros, which applying a generous 3% inflation rate would still only equate to an average

revenue of around €51k gross revenue per operator. Many were one person businesses and operated as sole traders.

A more extensive study was undertaken by Lenz and Riehle (2014), who examined 38 cycle logistic companies across Europe. Most were found to be single person or small enterprises, and the use of cargo cycles was very much a clear expression of company philosophy. The main challenges to such providers were found to be primarily the perception of customers as regards the modes viability as a freight carrier, and to a lesser extent poor infrastructure provision.

The authors report on a pilot test carried out by Dynamic Parcel Delivery (DPD) using cargo tricycles for the last mile delivery. In order for successful implementation, due to the limited loading capacity of the cycles, was the location of city center storage facilities at which the cycles could be reloaded next to their area of use. Greater general accessibility of the cargo bike was also found as another major advantage, hence as an example the ability (legally!) to ride on one-way streets in the opposite direction.

5.4 Cycle logistics and supplier access

One potential key advantage of cycle logistics over the traditional white van is a higher level of accessibility to the final delivery point. Jaller et al. (2013) for example highlights that parking represents a major challenge for drivers attempting to pick up or deliver goods within cities, with the problem being particularly acute in older cities characterized by smaller streets. Whilst little research exists on the topic, Lenz and Riehle (2014) highlight that following a pilot initiative undertaken by UPS in five German cities, avoiding the requirement to repeatedly search for a parking space was stated by the firm as a major advantage of the cargo bike over the traditional van.

Schliwa et al (2015) importantly highlight that in order to facilitate a holistic shift towards sustainable city logistics, local authorities should harness the potential of cycle logistics which is best achieved through the encouragement of existing (PCS) providers to integrate cycle logistics in one form or another into their supply chains for the last mile, first mile, last metre and express deliveries. This should be achieved through an active public-private partnership which would include measures such as the provision of cycle friendly infrastructure and pro-active urban governance measures (LEZs, parking enforcement etc). Their research also suggests that congestion charging can have a significant impact on the use of such services.

5.5 Triple Bottom Line

Carter and Easton (2011) highlight the idea of Elkington's triple bottom line, which represents the connection between environmental, social and economic performance. Whilst the first two are generally viewed, from a business perspective, as aspects of Corporate Social Responsibility (CSR), and as such an obligation or responsibility that may compromise economic performance, the triple bottom line approach suggests that companies identify activities that improve economic performance but that avoid social and environmental 'bads', and advocates that two or all three can be pursued

simultaneously. Hence as an example, investment in staff development improves staff morale (social) which leads to lower levels of absenteeism and increased productivity, the combined effect of which more than offset the additional staff development costs (economic). In some respects, this is viewing such costs as an investment in human capital, rather than a short term expense associated with a factor of production. As a basic idea therefore, the 3BL makes a lot of sense, hence rather than purely focus on short term profitability (economic), any company or organisation should concentrate on medium and longer term goals of basic survival and prosperity (social, environmental).

Nevertheless, the whole area of the 3BL was highlighted by Björkland and Johansson (2018) to be considerably underdeveloped in the UCC academic literature, with it receiving very little attention, a facet this review can wholly corroborate. Where it is cited however, the significance of the concept becomes very clear. Morganti and Gonzalez-Feliu (2015) for example highlight the 3BL as a major part of the key strategy document in establishing a successful food hub in Parma. Clearly defining economic, social and environmental goals and a concerted approach to achieving these aims was central to obtaining stakeholder involvement across the full spectrum of those involved. Cowie and Fisken (2019) add the importance of the 3BL approach to obtaining employee buy-in and its direct relevance to corporate social responsibility and how that defines a successful UCC business model.

Several attempts have been made to incorporate all three 3BL elements into various key UCC decisions, such as prime location, efficient pricing system and so on. These normally involve the construction of a fairly detailed conceptual model (e.g. Rao et al 2015, Handoko et al 2016), and have been cited as examples of studies paying more attention to the topic (Björkland and johansson, 2018). In some, if not all, respects however it is difficult to see how such a concept can be satisfactorily 'modelled'. The key ideas behind the 3BL can almost be viewed as selective, in other words, the rationale operator will ultimately only seek to maximise profits, and this will be undertaken in a non-deterministic fashion. Hence in some instances, this will be at the compromise of desirable environmental and social goals, i.e. pure economic profit maximisation, whilst in others this will be where two or all three can be pursued simultaneously, i.e. the 3BL. The two examples cited however involve trade-offs between these goals, hence can be argued to be solely consistent with the idea of economic profit maximisation rather than the 3BL.

The brevity of this whole section on the application of the 3BL to UCC should not be regarded as consistent with its 'importance' in the related literature, even if to date at 'face value' that has been true, but rather an issue that very much underlines the understated nature of the whole concept in this area of research. As highlighted, on-going research on the Surflogh project has tended to find that key issues to 'success' are very much linked to the basic concept. As reported by Cowie and Fisken (2019), the whole idea of sustainable logistics (environmental), the nature of the individuals involved/leading such initiatives (high awareness of social responsibilities) and the basic idea of making such services commercial viable (economic), is a combination of factors that in very rudimentary terms is the basic 3BL. As such, this is a line of inquiry that many researchers in the area should pay far greater attention to.

6.0 Policy

With regards to urban freight issues, policy is a key area, as in virtually all major cities urban freight activities are regulated by the local authority, and normally in the form of constraints, hence provides the backdrop to the whole issue of last mile consolidation. There are also limited cases of more 'positive' measures, and there is a very strong argument that in the current environment, successful business models require a proactive policy. All of these issues are discussed/outlined in this section.

6.1 The Concept of City Logistics

The whole area of last mile deliveries is part of the wider concept 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, touristic, 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) break urban logistics down into three components, city logistics, urban distribution and the last mile. Urban distribution is the operational aspects of how goods can be better distributed in, from and to urban areas. Last mile relates to the final leg of the supply chain, whether that be business to business (B2B) or business to final consumer (B2C), and need not necessarily be a separate stage. City logistics on the other hand focuses 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 et al. (2001) define 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. It could be further implied therefore that the years of a lack of proactive policy intervention would suggest that such a position has already been obtained.

To put the above into perspective, the situation in most locations at present is the free market solution, which given Cowie (2017) argues this is as a consequence of an almost perfectly competitive market, then 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 as discussed above, 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 consolidation of deliveries over the last mile resulted in efficiency improvements in the supply chain, then operators would currently be operating such measures. Ultimately therefore, it indicates that last mile consolidation services are uneconomic, certainly without any form of policy intervention. It would therefore seem that the practice of city logistics, as defined in this review, needs to be far more proactive than it has been to this point. Certainly with regard to the current pilot projects in Surflogh, these are based upon entirely market based commercial operations, and thus in some ways outlines the limits of what can be achieved without such policy intervention.

6.2 'Problem Solving' rather than 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, research conducted by Lindholm [2012] showed that urban freight transport is not a priority in many Swedish cities. Similar results were found by Witkowski and Kiba-Janiak (2014) in a survey in Polish cities with county rights, where in only a minority of cases (38%) were there 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 Binge (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 (Sjostdet, 2007). The authors highlight that the main reason for the 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 issue. A further facet however is that whilst passenger transport is high on the political agenda, this is not the case with freight, a fact that appears to be reflected in the construction of public administration bodies. In study of local authority transport departments, Ruesch and Glucker (2001) found that 25% of the cities included in their study on the Netherlands had no responsible entity for goods transport issues, whilst at 43% Lindholm and Binge (2014) found this to be even higher in Sweden. As regards the former study, the authors found that almost half of the cities studied had less than one part-time staff member employed for that purpose.

