UNIVERSITY OF WESTMINSTER

University of Southampton

Review of UK Urban Freight Studies

Allen, J., Browne, M., Cherrett, T. and McLeod, F.

Transport Studies Group
University of Westminster
London

Transportation Research Group
University of Southampton
Southampton

allenj@westminster.ac.uk
M.Browne@westminster.ac.uk

t.j.cherrett@soton.ac.uk
f.n.mcleod@soton.ac.uk

www.westminster.ac.uk/transport

http://www.trg.soton.ac.uk

GREEN LOGISTICS

November 2008

Review of UK Urban Freight Studies

Report produced as part of the Green Logistics Project:
Work Module 9 (Urban Freight Transport)

Allen, J., Browne, M., Cherrett, T. and McLeod, F.

University of Westminster and University of Southampton

Final version

November 2008

Acknowledgements:

The research reported in this document was funded by the Engineering and Physical Science Research Council as part of the University of Westminster's and University of Southampton's contribution to the Green Logistics project, and by Transport for London as part of the University of Westminster's contribution to the London Freight Data and Knowledge Centre. We would like to thank the TfL Freight Unit, and especially Bashir Khan, the Freight Data Analyst, for their considered input to this report.

Further details of the Green Logistics project can be found at:

http://www.greenlogistics.org

Further details of the Transport for London Freight Unit can be found at:

http://www.tfl.gov.uk/businessandpartners/freight/1284.aspx

CONTENTS Page No.

1. Introduction

This report is based on a review of UK studies in which data has been collected to obtain an understanding of road-based urban freight transport activities and patterns of operation.

Urban freight remains relatively under researched by comparison with passenger transport both in the UK and worldwide. However, in the UK there have been a number of studies that have attempted to investigate road-based freight operations since the 1960s. But no attempt has been made to draw together the results of these various studies and compare them. This is what is presented in this report.

The report has studied the results of 30 UK urban freight studies carried out in the last decade in order to attempt to provide insight into urban freight activities in our towns and cities. Section 2 presents this current knowledge about urban freight transport activities in the UK from these studies, and compares the similarities and differences between study findings.

Section 2.1 addresses the subject of the number of goods vehicle delivery and collection movements to and from urban establishments for goods collection and delivery. It also includes the effect of the goods supply system used by the establishment on number of vehicle deliveries and collections, the effect of business type and size of establishment on number of deliveries and collections, the scheduling of deliveries, and delivery vehicle trip origins.

Section 2.2 provides study results concerning other types of collections and deliveries at urban establishments (in addition to core goods deliveries – including goods transfers between premises, ancillary goods deliveries, money collection and delivery trips, waste collections from establishments,
and home deliveries made from urban establishments.

Section 2.3 presents data from these studies on patterns in vehicle delivery and collection trips at urban establishments by the time of day, day of week and month of year.

Section 2.4 contains data from studies showing the vehicle types used to make deliveries at urban establishments. This section also provides data on vehicles based at urban establishments.

Section 2.5 summarises data on goods vehicle dwell times at urban establishments. This includes data on the total time occupied on public roads by vehicles loading/unloading, the need for staff from the receiving establishment to be present at the delivery and the need for checking goods at receiving establishments. Delivery vehicle crew size data is also presented.

Section 2.6 addresses the loading/unloading process. This includes data on the stopping locations for vehicles making deliveries, legal and illegal loading/unloading activity, methods of goods handling used, access to the receiving establishments used by drivers making deliveries, and destinations within the receiving establishment for goods delivered by the driver.

Section 2.7 provides summary data from studies on the pattern of goods vehicle activity and goods vehicle rounds. This includes consideration of the type of delivery vehicle operator, the type of vehicle rounds performed, and vehicle utilisation and operational efficiency.

Service trips are not commonly researched in urban freight studies. Section 2.8 provides the available data on service trips to urban establishments including types and frequency of

service trips, vehicle types used, dwell times, and information on where service vehicles are parked during the service provision.

In section 3, the results of 7 UK urban freight studies carried out in the 1970s (between 1970 and 1975) are presented and the results compared with the recent UK studies that were presented in section 2. This provides insight into the extent of similarity and difference in urban freight operations over this 25-35 year period. Data is presented for all the topics reported on in these studies, including:

- the number and vehicle deliveries and collections at urban establishments (section 3.1)
- other collection and delivery at urban establishments (section 3.2)
- patterns of goods vehicle activity at urban establishments by the time of day, day of week and month of year (section 3.3)
- vehicle types used to make deliveries (section 3.4)
- goods vehicle dwell times (section 3.5)
- the loading/unloading process (section 3.6)
- goods vehicle rounds (section 3.7)
- service trips to urban establishments (section 3.8)

Section 4 provides concluding thoughts on the urban freight data presented in the report as well as on survey techniques used in urban freight studies.

Gaining a detailed understanding of urban freight transport activities is an important element in determining the current sustainability of such activity (in economic, social and environmental terms) and how best to go about enhancing its sustainability. It is hoped that reviewing the results of these UK studies, and comparing recent study results with those from the 1970s is of help in to obtain this insight.