The last point is particularly significant, as what it clearly shows is a lack of knowledge and expertise in public bodies with regards to urban freight issues, and the consequence of that is likely to be continuation of the status quo (problem focused, outdated) in the medium to longer term, and hence any measures are likely to be driven by the more general issue of the creation of improved (urban) public spaces.

Not only is there an issue with a general lack of interest in freight policy however; Dablanc (2007) makes the astute observation that this is compounded by local public policies regarding freight that are scarce and out-of-date. At the time of writing, the previous twenty years had seen very little, if any change at all, with the same regulatory measures used for largely the same purposes, and as stated, have been very much about addressing 'problems' rather than attempting to steer or direct what is essentially an key economic activity towards a more balanced and enriching outcome. Put another way, there has been a complete lack of the application of city logistics. As an example of such outdated practices, the author cites the case of several northern European cites (Amsterdam, Copenhagen, Stockholm and Gothenburg) which have implemented lorry access restrictions based on environmental criteria, such as emissions or loading criteria (e.g. fully loaded) rather than weight and size restrictions. The author also finds inconsistencies in the number and variety of rules that are applied to freight vehicles in the urban context, citing the example of a single French metropolitan area (not identified, but presumably Paris) where 30 different rules on truck weight and size were

found to exist. On a similar note, where attempts have been made to integrate freight transport into master transport plans, with specific measures that include optimisation of freight urban delivery, harmonisation of local truck regulations and the provision of on-street bay areas, very few have led to actual implementation due to a combination of budget constraints and a lack of the necessary skills or political authority to implement these types of measures.

The author also laments the lack of the development of the idea of ''urban logistics'', which in the context given is defined as any service provision that contributes to the optimised management of the movement of goods in cities, hence to some extent, city logistics. In terms of policy implementation, such ideas remain scarce, and even the enormous growth of ecommerce has not led to specialized urban logisticians. One may expect the PCS sector to develop to encompass some of these activities, in which the example of DHL and its network of 'packstations' and automated pick up points is highlighted, but while some progress has been made, this has not been along the lines outlined by the author, as in essence such 'developments' remain base level pick-up and delivery services rather than any progress towards whole system optimisation.

In a similar vein, Cherret et al (2012) underline that historically urban authorities have considered freight policy only as a reaction to negative environmental impacts, hence any measures have tended to be aimed at addressing a specific 'problem', rather than be viewed in a wider context. This is mainly because freight transport is generally viewed as an economic good, and hence will self-regulate to produce outcomes that are economically desirable. The authors follow Stathopoulos et al (2012) and classify policies designed to mitigate freight problems into six broad classes. In the context of Surflogh, these are particularly useful to give a regulatory overview, hence are listed as:

- Market based measures that are designed to influence the market price, hence are normally in the form of taxes and subsidies.
- Regulatory measures, hence direct action to prevent certain activities, the most common example being the imposition of time and access restrictions on freight vehicles.
- Land use planning measures, which may be considered as longer term policy actions, where the concentration of commercial activities may improve the efficiency of deliveries.
- Infrastructural measures (direct provision), referred to as public infrastructure by Muñuzuri et al, (2005), which in this context relates to the construction of logistics platforms aimed at consolidating deliveries and collections. To this however could also be added road developments
- Information based, which in practice has seen the piloting of initiatives that are designed to help facilitate the exchange of information between agents, or to support the routing and scheduling of vehicles.
- Management methods, which like a number of the other initiatives are not exclusively policy actions, but rather are aimed at promoting co-operation between operators and other stakeholders and the sharing of best practice. An example would be the DfT's Freight Quality Partnership programmes. These may therefore be better described as facilitatory actions.

The same authors also highlight that public authorities are hampered in policy development by a lack of a system of on-going public data collection regarding urban freight operations (beyond bland traffic counts). This typically results in urban authorities having limited insight into urban freight operating

patterns when attempting to develop suitable strategies and policy measures. It can be further implied that given the fragmented nature of the urban freight market, no one body has such an overview. To some extent however this can be viewed as a chicken and egg issue, as if policy was to be more pro-active, then through the regulatory framework it could implement structures and information systems that would deliver the required data, however in some ways this is just being left to the market. As stated above, this is also compounded by a lack of expertise in public authority bodies.

One issue not directly identified in the literature, but undoubtedly a major factor, is that with a problem focused policy framework, then 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) in Rome, found little support for policies targeted at addressing some of the issues with urban based freight. Under twelve different measures presented, four specifically related to the potential use of UCCs and eco vehicles. In all categories, policy support was less than 50%, and that from the policy maker group, underlining the general lack of interest within this group. Perhaps unsurprisingly, of the three groups, carriers were the least supportive of any of the measures, overall responses ranging from a high of 32% support for incentives to buy an eco-vehicle, to a low of zero percent for a tradable permit system for emissions. Overall support for UCCs was a lowly 13%. As the authors highlight, policies that generated least costs for users were found to be preferred, but as stated, even support for these tended to be very low. It would thus appear that policy acceptability is a real issue. One clear reason for this is that it is difficult, if not impossible, to highlight any positive benefits for the main stakeholders that come with such policy initiatives, as in many respects, what is being traded is economy for quality of life. As highlighted, what it potentially represents however is a barrier to future policy development beyond the 'problem solving' focus.

6.3 Policy In Support of Last Mile Consolidation

Kiba-Janiak (2017) proposes a conceptual description of a city maturity level with regard to freight transport policy with regards to proactive measures to introduce city logistics initiatives into urban transport planning. Maturity refers to the state of readiness to carry out actions in the specified area, and the author highlights these can be broadly broken down into five stages; initial, repeatable, defined, awakening, and finally a state of excellence and continuous improvement. The author goes on to highlight that many policies pursued by local authorities in this area are out dated, primarily due to a lack of knowledge and experience (to which one may add a lack of political will) in this area. Research is then carried out on 12 cities, with detailed definitions (in terms of actions and plans) as to what constitutes the five stages of maturity. Although a small sample, results show a fairly even distribution across the five levels, with the general trend tending to be that older member EU cities tend to show higher levels of maturity. The author concludes by highlighting that in terms of the cities

studied, low cost projects tended to prevail, such as spatial restrictions, loading zones, time restrictions and infrastructure access.

The idea of transport maturity is used by Akgun et al (2019) to present an excellent overview of policy processes and implementation issues surrounding urban freight transport (UFT). In the course of the research, eleven cities across three countries (Sweden, England and Scotland) were examined using documentary evidence and primary interviews. The results suggest that a lack of finance is the biggest issue with regard to being more pro-active in the area of UFT policy, and that this is both due to a lack of budget allocation at the local level and a lack of opportunities to bid for centralised funding at the national level, as any such measures tend to be targetED at reducing car use and promoting active travel.

The lack of financial resources also leads to a lack of the required knowledge and skillS and indeed dedicated UFT personnel, hence this lack of investment in human capital leads to a structural barrier to the development of such policies in the medium to longer terms. Strong links with businesses and operators were perhaps unsurprisingly found to lead to more proactivity by the local authority in UFT policies, but to a large extent there may be a chicken and egg issue here; hence a more UFT proactive authority is more likely to engage with all stakeholders, although in less successful areas the authors found a reluctance by business and operators to engage with the public authority (this was in Scotland). Sweden however had a far more formal and structured (and successful) approach to engagement. The authors then discuss the issue of public acceptability, and admit that this is something with regard to UFT that tends to be very low (it all just happens), but is an issue that needs to be developed. The authors go on to discuss why this is important.

Marcucci and Danielis (2008) highlight that it is politically unfeasible in most countries to directly impose the condition that final goods deliveries have to be channelled through a UCC, although some isolated cases do exist. The issue therefore becomes one of persuasion, and more generally, the range and effectiveness of policy measures that bring about real change. This brings into question the wider issue of the viability of proposed policy measures, and the difficulty of implementing these due to the negative impact these may have on economic growth. It should not be overlooked that the present situation in many cities may currently represent Pareto optimality, in other words, from an economic perspective we have obtained the optimal solution. Therefore, policy in this context may wish to be seen to be attempting to do something about the externalities associated with the current situation, but the reality may be that it is fairly ineffectual and purely satisfying the need for policy to be seen to be doing something.

In terms of the main measures used by public authorities to either support or establish UCC operations, these were categorised into three classes; financial, regulatory and indirect regulatory support by Lebeau et al (2017). Under the first banner of financial support measures, by far the most commonly used were in the form of start-up support. Longer term state support came under the title of ‘structural support’, although the authors found very few direct cases where this had been employed. More prevalent was where authorities offered services/access to assets which reduced operator operating costs, for example loans on favourable terms or the use of public infrastructure at low rents. The final category under the financial banner was interestingly termed ‘no financial support’, also referred to as the ‘German model’ of UCCs. In this case, direct financial support was

given, but in many cases funding was received for the monitoring and evaluation of the schemes. Thus funds were given for measurements, meetings and reports, and hence in some ways could be considered to be an ancillary funding mechanism, thereby indirectly supporting financial viability.

Direct regulatory support was where the UCC is given favourable regulatory terms over competing operators. Examples would be where the use of a UCC by carriers is deemed 'compulsory', or where a licencing system is put in place which enables carriers to make deliveries within a certain urban zone. Such schemes however tend to be very uncommon, with participation of carriers normally on a voluntary basis, and presumably with no quantitative licencing, i.e. a limit set on the number of licenses issued, but rather if carriers meet set criteria, a license will be issued. Although not stated, one reason is that they may be very difficult, if not impossible, to enforce a quantitative licencing regime, hence rendering any such measure ineffective. Restrictive licencing was piloted in the Netherlands, and one other case was found in Parma as part of the C-LIEGE project. In both pilots, unlicensed transporters were required to leave the last mile delivery to licenced operators, namely a UCC. One major problem with this type of measure is that it has been argued it gives a monopoly to licenced carriers (van Duin et al, 2010). Finally, favourable measures to the UCC have tended to provide a far more popular form of intervention than the first two highlighted. These occur where the UCC is granted exemptions or extensions to local urban traffic regulations, such as delivery time windows, or the use of priority lanes normally used by public transport, hence increasing the speed and reliability of the UCC's deliveries.

What the authors consider 'indirect regulatory support', relates to local traffic regulations that apply to all local traffic, but by their nature give an advantage to UCC type operation. Whilst at times there is a fine line between some of these measures and those already discussed, the key is that all modes are treated 'equally'. Hence six measures are listed, specifically time windows, weight restrictions, size restrictions, EURO norms, age of the vehicles and urban toll. Thus rather than UCCs having extended time delivery windows, the imposition of a delivery window 'encourages' carriers to deliver to a UCC, as at the time of arrival the delivery window may be closed. UCCs then consolidate loads throughout the day, and delivery when the window opens. 'Consolidation' therefore refers to both time and space. Weight and size restrictions can ban heavier/larger trucks, thus requiring the breaking of loads, emissions/age are fairly obvious, and an urban toll, rather than exempting UCCs, would encourage transporters to drop consignments at a UCC located outside of the charge zone, to then be consolidated with other consignments; the toll per unit delivered is therefore reduced. All of these measures are attempts at changing the economics of last mile delivery.

6.4 Identification of influential regulatory measures and who to target

Whilst most research on policy effects has been focused on carriers, Stathopoulos et al (2010) highlight there are few studies examining the possible reactions to policy initiatives from the receivers of goods, and hence little is known in this area. What they do suggest is that it is difficult to find appropriate policy instruments to effectively influence the behaviour of retailers. One of the reasons is that research by Akgun et al. (2019) suggests that deliveries are simply a consequence of being in the retail business, and whilst not viewed as straightforward, are far from seen as problematic. As a consequence, policy would have to impose fairly draconian measures to change that situation, and whether this would be desirable from a wider economic perspective is open to debate.

Some research on receivers (along with carriers) was carried out by Marcucci and Danelis (2008). Interestingly, their tentative results suggest that the packages of policies that may increase retailers' use of UCCs, are quite different from those that would influence the transport carrier. Whilst the former were more influenced by cost, the latter tended to focus on transport efficiency. The authors highlight that this is probably because any cost increases could to some extent be directly passed on to the retailer (assuming demand was relatively inelastic), however transport efficiency results in improved vehicle utilisation and lower costs to the transport operator. This would imply that there is no one package of measures that would encourage all stakeholders consistently in the use of UCC, and hence what would be required would be a range of measures, and in turn a fairly extensive policy portfolio. That said, and whilst an interesting piece of research, it perhaps has to be questioned how significant such a division of stakeholders is in practical terms, as such a division could be viewed as purely artificial as it ignores the interdependence between the two stakeholder groups. Hence, if a carrier is 'forced/persuaded' to use a UCC, then so too are retailers, and vice versa.

Holguín-Veras and Sánchez-Díaz, I. (2015) in an empirical study of alternative carrier centred (transport operator) and receiver centred (retailers) policies found that policies targeted at carriers aimed at influencing receivers to change behaviour are not likely to be effective; but, conversely, receiver-centered policies, if adopted by the receiver, lead to behavioural change on the part of the carrier. Their basic argument is that in such a situation the relative weak position of the carrier prevents them from forcing shippers or receivers to change behaviour, however the retailer will not hesitate to use their relatively strong position to impose their will on carriers. Whilst not stated, this suggests that consumer sovereignty is present in the urban freight market. The argument is based around the idea that where a charge may be imposed, few operators feel they can pass the additional toll costs on to the receivers. As a consequence, receivers are not given any price signals which may induce a change of behaviour. It could be argued however that such a situation arises because of the highly competitive nature of the freight transport market, and hence 'power' in this case was more by default than present in reality. It could also be argued that this incorrectly specifies the buyer-seller relationship. It is not the retailer who employs the carrier, but rather the shipper, hence the carrier is accountable to the shipper, not the retailer.

The findings of Holguín-Veras and Sánchez-Díaz (2015) however are supported by the observations of Dablanc (2007), who states that truck drivers will always follow what the parcels' receiver wants. From her own experiences, the author notes that where measures such as rescheduling a delivery round, increasing delivery prices, decreasing the number of deliveries made to the same shop every week may appear quite reasonable when fuel prices go up or traffic congestion worsens, the reality is that such actions are extremely uncommon. In most cases, the associated cost increases are absorbed by the carrier, in the short term at least.

6.5 Legal and other barriers to implementation

Based on research on an initiative that sought to implement a UCC demonstration project in the Norwegian capital Oslo, Nordtømme et al (2015) highlight a number of legal barriers towards the actual implantation of such measures, which in their case, even included one that was publicly initiated in pursuit of improving the city environment. Such barriers tended to compromise policy

supportive measures of the UCC. Hence the banning of vehicles above 3.5t from the city centre required not only the implementation of the regulation, but also a change in the legislation in order to create the required street signs, as such signage for access restrictions did not exist under Norwegian law. Further legal barriers emerged in pursuit of a critical mass, when it was proposed that all public offices should receive their deliveries from the UCC. Despite a supportive contractor, city procurement refused to alter the existing contract, as this essentially was governed by EU rules on public procurement. As such, the whole initiative floundered, with the main barriers found to be related to financial concerns (of the initiatives sponsors) and stakeholder acceptability/buy-in. Further barriers related to institutional, practical and legal issues. In some senses, what the case shows is that the establishment of such initiatives are not as straightforward as may be initially foreseen, as what it may require is changes in areas that seem far removed from the initial proposal. That in itself can present a major institutional barrier.