A separate report as part of this same Green Logistics project has reviewed more than 160 urban freight studies worldwide (approximately 60 from the UK and 110 from other countries) in order to examine the survey techniques used to research urban freight activities. It presents the results of the literature review of these urban freight studies, indicating the types of survey used, the primary focus of the research, the sample sizes, response rates, and geographical and business coverage of these studies that have been carried out in different countries (Allen and Browne, 2008).

We intend to produce an additional report that contains all the urban freight survey forms that we have obtained during the course of carrying out this research.

Another report offering guidance and recommendations in carrying out urban freight survey work is planned for 2009 as part of the Green Logistics project.

2. Analysis of recent urban freight study results in the UK

An analysis of the results of 30 urban freight studies conducted in the UK over approximately the last decade (1996-2008) was carried out in order to examine various features of urban road freight activities in the UK. These represent all the recent UK studies that the authors were able to identify and obtain.

It is important to note that in most cases only a report or paper detailing the results of the study was available rather than the raw data collected in surveys. In addition, the same topic has often been investigated in differing ways in the various studies. Also, even when the same survey technique is used to study a particular aspect of urban freight activity, the way in which the question is phrased is often different. All of these complications make comparisons between the study results difficult. It is also important to bear in mind that that many of the studies have relatively small sample sizes.

However, despite all the difficulties it was hoped that by extracting results from these surveys and comparing results where more than one survey has focussed on a specific issue, that it would be possible to enhance the existing knowledge of urban freight transport activities. These UK studies that were analysed are summarised in Table 2.1. Further discussion of types of urban freight survey can be found in another report produced as part of this project (Allen and Browne, 2008).

It is important to note that in addition to specific urban freight studies, national surveys carried out by governments can also be of use in analysing urban freight transport. For instance, the Continuing Survey of Road Goods Transport (CSRGT) in the UK and comparable compulsory surveys of freight operators in other EU member states which are based on vehicle trip diaries can provide details of distances travelled, number of stops, vehicle lading and empty running. Also, the national Commodity Flow Survey in the USA collects data about flows to and from urban establishments. However, due to the total sample sizes in such national surveys, disaggregated this data for a particular urban area is only likely to be robust for very large urban areas (where a sufficient proportion of all surveyed freight activities will have taken place).

In addition, there are many other sources that can provide details about various aspects of urban freight transport. A summary of such data is provided in the BESTUFS project report, which provided summary information for eleven European countries about data sources for road freight as well as other modes (Browne and Allen, 2006). A summary of data that could be used for freight modelling at national, regional and urban scales was also carried out for the UK Department for Transport (WSP and Katalysis, 2002). In addition, the Key Performance Indicator studies commissioned by the UK Department for Transport contain operational data about vehicle operating patterns in various sectors including food, non-food, express parcels, and pallet networks some of which takes place in urban areas. This data could potentially be disaggregated by geographical location in order to obtain further insight into urban freight activities.

Table 2.1: Summary details of the recent UK urban freight studies analysed

Study	Location	Date	Survey type	Sample size and response rate	Types of businesses	Reference
Winchester, Southampton, Leeds	Retail locations in all 3 cities: historic town, industrial town, metropolitan city	1996	Establishment survey	197 establishments (from 731 asked = 27%)	Nine types of retailer	Edwards, 1997.
Norwich and London	Various parts of Norwich and retail high street in Marylebone, London	1999	Establishment survey; operator survey; service provider survey	58 establishments, 7 operators, 5 service providers, 8 suppliers and wholesalers plus discussion groups	Mostly retail, but also food and drink, professional services and industrial	Allen et al., 2000
Birmingham, Basingstoke, Norwich	Distribution companies delivering to one or more of these urban areas from various depot locations	2001	Freight operator survey; vehicle trip diaries; parking survey; traffic counts	7 distribution companies	Drinks (beer, wine, soft) x 2; Dedicated storage/distribution for non-food retailer x 2; General storage/distribution, including drinks x 2; Parcels carrier	Allen et al., 2003
Winchester	Winchester city centre, Winnall and Bar End (both more industrial parts of Winchester).	2001	Establishment survey	133 establishments (from 403 asked = 33% response rate)	Various retail outlets, service industries, restaurants, pubs and hotels.	Cherrett et al., 2002
Norwich	Bedford Street - retail street comprising mainly small, independent retailers	2001	Establishment survey; driver survey; parking survey; traffic counts	21 establishments, 35 drivers	retailers many independent inc.furniture, computer repairs, public houses, travel agents and jewellers.	Allen et al., 2003
Covent Garden	Seven Dials area of Covent Garden, London - mainly small, independent retailers	2001	Establishment survey	112 establishments (from 153 asked = 73% response rate)	Retail, bars, restaurants, cafes, hairdressers, theatre, hotel, offices	Tyler, 2001
Park Royal	Park Royal, West London, a major industrial area.	2002	Establishment survey; parking survey; traffic counts	64 establishments (from 400 asked = 16% response rate)	Industrial and commercial establishments including BBC TV, McVities, Royal Mail, Jewson, Exel and DHL	MVA, 2002
Reading	Market Place and Friar Street - town centre retailing and business areas	2002-2003	Establishment survey; vehicle observation survey; traffic counts	Market Place: 31 establishments (from 51 asked = 61% response rate); Friar Street: 30 establishments	Market Place - shops, banks and offices; Friar Street - shops selling heavier items and pubs/bars	Peter Brett Associates, 2003
Bexleyheath	The Broadway in Bexleyheath, southeast London	2003	Establishment survey	21 establishments (from 251 asked = 8% response rate)	Various retail stores, one bank, one restaurant, two pubs	Intermodality, 2004 (not published)