Kiba-Janiak (2017b) through a combination of Delphi survey and direct questionnaires to local authority departments, found that the most important opportunities for cities with regards to the implementation of city logistics measures, are stakeholders' willingness for cooperation, as well as a good and long cooperation with them. The authors highlight that what this underlines is that local authorities, even though they are one of the most significant city logistics' stakeholders, cannot successfully implement measures without a high degree of cooperation with other stakeholders. What this may tend to suggest therefore, is that a proactive policy requires a high degree of consensus amongst stakeholders in order to be successful. In turn, this may suggest that with the exception of isolated cases, this will tend to lead to conservative policies in this area.

Gammelgaard (2015) provides an excellent introduction into the key issues behind the need to improve city logistics, and highlights the problem of the co-ordination of often conflicting stakeholders as a significant barrier to bringing about any real change. The author's central proposition is that progress toward city logistics not only requires stakeholder collaboration/co-ordination, but also a profound understanding of how the change processes toward the desired state unfolds over time. This is a key issue already evidenced in the work of Morganti and Gonzalez-Feliu (2015) with regard to the (successful) establishment of a food hub in Parma. Four process theories of organisational development and change are outlined by the author, and then applied to city logistics. The first, 'life cycle', is where city logistics are regulated by the municipality (a single organisation), and hence change occurs where new solutions outpace existing ones, hence we move from one life cycle to another. Under 'evolution', several models of city logistics exist, and the ones that adapt the best survive by natural selection. From a 'dialectic' perspective, various independent organisations collide into conflict, which is resolved by synthesis, i.e. a solution that captures the best of the diverging positions. Lastly, 'teleology', that is where an action has a purpose, but where dissatisfaction with the current situation, e.g. too many vans, leads to new solutions being sought and decided upon by management. Viewing these perspectives very critically, some may be questionable in the context of city logistics. For example, the idea of 'evolution' is clearly the market solution, whilst the 'life cycle' and 'teleology' could be argued to be different stages of the policy solution. 'Dialectic' on the other hand may be very unlikely to be found to exist in the city logistics context. The process of change is then examined with regard to the establishment of a UCC in Copenhagen (Citylogistik-kbh) and the author outlines how various stages, in terms of the four listed, were encountered and

resolved. Perhaps one limitation of this research is that whilst it is very insightful into the issues behind establishing a UCC initiative, ultimately the initiative failed fairly spectacularly, and hence the key issue of the factors behind the establishment of a *successful* UCC remain unanswered. To make clear, whilst various barriers may have been overcome in the process of establishment, the net outcome would suggest that unsatisfactory compromises were reached rather than real working solutions. What it does highlight however is a possible tendency to overly focus on internal issues and processes rather than real world engagement.

In a case study surrounding the failure to implement a UCC in Oslo as part of a wider initiative, Nordromme et al (2015) identified the main barriers that occurred under the headings of financial and practical barriers (a UCC requires an investment and no private operator motivated to take the economic risk); social and cultural barriers, which referred to resistance to change from stakeholders with investments in current systems, which was underpinned by a scepticism re the necessity for a UCC, where in their opinion the goods they carried were already optimally consolidated; institutional barriers which surround problems of co-ordination between the different authoritative bodies and levels, which is almost getting into Coase theorem; and finally legal barriers, where authorities were not legally empowered to undertake some of the actions required to establish a UCC, such as road signage.

7.0 Partnership Working

The influence of policy and more generally the importance of stakeholder engagement leads into the issue of collaboration between the public and private sectors, as in order to be effective policy needs to engage the private sector and gain public acceptability in order to produce the desired outcomes.

7.1 Forms of public-private partnerships

Given a backdrop of a failure to implement commercially viable UCCs, then along with policy initiatives, a far more co-operative framework of some form between the public and private sectors is clearly required. Taniguchi (2014), citing Browne et al, (2004), highlights that public-private partnerships are a core element for achieving such outcomes, i.e. pro-active city logistics. In the past, there has been a clear division between the publicly led transport planning function, and privately driven urban freight operations, with the combination of the two not always producing desirable outcomes. As the author highlights, public-private partnerships allow all stakeholders to take part in developing urban freight transport plans from the initial stages, and also the sharing of data between private companies and the public sector. This could lead to a better all-round understanding of the situation with regards to goods distribution and its related problems.

Nevertheless, a key issue in all of this debate is what would actually constitute a 'partnership', what characteristics clearly define such an association, and could the same outcomes be achieved through lesser forms of collaboration? There is a strong argument that any form of 'formal' collaboration should be one that has clear aims and objectives. As Lindholm and Browne (2012) highlight however, there are many unanswered questions about PPPs in urban freight transport, as there have been very few studies of the dynamics of 'partnership' working surrounding ground level initiatives. Furthermore, what actually constitutes a partnership can be lost in translation in different legal

contexts. During the course of their own research, they encountered several terms used to describe similar activities, broadly summarised under five headings:

- Public Private Partnership - which was generally used in a wider context
- Freight Charter - which related to a specific contract with obligations between stakeholders
- Freight Quality Partnership - was a forum with specific relevance to freight,
- Local Freight Network - which related to a local context,
- Peer to Peer exchange - which involved the exchange of information between two individuals or groups of stakeholders.

In some senses, these should be considered to be differing shades of grey that have a high degree of cross over rather than a clear hierarchical structure based on the extensiveness of collaboration. As a consequence, from these general definitions the authors developed the idea of a 'narrow' PPP as one where the private sector is involved in a specific public project, and a 'broader' PPP where the public sector intervenes in private practices and operations. The latter would also encompass the functions of consultation and dialogue in the public decision making process.

Not all partnership forms however need be 'public-private'. Browne et al (2016) for example highlight a particular public-private partnership initiative that may be better described as 'private-public', and such bodies have met with some success in addressing issues around urban freight issues. The specific example given is Business Improvement Districts (BIDs). These are general interest bodies, where local businesses have voted to collectively invest (funded by a local tax) in improving the surrounding environment. As this involves the improvement of public space, this inevitably has meant working closely with the relevant public bodies, specifically in this case local councils, Transport for London and the Metropolitan Police. Of the five BIDs reviewed however it is difficult to isolate the real impact of the BID, as in several cases the prime driver appears to have been one of the major land owners, specifically the Crown Estate. It does nevertheless suggest there is a role to play for private-public partnerships, and that the main instigator of any action need not always be the public sector.

Schliwa et al (2015) suggest a form of public-private partnership that requires a more 'pro-active' position to be taken by the public body with reference to policy, hence rather than facilitate such measures, clear action is taken. What they suggest is that this would include a combination of measures that would on the one hand encourage sustainable modes and delivery systems, whilst on the other attempt to limit private vehicle use through measures such as LEZs and strict parking and loading enforcement. Their research also suggests that congestion charging can have a significant impact on freight modal choice. In many respects, this would be a similar idea to the provision of bus quality partnerships that exist in most if not all British cities, where the local authority enhances the infrastructure and the (private) operator invests in the bus fleet. In contrast to most forms of public-partnerships that have to date operated in the sector (where the public body acts as underwriter and contractor of the UCC facility), this approach is particularly appealing, as it clearly defines roles and responsibilities, is strongly focused on the key idea of city logistics, and in order to be successful, underlines the idea of true 'partnership' working. As such, this would also be consistent with a bottom up approach.