Bristol	Broadmead retailing area of the city	2003	Establishment survey	118 establishments (from 137 asked = 87% response rate)	clothes, food and other retailers including shopping centre	TTR, 2004
Torbay	Torquay, Paignton and Brixham	2003	Establishment survey	34 establishments (from 163 asked = 21% response rate)	Wide variety, including small retail businesses, manufacturers, hotels and the regional hospital.	Devon County Council private communication
Winchester	Winchester city centre, Winnall and Bar End (both more industrial parts of Winchester).	2003	Establishment survey; suppliers survey; couriers survey; service providers survey	74 establishments; 13 service providers; 19 suppliers; 6 couriers (from 403 establishments; 49 service providers; 98 suppliers; 9 couriers asked = response rates 18% establishments; 29% service providers; 19% suppliers)	Retailers, warehouses, manufacturers, services, restaurants, pubs and hotels	Cherrett and Smyth, 2003
Ealing	Ealing town centre, West London.	2004	Vehicle observation survey	1048 deliveries to 130 establishments observed over six days (7am-7pm)	Survey sites included retail, food and drink, business and professional services.	MVA, 2004
Colchester	Colchester town centre	2005	Establishment survey	244 establishments (from 800 asked = 30.5% response rate)	All business types in town centre	Steer Davies Gleave, 2005
West Sussex	Chichester, Horsham, Worthing and Crawley	2005	Establishment survey	51 establishments (from 97 asked = 53% response rate)	Various retail outlets, service industries, restaurants, pubs and hotels.	Cherrett and Hickford, 2005
Covent Garden	Seven Dials area of Covent Garden, London - mainly small, independent retailers	2005	Vehicle observation survey	2 streets surveyed	Retail, bars, restaurants, cafes, hairdressers, theatre, hotel, offices	Salgado, 2005
Wallington	Small town in south London	2005	Establishment survey; vehicle observation survey; driver survey	100 establishments; 270 vehicles observed, 80 drivers surveyed (from 130 establishments and 270 drivers asked = 77% of establishments, 30% of drivers)	All types of business in town centre	MVA, 2005.
Southwark and Lewisham	Businesses based in the two boroughs that operated light goods vehicles	2005	Freight operator survey	82 operators (from 718 companies asked = 13%)	Wide range of businesses that operated LGVs	Browne, et al., 2005
Croydon and Sutton	Main shopping areas of Croydon and Sutton, south London	2006	Establishment survey	183 establishments (121 in Croydon + 62 in Sutton) (from 469 asked = 39% response rate)	Various retailers - clothing represented 25%; banks not included	TTR, 2007

Catford	High street in southeast London	2006	Establishment survey; vehicle observation survey	45 establishments (from 200 asked = 23% response rate)	Mostly retailers (inc 10 food stores) plus restaurants, bars and clubs	Peter Brett Associates, 2006
Westminster and Croydon	Businesses based in the two boroughs	2006	Freight operator survey	130 operators (from 3195 companies asked = 4%)	Wide range of businesses that operated LGVs	Synovate, 2006
London wholesale produce markets	Western International Market; New Covent Garden Market; New Spitalfields Market; Billingsgate Market; and Smithfield's Market	2006-2007	Establishment survey; driver survey; traffic counts	298 establishments and 2053 drivers (from 4062 establishments and 523 drivers asked = 51% establishments and 57% drivers)	The five major wholesale produce markets in London	MVA, 2007.
Bromley	Main shopping areas of Bromley, south London	2007	Establishment survey	98 establishments (from 140 asked = 70% response rate)	Various retailers - clothing represented 37%; banks included	TTR, 2007
Wansdworth	Northcote Road, Wandsworth, London	2007	Establishment survey; driver survey; vehicle observation survey	26 deliveries observed; establishments surveyed not stated	almost exclusively independent speciality shops	TTR, 2007
Croydon	High Street, Croydon, London	2007	Establishment survey; driver survey; vehicle observation survey	10 establishments (all retailers)	Street made up mostly of retailers and restaurants	TTR, 2007
Kingston	Market Square, Kingston, London	2007	Establishment survey; driver survey; vehicle observation survey	12 establishments (all retailers); 20 deliveries observed	Square that has a daily street market	TTR, 2007
Lewisham	Deptford High Street, Lewisham, London	2007	Establishment survey; vehicle observation survey	7 establishments (all retailers); 24 deliveries observed	Street made up mostly of independent retailers and restaurants	TTR, 2007
Merton	London Road, Merton, London	2007	Establishment survey; driver survey; vehicle observation survey	15 establishments (all retailers); 3 drivers	Retailers and restaurants	TTR, 2007
Lisson Grove	Church Street in Lisson Grove, Westminster	2008	Establishment survey; traffic counts	104 establishments (from 155 asked = 67% response rate)	Shops and market stalls	Westminster City Council, 2008

2.1 Number of vehicle deliveries and collections at establishments

Research has identified that urban establishments receive visits from commercial vehicles for a variety of reasons (Allen et al., 2000). The most noticeable and common form of commercial vehicle trips to and from urban establishments are to deliver and collect "core" goods. "Core" goods are the goods that are of fundamental importance to the activity carried out at the premises. In the case of retail establishments, the "core" goods are the goods sold to final customers. In the case of a warehouse, the "core" goods are the goods delivered by suppliers which are to be supplied from the warehouse to other premises. In the case of manufacturing establishments, the "core" goods are the goods used in the production process. In addition to the goods vehicle trips delivering and collecting "core" goods, there are a number of other commercial vehicle trips that take place at urban establishments including:

- Core and ancillary goods transfers between establishments
- Ancillary goods deliveries to establishments
- Money collection and delivery
- Waste collections from establishments
- Postal collection and delivery by Royal Mail
- Other goods collected from establishments (in addition to core goods, waste and Royal Mail post)
- Home deliveries (goods despatched from establishments to their customers)
- Service trips to establishments

Service trips are distinguished from good trips as being those trips in which the main purpose is to carry out a servicing activity at the establishment, rather than to solely deliver or collect goods. Examples of service trips to urban establishments include computer equipment servicing, photocopier servicing, cash register servicing, security and fire alarms servicing, plant care services, lift and escalator servicing, air conditioning servicing, towel and dry cleaning services, and general cleaning services. Many service providers have to take equipment and tools to the establishment where the service is to be provided. These service trips can, of course, also involve the person who is providing the service taking goods to or from the establishment where the service is performed (such as parts for machinery that is being repaired, or new plants in the case of a plant care service company). Sections 2.1 - 2.7 are concerned with goods deliveries and collections at urban establishments. Service trips are discussed in greater detail in section 2.8.

Many of the recent UK surveys reviewed during this work have collected data about the number of goods vehicle trips to establishments in urban areas to provide deliveries. In most cases this data was collected by establishment survey, but in a few cases it was collected by vehicle observation survey – the technique used is noted in Table 2.2. Vehicle observation surveys are likely to underestimate vehicle trips to establishments for two key reasons: i) the time over which the survey is conducted (the surveys are typically less than 24 hours per day so night deliveries are not counted, and do not always take place over an entire week), and ii) deliveries made via side and rear roads are often not observed by surveyors. By contrast, establishment surveys rely on the ability of the respondent in the receiving establishment to provide information about the average number of vehicle deliveries over a given time period, and the quality of this response will depend on the knowledge of the respondent as no direct observations are made in this approach. The study in Market Place, Reading made use of both survey techniques to calculate the number of goods vehicle deliveries and collections per establishment in a typical week (see Table 2.2). The observation survey produced an average of 11 deliveries and collections per establishment per week, compared with 16 deliveries and collections per establishment per week in the establishment survey. Studies in Putney, Camberley, and Newbury in the 1970s made use

of both vehicle observation surveys and establishments surveys. As part of this work, a comparison was made between establishments that only received collections and deliveries through the front door. The difference between the total number of goods vehicle trips estimated by respondents in establishments and that observed on-street was +14%, -15% and -14% at Newbury, Camberley and Putney (these earlier UK urban freight studies are considered in more detail in section 3).

Table 2.2 provides details of the number of goods vehicles deliveries to establishments in the UK surveys reviewed. The average number of vehicle deliveries per establishment in a typical week ranges from 1.8 (in the Croydon study) to 24.5 (in the Torbay study). Table 2.2 also reflect the range in the number of deliveries per establishment within these studies (for those which data is available). Table 2.2 also shows the average number of sources from which deliveries are despatched to establishments. This also varies from 1.3 sources per establishment in the Bromley study to 14.1 in the Norwich and London study.

A wide range of factors will affect the number of goods vehicle deliveries made to an establishment. These include: the type of business, the size of the business (in terms of physical space, number of employees and turnover of goods), the range of goods required by the establishment, and the type of supply chain/goods supply system in which the establishment operates (i.e. whether goods destined for the establishment are consolidated upstream or not). This latter point is reflected in Table 2.2, with those studies showing higher average number of sources from which goods are dispatched to establishments also tending to show greater vehicle deliveries per establishment per week. The Norwich/London study showed how the number of vehicle deliveries varied by type of goods supply system (centralised, decentralised or hybrid - see section 2.1.1).

Binsbergen and Visser (1999) have noted that Dutch research has shown that local differences occur in the average number of deliveries and collections at establishments at an urban level. They note this is related to the size, economic composition, and number and type of businesses within the urban area.