Nevertheless, when reviewing the related literature, without a major paradigm shift, it is difficult to see how any form of 'real' PPP could be applied to the general issue of city logistics, other than in the form of a forum or a specific project, such as a UCC. In many cases therefore, there is no movement away from the overall framework where the local authority regulates (generally through limitation) the private road freight sector in its respective area (Lindholm and Browne, 2012).

7.2 Successful Partnership Working

In examining the literature, it is actually quite difficult to establish or even define what constitutes 'successful' partnership working or the key factors that bring it about. Almost all authors agree that in order for the issues surrounding urban freight to be addressed, then some form of co-operation between the relevant stakeholders is required (and at a very early stage), with unsurprisingly the two key actors being the local authority in the role of the transport planner and regulator, and the private sector in the role of the transport operator. What actually constitutes 'success' however appears elusive, although Lindholm and Browne (2013) highlight the case of the Committee of Distribution Affairs in Utrecht. This is a formal advisory committee which has had a direct influence on plans, policies and an air quality action plan. As confirmatory evidence, the authors also found that in order to attract private businesses to participate, meeting agendas needed to include plans for action and change, hence represent some clear remit or programme for action. 'Success' therefore can perhaps be defined where partnership working results in the drawing up, and hence commitment too, some formal document that has actions that lead to the introduction of some form of city logistics into the area. Nevertheless, success can be defined more loosely. Allen et al (2010) (cited in Lindholm and Browne, 2013) state that the establishment of FQPs in Britain has resulted in improved partnership between the public and private sectors, but the form or substance of that improvement is not specified. Their research however also suggests that the biggest challenge facing such partnerships is to maintain the interest and focus of members. It may be implied therefore, that in order to be maintained, such organisations need to be seen to be achieving some purpose, hence the continued existence of these organisations may in itself be seen as a measure of success. This is generally confirmed by Lindholm and Browne (2013), who note that outputs and achievements are a way to support the work of the partnerships and hence encourages continued attendance. The authors go on to put forward a strong argument that just because it becomes a talk shop, due for example to limited resources, this may be no bad thing.

Dablanc (2007) highlights that in some situations, what constitutes successful 'partnership working' can be a developmental process. The author cites the case of London, where the two largest carrier representative bodies, the Freight Transport Association and the Road Haulage Association, through various forums discussed the practical details of delivery organization with Transport for London. Through such actions, these forums become genuine negotiations which resulted in compromise being made on either side, and hence what emerged was some form of optimal resolution.

One important facet that comes out of the work of Gammelgaard (2015), is that whilst there may be 'success' in gaining support in establishing a common urban freight initiative, this can change when the realities of actually operating it begin to emerge. In the author's own case, the establishment of a UCC initiative in Copenhagen arose out of a common consent over the 'killer truck' debate and a clear need for change. This was then taken forward by the public body, but the process of bringing

about change encountered considerable resistance through groupthink and parochial self-interest which prevented the seeking of new solutions. Whilst the UCC was established (very much as a result of a top down approach), ultimately the whole initiative collapsed due to a lack of buy-in, i.e. there was no partnership working.

Despite numerous studies, knowledge of successful collaboration in city logistics remains limited (Martinsen et al., 2012), due to the fact that few studies have considered stakeholder relationships, let alone examined them (Martinsen et al., 2012; Taniguchi and Tamagawa, 2005). As Björklund and Gustafsson (2015) add, this is despite the existence of a large number of freight consolidation initiatives. In many senses this is also strongly evidenced in this whole review, where most research centres upon specific initiatives, but little analysis examines the underlying factors that make these successful. Thus whilst the literature finds partnership working key to the success of last mile consolidation initiatives, little research exists on the deeper underlying aspects that lead to such outcomes, i.e. successful partnerships. One valid attempt is put forward by Quak et al (2016), who introduce the idea of shared situational awareness (Kurapati et al, 2012) to the urban freight context, and added to that the idea of Joint Production Knowledge (JPK). As the authors note, the issues surrounding urban freight involve many actors, vehicle technologies, ICT applications, regulation, user practices and markets. This complicates the decision making process as it involves a high number of interactions. It therefore becomes impossible for one actor to understand the situation in its entirety, as it becomes difficult or impossible to appreciate other perspectives of that same situation. As a consequence, this results in low levels of shared situational awareness. JPK on the other hand "implies that scientists, policymakers, and sometimes other societal actors cooperate in the exchange, production and application of knowledge", and participation in this process results in collaborative action to make a transition in the system. The existence of JPK therefore would be a clear indicator of successful partnership working, and when taken together, raised levels of SSA increase the possibilities of bringing about change, and JKP is the mechanism through which that change is made possible.

Whilst the above argument has much validity, in some ways it lacks real conviction, and the authors themselves recognise that in practice the role of JKP has been limited to sharing rather than creating knowledge and hence difficult to translate into actual change. An economist would point to Coase theorem, which relates to situations where in order to obtain economic efficiency where externalities are present in a multi actor environment, the barrier to any resolution is the very high transaction costs that would be incurred in bringing change about. This should act as a strong motivator to consider other institutional arrangements that could identify alternatives that would come closest to the unattainable outcome of zero transaction costs and thereby achieve an economically efficient outcome. Both views have considerable merit in explaining successful partnership working, the idea of a raised awareness of SSA produces the incentive to reduce transaction costs (i.e. form partnerships) in order to create JKP that leads to economically efficient outcomes.

Through this kind of analysis, maybe some form of identification of the deeper underlying issues that lead to successful partnership working can be gained, rather than simply research by individual example, which appears to have been very common in this whole subject area.

On the issue of successful partnerships, one factor that appears to have been completely absent in the research undertaken is the idea of real political will for change, and the role that this plays in partnership working. Any change requires collaboration between the public and private sectors, but whilst entirely judgemental, in order to be successful it is heavily dependent upon an underlying 'real' political will; hence rather than satisfying the need to be seen to be taking action, any policy initiative sets out to bring about real change. In many respects, such action could be considered to be one of radical policy change, hence rather than tinker with the current urban freight system, policy that brings about major change is implemented. Such an example already exists with the introduction of the congestion charge in London in 2003, from which Richardson et al (2004) identified 5 key criteria, subsequently referred to as the Livingstone Criteria, required to bring about a major policy paradigm shift, these being:

1. The problem is so obvious that there's widespread societal will for a change.
2. A strong political leadership who can connect the problem ("something needs to be done") with the solution (a radical policy change).
3. A regional (neither local nor central) and powerful layer of government which is best placed to design and implement a strategic transport policy.
4. A central government that enables the necessary legislation.
5. A clearly motivated technical team capable of executing the political leader's vision.

Whilst some of these criteria are present in the literature, on the whole and certainly collectively they are notable for their absence, particularly the first, second and fifth, and this is a key idea that will be taken forward in the Surflogh project.

7.3 Private-Private Partnerships

Although considerable research has examined public private partnerships, very little centres on private-private partnerships, and in some senses this is key when viewed in line with the main ideas behind a bottom up approach. Montoya-Torres et al (2017) present a very good case against horizontal private-private partnerships, and why any reliance on such an approach is likely to never materialise. Calibrating their model using real data from three chains of delivery stores in central Bogota, what their results show is that through a collaborative delivery network, overall saving in terms of (delivery) time is in the order of 26%. Examination of the underlying assumptions however, would suggest that this should be considered to be a highly optimistic figure. Importantly, what the authors note is that the benefits from collaboration are unevenly distributed amongst the collaborating parties, with one of the companies (E), only producing time savings in the order of 6%. It is highly questionable if this would be a sufficient saving to cover the added transaction costs, the need for an extra handling and the requirement for the reposition of goods (all of which are not included in the model). It is therefore highly unlikely that company E would participate in the collaboration, even ignoring the fact that its collaborators, i.e. its main rivals, are gaining higher rewards from the combined venture. Whilst not explored, the overall benefits once E is removed are likely to substantially decline and encounter the same issues as the previous (full) collaboration scenario. In other words, horizontal private-private partnerships will never be formed, such a

'solution' to urban freight issues simply does not exist due to the uneven distribution of the benefits and the transaction costs involved.