It is important to recognise that the studies reviewed often involve a wide range of business types, sizes and ownerships of establishment (i.e. some studies focus on areas with small, independent shops while other focus of large establishments that are part of national chains), and have relatively small sample sizes, so comparing averages can be misleading. The average number of deliveries per establishment may be substantially inflated by a small number of establishments receiving a large numbers of deliveries. The median is probably a better indicator of what is ‘typical’, although it is perhaps foolhardy to generalise about numbers of deliveries as they are highly variable depending on the specific business. However without access to the raw data collected in these surveys a more detailed analysis is not possible.

It should also be noted that in some studies respondents were asked to provide an estimate of all goods vehicle deliveries in a typical week, while in other cases respondents were asked to estimate vehicle deliveries of “core goods” (i.e. those goods that are fundamental to the establishment, with ancillary goods vehicle movements being dealt with separately. In addition, in the case of some of the studies reviewed it has been necessary to estimate the average number of deliveries per establishment from results provided in study reports that were grouped into ranges of deliveries per establishment (e.g. 1-2 deliveries, 2-5 deliveries, 6-10 deliveries etc).

All recent UK studies reviewed have only expressed freight delivery and collection activity at urban establishments in terms of the number of vehicle trips, there have been no attempts to quantify tonnages, volumes, or monetary values of goods delivered and collected. In a very limited number of recent UK studies data about the number of items by packaging type (e.g.

boxes, pallets, racks etc.) has been gathered for a limited sample. Dutch urban freight studies have attempted to quantify volumes of goods delivered and collected but Binsbergen and Visser (1999) have noted that this proved difficult and data was deemed unreliable.

Table 2.2: Goods vehicle delivery trips to urban establishments in recent UK studies

Study	Year of study	Number of respondents	Ave delivery trips per establishment per typical week	Range of no. of deliveries in typical week	Ave. no of sources for deliveries per establishment	Survey technique used
Leeds	1996	444	9.6	5-100		Establishment survey
Southampton	1996	172	9.7	1-100		Establishment survey
Winchester	1996	115	8.3	2-100		Establishment survey
Norwich and London*	1999	34	19.6	1-159	14.1	Establishment survey
Covent Garden	2001	104	5.7	0.25-75		Establishment survey
Norwich	2001	21	21.6	2-150		Establishment survey
Winchester	2001	137	10.6	0.5-90	8.7	Establishment survey
Park Royal	2002	101	121.0	<10 to >500		Establishment survey
Bexleyheath	2003	21	16.2			Establishment survey
Broadmead, Bristol	2003	119	6.1	1-60		Establishment survey
Torbay	2003	34	24.5			Establishment survey
Ealing	2004	130	7.6			Observation survey
Colchester	2005	228	8.4			Establishment survey
Chichester, W.Sussex	2005	14	6.4	1-23	3.1	Establishment survey
Crawley, W.Sussex	2005	9	5.7	1-30	2.4	Establishment survey
Horsham, W.Sussex	2005	14	8.9	1-31	2.9	Establishment survey
Worthing, W.Sussex	2005	14	7.3	1-30	2.6	Establishment survey
Wallington	2005	85	13.0			Establishment survey
Catford	2006	45	12.0	1-60		Establishment survey
Croydon & Sutton	2006	183	4.9	1-100		Establishment survey
Bromley	2007	98	5.4	1-100	1.3	Establishment survey
Clapham Junction	2007		9.5			Establishment survey
Croydon	2007		1.8			Establishment survey
Kingston	2007		2.0			Establishment survey
Lewisham	2007	7	5.3	3-14	2.7	Establishment survey
Merton	2007		2.1			Establishment survey
Reading (Friar Street)*	2002-3	30	23.0			Establishment survey
Reading (Market Place)*	2002-3	31	16.0			Establishment survey
Reading (Market Place)*	2002-3		11.0			Observation survey

Note: * - results include goods vehicle collections of core goods as well (i.e. not waste collection trips)

2.1.1 Effect of goods supply system on number of vehicle deliveries and collections

The type of goods supply system that establishments use will also affect the number of goods vehicle deliveries to and from the establishment. In the Norwich/London study (Allen et al.,, 2000) three types of goods supply systems were defined:

- those establishments which receive all their goods from a single final point of despatch (referred to as a centralised goods supply system).
- those establishments which receive goods from several different final points of despatch with different vehicles delivering goods to the establishments from each final point of despatch (referred to as a decentralised goods supply system).
- those establishments which receive a significant proportion of their goods from one final point of despatch and the rest of their goods from a number of different final points of despatch (referred to as a hybrid goods supply system).

The Norwich/London study indicated that it was generally only establishments owned by large companies with multiple outlets that are capable of organising their supply system so that all core goods are despatched from one final geographical point to the establishments. Table 2.3 shows the relationship between goods supply systems and the number of deliveries per week from this study.

Table 2.3: Goods supply system and deliveries/collections per week at selected establishments (Norwich and London, 1999)

Type	Ownership	No. of points from which goods are despatched to establishments	No. of vehicle collections and deliveries for core goods per week
Centralised			
Dry cleaning shop	Multiple	1	1
Furniture shop	Multiple	1	1
Gift shop	Multiple	1	1
Clothes shop	Multiple	1	2
Clothes shop	Multiple	1	2
Travel agent	Multiple	1	2
Fast food restaurant	Multiple	1	3
Pizza restaurant	Multiple	1	3
Florist	Independent	1	6
Shoe shop	Multiple	1	6
Department store	Multiple	1	12
Variety store	Multiple	1	15
Decentralised			
Gift shop	Independent	50	3
Clothes shop	Independent	5-10	4
Shoe shop	Independent	15	5
Printing/photocopy shop	Franchise	3-4	6
Furniture & carpet shop	Independent	20	10
Florist	Independent	6	10
Hardware shop	Independent	50	18
Book shop	Independent	50	25
Public house	Independent	12	26
Builders merchant	Independent	30	35
Hybrid			
Off-licence	Multiple	6	3
Stationers/office supplies shop	Multiple	5	9
Public house	Multiple	7	13
Pizza restaurant	Multiple	9	17
Chemist	Multiple	3	24
Newsagent	Independent	11	25
Convenience grocer	Independent	6	26
Book shop	Multiple	50	40
Furniture & carpet shop	Multiple	50	46
Chemist	Independent	40	50
Supermarket	Multiple	7	60
Convenience grocer	Multiple	30	159

Source: Allen et al., 2000.

2.1.2 Effect of business type and size of establishment on number of deliveries and collections

The type of business conducted at an establishment is also a determinant of the number of goods vehicle collections and deliveries that take place. Results from the Winchester study indicate the number of core goods deliveries generated by establishments involved in different types of business (see Table 2.4). Table 2.5 shows the results from the study in Wallington.

Table 2.4: Core goods deliveries by business type and vehicle type (Winchester, 2001)

Business Type	Mean number of core deliveries in a week
Food retail	16.4
Clothing retail	4.8
Other retail	8.6
Restaurant	3.0
Public House	5.0
Hotel	24.5
Banks	5.3
Other Services	9.7
Warehousing	36.8
Manufacturing	24.1
Personal Services	2.3

As Binsbergen and Visser (1999) have noted there is no general-use classification for types of establishments in urban freight research. This results in most urban freight studies developing its own unique set of business types for analysis. This makes comparison of deliveries and collections and other aspects of freight activity at establishments between studies difficult.

Table 2.5: Collections and deliveries per typical weekday by business type (Wallington, 2005)

Type of establishment	No. of establishments	Mean collections and deliveries per establishment on typical weekday
Shops	50	2.6
Financial & professional services	16	1.5
Cafes and restaurants	16	1.9
Office	5	11.0
Other	5	5.0
Total	**92**	**2.9**

Several urban freight studies in the UK during the 1970s collected data about floor space and number of employees at establishments surveyed in order to try to relate the number of deliveries (and collections) to these variables. However these attempts were largely unsuccessful – presumably due to the involvement of other factors such as product turnovers, product ranges and goods supply systems. As a consequence very few of the

urban freight studies in the last 15 years have collected floor space and employee data. However the Ealing and Wallington studies have collected this information – Table 2.6 shows a comparison of 12-hour vehicle delivery rates per 100 sq m on typical weekday in both of these studies.

Table 2.6: Comparison of 12-hour vehicle delivery rates per 100 sq m on typical weekday (7am-7pm)

Type of establishment	Wallington, 2005	Ealing, 2004
Shops	1.05	1.89
Financial and professional services	0.93	1.42
Cafes and restaurants	1.44	1.19
Office	0.40	*
Others	0.53	0.15
Ave for shops, financial and cafes/restaurants	1.11	1.41
Ave for all land use classes	0.90	1.46

Note: * - office establishments have been included into the 'others' category.

2.1.3 Type of goods and type of packaging

A few recent urban freight studies have collected data about the type of goods but as there is no general-use classification for types of goods in urban freight research (as is also the case for types of establishments) this makes any attempts at comparisons difficult if not impossible. For instance the classification of goods types from selected studies is shown in Table 2.7.

Table 2.7: Classification of types of goods used in selected recent UK urban freight studies

Study	Classification of type of goods
Wallington, 2005	- Food or drink - Shop supplies - Building materials - Other
Catford, 2006	- Drink - Food - Cosmetics - Furniture - Lighting equipment - Printing equipment - Small packages - Other

As previously mentioned, in a small number of recent UK studies data about the number of items by packaging type (e.g. boxes, pallets, racks etc.) has been gathered rather than attempting to investigate the type of goods. Again, lack of standardisation in the classification of packaging types makes comparisons difficult even if there was data from

many studies. Examples are provided in Table 2.8. See section 2.6.3 for further details about type of packaging in the Sutton/Croydon and Bromley studies.