More success may be achieved with some form of vertical private-private partnerships. Schliwa et al (2015) in a study centred around in-depth case studies of three cycle logistics providers, find that key to the success in each case is a business that is built on strong partnerships with existing PCS providers, with in one case 60% of all revenue came from one courier. Cowie and Fisken (2019) found similar outcomes based on a case study of cycle logistics operator Zedify Glasgow, where the success of the business was highly dependent upon providing complementary services to an existing PCS provider, which resulted in cost savings for the prime contractor.

8.0 Conclusions, Discussion and Research Implications

8.1 Key findings and assessment of strength of evidence

Before the main conclusions are discussed from undertaking the literature review, below are listed key findings that have emerged from the literature along with an assessment as to the strength of the evidence for each finding.

Freight transport policy has historically and continues to be 'problem focused'.	**Strong**
The current body of literature fails to recognise segmentation in urban freight deliveries and hence has overlooked the idea of the paradox of the UCC.	**Strong**
Business models for UCCs have clearly been identified in the research.	**Weak**
The need to establish a critical mass for UCC services is well recognised in the literature	**Strong**
Very little research has examined the underlying economics of the urban freight market, and ultimately this is the main driving force.	**Strong**
Bottom up rather than top down approaches to the establishment of a UCC are more likely to succeed.	**Medium**
The provision of ancillary services is continually highlighted as a major advantage of UCCs, however there is very little empirical evidence to validate such claims.	**Strong**
Research by singular example is a common approach used, but this tends to be distractive, as these should generally be considered to be the exception rather than the rule. What is required is a deeper understanding of the underlying factors behind such examples, not simply the example.	**Strong**
There exists an academic bias in favour of last mile consolidation and this is tending to distract from identifying key issues to successful commercial operation of such initiatives.	**Medium**
There exists a high level of stagnation in the published research, with much of the 'findings' constituting variations of key factors identified in Browne et al, 2005	**Strong**

8.2 Overriding conclusions

The overriding conclusion from the literature review is that as a commercial enterprise, urban consolidation centres are most likely to be heavy loss makers. The literature documents an endless stream of UCC initiatives that have almost all terminated once public funding has ceased. What is slightly concerning, is that despite the large number of initiatives and the large body of associated research, the actual reasons for this remain largely unclear. This is best summarised by Björklund et al (2017), who state that few researchers have actually provided profound insights into the design of viable business models for UCC success.

A critical view of why this may be the case is that many studies appear to avoid attempting to gain an understanding of the fundamental issues behind urban freight deliveries. To some extent this is related to the research methods that have been used, with an over reliance on quantitative studies, which by their very nature are limited in scope, and very few employing qualitative approaches that may produce such insights. A second factor is that it may be argued that in many senses what is being researched is a 'solution', where the reality may be that what this actually represents is a solution

looking for a problem. To put more specifically, what is actually required from the research is a better understanding of the characteristics of the urban freight market, in doing so this would then identify the reasons behind the commercial failure of UCC initiatives.

If the market cannot sustain such supply chains, then a second closely related conclusion would be that commercial viability can only be induced through policy driven regulatory measures. The interaction between policy and commercial viability therefore becomes critical, and the only way this should be achieved is through active city logistics. A major barrier to that however, is a real lack of relevant knowledge, experience and expertise in the public sector.

A third main conclusion is that the whole research area appears to have stagnated, with many of the papers reviewed providing very little real insights. Whilst the review set out to include 60 academic papers, the reality was that beyond around 25, with some notable exceptions, very few further insights were gained, much of the ground that was covered was simply repeating the work of Browne et al (2005). This is strongly related to the research a 'solution' issue highlighted above. Until the real underlying issue is studied, research in the area will continue to stagnate.

This does nevertheless provide Surflogh with ample research opportunities, with the main areas listed in the next section.

8.3 Research Implications for SURFLOGH

Despite the highly critical nature of the previous section, significant insights have been gained from undertaking the literature review, and from this has been constructed a strong knowledge base from which to draw upon as the Surflogh project progresses. Simultaneously, arising out of the exercise are also key areas where the review has found a lack of knowledge, specifically:

- Bottom up v top down approaches to urban freight hubs
- Vertical private-private partnerships
- Practical application of Elvington's triple bottom line
- Political will for change as evidenced by Livingstone's criteria for radical policy change
- Active city logistics in the form of clear role definition based on areas of expertise

These are the key areas that the research element of the Surflogh project will seek to build upon

9.0 References

Akgün, E. Z., Monios, J., Rye, T., & Fonzone, A. (2019). Influences on urban freight transport policy choice by local authorities. *Transport Policy*, 75, 88–98. https://doi.org/10.1016/j.tranpol.2019.01.009

Allen, J., Tanner, G., Browne, M., Jones, P. (2000). *A Framework for Considering Policies to Encourage Sustainable Urban Freight Traffic and Goods/Service Flows – Summary Report*. University of Westminster, London. (http:// home.wmin.ac.uk/transport/projects/u-d-summ.htm, last accessed 1st September 2019).

Allen, J., Browne, M., Piotrowska, M. and Woodburn, A. (2010). Freight Quality Partnerships in the UK - an analysis of their work and achievements. In *Green Logistics project* (Ed.). London, UK: Transport Studies Group, University of Westminster.

Ambrosini, C., and J. L. Routhier (2004). Objectives, methods and results of surveys carried out in the field of urban freight transport: an international comparison. *Transport Reviews*, 24 (1), 57 – 77..

Arvidsson, N. (2013). The Milk Run Revisited: A Load Factor Paradox with Economic and Environmental Implications for Urban Freight Transport, *Transportation Research Part A: Policy and Practice*, 51(1), 56–62. DOI: 10.1016/j.tra.2013.04.001

Arvidsson, N and A. Pazirandeh (2017). An Ex Ante Evaluation of Mobile Depots in Cities: A Sustainability Perspective. *International Journal of Sustainable Transportation*, 11(8), pp. 623 – 632.

Bakos, A., K. Böna and S. Foltin, S. (2012). The development of a complex city logistics cost model according to a multiple-stage gateway concept. *Periodica Polytechnica Transportation Engineering*, 40(1), 17.

Benjelloun, A., Crainic, T. G., & Bigras, Y. (2010). Towards a taxonomy of City Logistics projects. In *Procedia - Social and Behavioral Sciences* (Vol. 2, pp. 6217–6228). https://doi.org/10.1016/j.sbspro.2010.04.032

Björklund, M., Abrahamsson, M., & Johansson, H. (2017). Critical factors for viable business models for urban consolidation centres. *Research in Transportation Economics*, 64, 36–47. https://doi.org/10.1016/j.retrec.2017.09.009

Björklund, M., & Johansson, H. (2018). Urban consolidation centre – a literature review, categorisation, and a future research agenda. *International Journal of Physical Distribution and Logistics Management*, 48(8), 745–764. https://doi.org/10.1108/IJPDLM-01-2017-0050

Björklund, M., & Gustafsson, S. (2015). Toward sustainability with the coordinated freight distribution of municipal goods. *Journal of Cleaner Production*, 98, 194–204. https://doi.org/10.1016/j.jclepro.2014.10.043

Browne, M., Allen, J., 1998. Strategies to reduce the use of energy by road freight transport in cities. *Transport Logistics*, 1, 195 – 209.