Table 2.8: Classification of packaging types (in which goods are delivered) used in selected recent UK urban freight studies

Study	Classification of type of goods
Bromley 2007; Croydon/Sutton 2006	- Loose Boxes - Pallets - Roll cages - Hanging Rails - Other
Reading, 2002-3	- Cardboard Box - Crate / Tote Bins - Roll Cage / retention Units - Hanging Garment Rails - Wooden or Plastic Box / Cage Pallets - Kegs - Other

Cardboard Box
Crate / Tote Bins
Roll Cage / retention Units
Hanging Garment Rails
Wooden or Plastic Box / Cage Pallets
Kegs
Other

2.1.4 Scheduling of deliveries

Deliveries of core goods to establishments can either be scheduled (i.e. planned in advance and regular) or ad hoc (i.e. unscheduled). Table 2.9 shows the degree of organisation of delivery schedules identified in three of the urban freight studies reviewed using establishment surveys.

Table 2.9: Extent of scheduling identified at establishments receiving deliveries in recent UK urban freight studies (% of respondents)

Organisation of Delivery Schedule	Bromley, 2007	Croydon & Sutton, 2007	Bristol, Broadmead, 2003
Regular schedule	86%	56%	66%
Ad hoc	7%	8%	12%
Mix	6%	36%	22%
Total	**100%**	**100%**	**100%**
No. of respondents	98	183	119

The majority of respondents in each of the three retail studies operated with regular delivery schedules, with only a small proportion of respondents receiving completely ad hoc deliveries. In the case of the Croydon/Sutton and Broadmead studies a sizeable proportion of respondents received both scheduled and ad-hoc deliveries (i.e. a mix), whereas in Bromley only 6% of respondents received such a mix. The majority of retailers receiving a mix of scheduled and ad-hoc deliveries typically received unpredictable deliveries from

parcels carriers and couriers and/or had arrangements in place for emergency ordering of stock which was delivered when required alongside their regular planned deliveries. The respondents receiving ad hoc deliveries tended to be small retail outlets with either low stock turnover or who were selling perishable items.

2.1.5 Delivery vehicle trip origins

Two freight studies in London have examined the origin of core goods delivery trips to urban establishments (Bromley and Bexleyheath). In the Bromley study 47% of delivery vehicles had been despatched from either London or Kent origins (the two nearest regions), approximately another 20% of vehicles had journey origins in the rest of the south east, about 25% had been despatched from more distant depots in the UK, and 7% had been despatched from depots outside the UK. In the Bexleyheath study approximately 35% of delivery vehicles had been despatched from either London or Kent origins (the two nearest regions), approximately 15% had journey origins in the rest of the south east, and the remaining 50% had come from more distant depots in the UK.

The Torbay freight study found that 29% of delivery trips originated from within Devon (especially from Plymouth and Exeter), and 9% were from the Bristol area. Sixty-one percent of delivery trips originated elsewhere in the UK, with 1% of delivery trips coming to Torbay direct from Europe.

In the Park Royal freight study of establishment located on an industrial estate in west London, respondents were asked to provide the main destinations for vehicles making deliveries of goods from their establishments. Of the 64 respondents, 17 identified west London as a major destination (i.e. very local trips), 24 respondents identified other locations in London, 15 respondents identified locations in south east England, 26 respondents identified elsewhere in the UK, and 1 respondent identified international locations. Respondents were allowed to select more than one main destination.

2.1.6 Combined delivery and collection trips

Three of the freight studies reviewed have asked respondents about whether the vehicles making deliveries of core goods to their establishment take away any goods, such as returns or material for recycling, as part of their work. In the Colchester study 11% of respondents said that always happened (i.e. all delivery trips), 13% said that it often happened as part of delivery trips, and 58% said that it sometimes happened. Only 17% of respondents said that this never happened (there were 235 respondents to this question in the Colchester study).

In the Bexleyheath study respondents at establishments said that approximately 85% of vehicle deliveries are also involved in making collections (such as product returns, packaging, and waste) from the establishment as part of the trip. This could take place on either an occasional or frequent basis. The other 15% of vehicle deliveries were never involved in making collections.

In the West Sussex study, establishments were asked to indicate whether delivery vehicles also removed any goods (e.g. returns) or waste collection (e.g. packaging) as part of the delivery process. For return goods, the responses were that 39% of establishments ‘always’ had returns collected by delivery vehicles, 57% ‘sometimes’ and only 4% ‘never’. For waste collection, the responses were that 31% of establishments ‘always’ had their waste collected by delivery vehicles, 16% ‘sometimes’ and 53% ‘never’.

In the Reading study in Market Place 76% of respondents said that delivery vehicles collected return products and/or internal mail to some extent.

2.2 Other delivery and collection trips at establishments

As previously mentioned, in addition to the goods vehicle trips delivering and collecting "core" goods, there are a number of other commercial vehicle trips that take place at urban establishments. All goods vehicle trips at urban established will be counted in studies using vehicle observation surveys. However, the situation is less clear in the case of establishment surveys. Some establishment surveys make it clear that they are only focusing on deliveries and collections of "core" goods, while in others the breadth of goods vehicle collections and deliveries is not always documented. In these cases it is not obvious whether the survey made clear about whether or not the respondent should provide details about all goods vehicle collections and deliveries but failed to document this in the report, or whether this issue was left unclear when carrying out the survey. If a respondent is not prompted to include these other types of delivery and collection trip in their estimate of trip generation at the establishment it is likely that the response will only provide details of "core" goods collections and deliveries as these are the most obvious and come immediately to mind when asked, whereas the other types are less noticeable and may also occur less frequently. However the Norwich/London survey in 1999 showed that these other delivery and collection trips can generate as many, and in some cases more, vehicle trips than "core" goods trips so are an important topic of study in any urban freight research concerned with trip generation and the impacts of freight activity levels.