Browne, M. and J. Allen (1999) The impact of sustainability policies on urban freight transport and logistics systems. In: Meermans H, Van de Voorde E, Winkelmans W (eds) *8th World Conference on Transport Research (WCTR): Volume 1 Transport Modes and Systems*. Antwerp: Elsevier.

Browne, M., Nemoto, T., Visser, J. and Whiteing, T. (2004). Urban freight movements and public-private partnerships, In *Logistics Systems for Sustainable Cities*, E. Taniguchi and R.G. Thompson, (Eds.), Elsevier, Oxford, 17-35.

Browne, M., Sweet, M., Woodburn, A., & Allen, J. (2005). *Urban Freight Consolidation Centres Final Report*. London: University of Westminster.

Browne, M., Allen, J., & Alexander, P. (2016). Business Improvement Districts in Urban Freight Sustainability Initiatives: A Case Study Approach. *Transportation Research Procedia*, 12(June 2015), 450–460. https://doi.org/10.1016/j.trpro.2016.02.079

Cardenas, I., Borbon-Galvez, Y., Verlinden, T., Van de Voorde, E., Vanelslander, T., & Dewulf, W. (2017). City logistics, urban goods distribution and last mile delivery and collection. *Competition and Regulation in Network Industries*, 18(1–2), 22–43. https://doi.org/10.1177/1783591717736505

Carter, C. R., & Easton, P. L. (2011). Sustainable supply chain management: Evolution and future directions. *International Journal of Physical Distribution and Logistics Management*, 41(1), 46–62. https://doi.org/10.1108/09600031111101420

Cherrett, T., Allen, J., Mcleod, F., Maynard, S., Hickford, A., & Browne, M. (2012). Understanding urban freight activity – key issues for freight planning. *Journal of Transport Geography*, 24, 22–32. https://doi.org/10.1016/j.jtrangeo.2012.05.008

Cowie, J. (2017). Competition and complementary in road haulage. In Cowie, J. and S. Ison (eds), *The Routledge Handbook of Transport Economics*. Aldershot: Routledge

Cowie, J., & Fisken, K. (2019). Delivering on Sustainable Logistics by thinking inside the Box – a case study of a successful business model. Paper presented at the Scottish Transport and Applications Research (STAR) Conference, Glasgow Caledonian University, Glasgow, 23rd May.

Crowther, M.A. and Cook, D. J. (2007), Trials and tribulations of systematic reviews and meta analyses, *American Society of Hematology Education Program 2007*, 1, pp. 493 – 497.

Dablanc, L. (2007). Goods transport in large European cities: Difficult to organize, difficult to modernize. *Transportation Research Part A: Policy and Practice*, 41(3), 280–285. https://doi.org/10.1016/j.tra.2006.05.005

Elvington, J. (1999). *Cannibals with Forks: The triple bottom line of 21st Century business*. London: Capstone

Faccio, M., & Gamberi, M. (2015). New city logistics paradigm: From the "Last Mile" to the "Last 50 Miles" sustainable distribution. *Sustainability*, 7(11), 14873–14894. https://doi.org/10.3390/su71114873

Gammelgaard, B. (2015). The emergence of city logistics:The case of Copenhagen's Citylogistik-kbh. *International Journal of Physical Distribution and Logistics Management*, 45(4), 333–351. https://doi.org/10.1108/IJPDLM-12-2014-0291

Gassmann, O., K. Frankenberger and M. Csik (2014). *The Business Model Navigator: 55 Models That Will Revolutionise Your Business*. London: FT Publishing International.

Handoko, S. D., Lau, H. C., & Cheng, S. F. (2016). Achieving Economic and Environmental Sustainabilities in Urban Consolidation Center With Bicriteria Auction. *IEEE Transactions on Automation Science and Engineering*, 13(4), 1471–1479. https://doi.org/10.1109/TASE.2016.2563459

Hicks, S.K., 1977. Urban freight. In: Hensher, D. (Ed.), *Urban Transport Economics*. Cambridge University Press, Cambridge, pp. 100–130.

Holguín-Veras, J., & Sánchez-Díaz, I. (2016). Freight Demand Management and the Potential of Receiver-Led Consolidation programs. *Transportation Research Part A: Policy and Practice*, 84, 109–130. https://doi.org/10.1016/j.tra.2015.06.013

Horwood, E.M., 1958. *A Comparative Spatial Analysis of Urban Freeway Systems*. University of Washington Press, Seattle.

Jaller, M., J. Holguin-Veras and S. Hodge (2013). Parking in the city: challenges for freight traffic. *Transportation Research Record*, 2379, pp. 46 – 56.

Janjevic, M., & Ndiaye, A. (2017). Investigating the financial viability of urban consolidation centre projects. *Research in Transportation Business and Management*, 24, 101–113. https://doi.org/10.1016/j.rtbm.2017.05.001.

Johansson, H., & Björklund, M. (2017). Urban consolidation centres: retail stores' demands for UCC services. *International Journal of Physical Distribution and Logistics Management*, 47(7), 646–662. https://doi.org/10.1108/IJPDLM-02-2017-0114.

Kiba-Janiak, M. (2017). Urban freight transport in city strategic planning. *Research in Transportation Business and Management*, 24(October 2016), 4–16. https://doi.org/10.1016/j.rtbm.2017.05.003

Kiba-Janiak, M. (2017b). Opportunities and threats for city logistics development from a local authority perspective. *Journal of Economics and Management*, 28, 23–39. https://doi.org/10.22367/jem.2017.28.02

Koehler, U. (2004). New ideas for the city-logistics project in Kassel. In Taniguchi, E. and R. Thompson (eds), *Logistics systems for sustainable cities*, 321 – 332. Amsterdam: Elsevier.

Kurapati, S., G. Kolfschoten, A. Verbraeck, H. Drachsler, M. Specht, F. Brazier (2012) A Theoretical Framework for Shared Situational Awareness in Sociotechnical Systems In: Proceedings of the 2nd Workshop on Awareness and Reflection in Technology-Enhanced Learning. In conjunction with the 7th European Conference on Technology Enhanced Learning: 21st Century Learning for 21st Century Skills pp. 47- 53. ISSN 1613-0073

Lebeau, P., Verlinde, S., Macharis, C., & Van Mierlo, J. (2017). How can authorities support urban consolidation centres? A review of the accompanying measures. *Journal of Urbanism*, 10(4), 468–486. https://doi.org/10.1080/17549175.2017.1310747

Lenz, B., & Riehle, E. (2014). Bikes for Urban Freight? *Transportation Research Record: Journal of the Transportation Research Board*, 2379(1), 39–45. https://doi.org/10.3141/2379-05

Lindholm, M. (2012). Enabling Sustainable Development of Urban Freight from a Local Authority Perspective. PhD thesis. Department of Technology Manage- ment and Economics. Chalmes University of Technology, Gothenburg. Sweden.

Lindholm, M., & Browne, M. (2013). Local authority cooperation with urban freight stakeholders: A comparison of partnership approaches. *European Journal of Transport and Infrastructure Research*, 13(1), 20–38.

Lindholm, M. E., & Blinge, M. (2014). Assessing knowledge and awareness of the sustainable urban freight transport among Swedish local authority policy planners. *Transport Policy*, 32, pp. 124–131. https://doi.org/10.1016/j.tranpol.2014.01.004

Maes, J., & Vanelslander, T. (2012). The Use of Bicycle Messengers in the Logistics Chain, Concepts Further Revised. *Procedia - Social and Behavioral Sciences*, 39, 409–423. https://doi.org/10.1016/j.sbspro.2012.03.118

Marcucci, E., & Danielis, R. (2008). The potential demand for a urban freight consolidation centre. *Transportation*, 35(2), 269–284. https://doi.org/10.1007/s11116-007-9147-3

Martinsen, U., Björklund, M., Huge Brodin, M. (2012). The importance of stakeholder relationships in city logistics projects. In: Conference Proceeding at the NoFoMa Conference, Finland.

Monson, J., Chiu, J., & Cooley, J. (1968). The Effect of Separation of Ownership and Control on the Performance of the Large Firm. *The Quarterly Journal of Economics*, 82(3), pp. 435–451.

Montoya-Torres, J. R., Muñoz-Villamizar, A., & Vega-Mejía, C. A. (2016). On the impact of collaborative strategies for goods delivery in city logistics. *Production Planning and Control*, 27(6), 443–455. https://doi.org/10.1080/09537287.2016.1147092

Morganti, E., & Gonzalez-Feliu, J. (2015). City logistics for perishable products. The case of the Parma's Food Hub. *Case Studies on Transport Policy*, 3(2), 120–128. https://doi.org/10.1016/j.cstp.2014.08.003

Muñuzuri, J., Larrañeta, J., Onieva, L., & Cortés, P. (2005). Solutions applicable by local administrations for urban logistics improvement. *Cities*, 22(1), 15–28. https://doi.org/10.1016/j.cities.2004.10.003

Nordtømme, M. E., Bjerkan, K. Y., & Sund, A. B. (2015). Barriers to urban freight policy implementation: The case of urban consolidation center in Oslo. *Transport Policy*, 44, 179–186. https://doi.org/10.1016/j.tranpol.2015.08.005

Olsson, J., & Woxenius, J. (2014). Localisation of freight consolidation centres serving small road hauliers in a wider urban area: Barriers for more efficient freight deliveries in Gothenburg. *Journal of Transport Geography*, 34, 25–33. https://doi.org/10.1016/j.jtrangeo.2013.10.016

Ogden, K.W., 1992. *Urban Goods Movement: A Guide to Policy and Planning*. Ashgate, Aldershot.

Paddeu, D. (2017). The Bristol-Bath Urban freight Consolidation Centre from the perspective of its users. *Case Studies on Transport Policy*, 5(3), 483–491. https://doi.org/10.1016/j.cstp.2017.06.001

Quak, H., & Tavasszy, L. (2011). Customised Solutions for Sustainable City Logistics: The Validity of Urban Freight Consolidation Centres. In van Nunen, J., P. Huijbregts and P. Rietveld (eds), *Transitions Towards Sustainable Mobility: New Solutoins and Approaches for Sustainable Transport Systems*. Dordrecht: Springer.

Quak, H., Balm, S., & Posthumus, B. (2014). Evaluation of City Logistics Solutions with Business Model Analysis. In *Research Procedia - Social and Behavioral Sciences* (Vol. 125, pp. 111–124). Elsevier B.V. https://doi.org/10.1016/j.sbspro.2014.01.1460

Quak, H., Lindholm, M., Tavasszy, L., & Browne, M. (2016). From Freight Partnerships to City Logistics Living Labs - Giving Meaning to the Elusive Concept of Living Labs. In *Transportation Research Procedia* (Vol. 12, pp. 461–473). Elsevier B.V. https://doi.org/10.1016/j.trpro.2016.02.080

Rao, C., Goh, M., Zhao, Y., & Zheng, J. (2015). Location selection of city logistics centers under sustainability. *Transportation Research Part D: Transport and Environment*, 36, 29–44. https://doi.org/10.1016/j.trd.2015.02.008

Regan, A., & Golob, T. F. (2005). Trucking industry demand for urban shared use freight terminals. *Transportation*, 32(1), 23 – 36.

Richardson, T., K. Livingstone, D. Banister, P. Goodwin, J. Urry and M. Siemiatycki. (2004). Planning and the Big C: Challenging auto dependence through Conviction Politics in London. *Planning Theory & Practice*, 5(4), pp. 487-514.

Rijsenbrij, J.C., 2005. Benefits from changes in scale in sustainable city logistics. In: Taniguchi, E., Thompson, R.G. (Eds.), *Recent Advances in City Logistics*. Proceedings of the 4th International Conference on City Logistics (Langkawi, Malaysia, 12–14 July, 2005). Elsevier, Amsterdam.

Rodrigues, J.-P. (2006). Viewpoint: transport geography should follow the freight. *Journal of Transport Geography*, 14, pp. 386–388.

Ruesch, M., Glucker, C., 2001. City enquiry: European Survey on Transport and Delivery of Goods in Urban Areas. Zurich, Switzerland

Schliwa, G., Armitage, R., Aziz, S., Evans, J., & Rhoades, J. (2015). Sustainable city logistics - Making cargo cycles viable for urban freight transport. *Research in Transportation Business and Management*, 15, 50–57. https://doi.org/10.1016/j.rtbm.2015.02.001

Stathopoulos, A., Valeri, E., & Marcucci, E. (2012). Stakeholder reactions to urban freight policy innovation. *Journal of Transport Geography*, 22, 34–45. https://doi.org/10.1016/j.jtrangeo.2011.11.017

Taniguchi, E., Thompson, R. G., Yamada, T. and van Duin, R. (2001). *City logistics: Network modelling and intelligent transport systems*. Pergamon: Oxford.

Taniguchi, E. and Tamagawa, D. (2005). Evaluating city logistics measures considering the behaviour of several stakeholders. *J. East. Asia Soc. Transp. Stud*. 6, 3062 - 3076.

Taniguchi, E. (2014). Concepts of City Logistics for Sustainable and Liveable Cities. In *Procedia - Social and Behavioral Sciences* (Vol. 151, pp. 310–317). Elsevier B.V. https://doi.org/10.1016/j.sbspro.2014.10.029

Triantafyllou, M., Cherrett, T., & Browne, M. (2014). Urban Freight Consolidation Centers. *Transportation Research Record: Journal of the Transportation Research Board*, 2411(2411), 34–44. https://doi.org/10.3141/2411-05

Van Duin, J. H. R., Quak, H., & Muñuzuri, J. (2010). New challenges for urban consolidation centres: A case study in The Hague. In *Procedia - Social and Behavioral Sciences* (Vol. 2, pp. 6177–6188). https://doi.org/10.1016/j.sbspro.2010.04.029

van Rooijen, T., & Quak, H. (2010). The Sixth International Conference on City Logistics Local impacts of a new urban consolidation centre – the case of. In *Procedia - Social and Behavioral Sciences* (Vol. 2, pp. 5967–5979). https://doi.org/10.1016/j.sbspro.2010.04.011.

Verlinde, S., Macharis, C., Milan, L., & Kin, B. (2014). Does a Mobile Depot Make Urban Deliveries Faster, More Sustainable and More Economically Viable: Results of a Pilot Test in Brussels. In *Transportation Research Procedia*. https://doi.org/10.1016/j.trpro.2014.11.027

Witkowski J., Kiba-Janiak M. (2014). The role of local governments in the development of city logistics. *Procedía - Social and Behavioral Sciences*. Vol. 125, pp. 373385, http://dx.doi.org/10.1016/j.sbspro.2014.01.1481.


SURFLOGH
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[i] More has been done in sociology, however even here there is some idea as to how the whole profession has been viewed, see for example Fincham (2007).