In addition, data about any other collections or deliveries to urban establishments that are carried out by non-goods vehicles are often not collected by establishment surveys, and may or may not be collected by vehicle observation surveys, depending on how easy or not it is to distinguish say a delivery by car from a customer visiting a shop by car. Deliveries and collections that take place on-foot are unlikely to be captured by either survey technique.

Few of the recent UK studies reviewed have addressed these other collections and deliveries at urban establishments with much clarity. Waste collections are probably the most reported of these other delivery and collection trip types. The Norwich/London study in 1999 attempted to address these other delivery and collection trips in some detail and in doing so identified the difficulties involved in capturing this information. Sections 2.2.1 to 2.2.6 address these other collections and deliveries providing results from the Norwich/London study and other studies where available.

2.2.1 Core goods transfers between premises

Some retail and office establishments that are part of larger companies transfer core goods (and in some cases ancillary goods) between their establishments and other similar establishments owned by the company. The purpose of these transfers is to acquire goods that are required at the establishments without having to obtain these from upstream in the supply chain (i.e. from suppliers, wholesalers or distribution centres). These transfers are movements of goods between establishments that carry out the same function (e.g. from one retail outlet to another, or one office to another). These transfers are, of course, only possible in companies with more than one establishment that carry out a similar function. Sometimes these goods transfers are collected from one establishment by a goods vehicle making core goods deliveries and then transported to the other establishment when making a core goods collection/delivery to that establishment (thereby not resulting in additional vehicle trips), in other cases an express/parcels company, or a vehicle based at the establishment, or the post may be used.

In the Norwich/London study, the majority of companies with two or more similar establishments performed goods transfers when necessary. Of the 31 establishments that did perform goods transfers, 15 transferred goods between themselves and other branches

in their company on a regular basis, while 16 made such transfers on an occasional basis. The method by which these goods transfers were carried out is shown in Table 2.10.

Table 2.10: Main method of transferring goods between similar establishments in Norwich/London, 1999

Method of transferring goods between establishments	Number of respondents
On core goods vehicle collecting or delivering to establishments	6
Additional trip by goods vehicle based at one of the establishments	13
Additional trip by goods vehicle not based at either establishments	8
By post	1
By staff on foot	3

The frequency with which goods transfers take place varied at different establishments in the Norwich/London study. Sixteen establishments indicated that goods transfers only took place on an occasional basis. However, a florist, off-licence and pizza restaurant each reported 10 goods transfer vehicle trips per week, with an office and computer shop reporting 5 and 3 such trips per week respectively.

In the West Sussex towns study 64% of urban establishments transferred core goods between branches, 38% of which did so once a week or more. Of the respondents who did transfer core goods, 60% said that the receiving braches could be anywhere in the country, the other 40% indicating that the goods would be delivered within the local region.

2.2.2 Ancillary goods deliveries to establishments

"Ancillary" goods are those goods required by the establishments in order to function on a day-to-day basis, but which are not the "core" goods connected with the establishments (i.e. not goods to be sold to customers in the case of a retail establishments, or goods to be used in the production process in the case of a factory). Ancillary goods include items such as till rolls, stationery, plastic and paper bags, printer cartridges, display material, light bulbs, cleaning materials, in-house and customer magazines, publicity material, product information, and paperwork and administration sent from head office.

The Norwich/London study found that a majority (38) of the 50 establishments surveyed received separate vehicle deliveries or made additional trips from the establishment specifically for ancillary goods. Twelve establishments received all their ancillary goods on vehicles delivering core goods (see Table 2.11.

.

Table 2.11: Method by which establishments receive ancillary goods in Norwich/London, 1999

Method	Number of respondents
Receive all ancillary goods on separate vehicle deliveries from suppliers	28
Receive separate ancillary goods deliveries from suppliers as well as ancillary goods with core goods vehicle deliveries	7
Receive ancillary goods with core goods vehicle deliveries	12
Collect ancillary goods themselves using own vehicle	3
Not known	8

Nineteen of the establishments receive either some or all of their ancillary goods on vehicles making core goods deliveries. Of these 19 establishments, only 2 are independently-owned and 17 of them are multiples. All the 17 multiple establishments receive either some or all of their core goods from their own distribution centres. Receiving ancillary goods with core goods can obviously help to reduce the total number of vehicle deliveries made to an establishment and help to reduce the cost of purchasing and receiving ancillary goods. However, as the results indicate and would be expected, this is easier to organise for large companies operating their own goods distribution systems.

The study examined delivery frequencies at establishments which receive separate ancillary goods deliveries. Ten respondents received 50-200 ancillary vehicle deliveries per year, 14 respondents received 10-40 such deliveries per year, and 11 respondents received 1-11 such deliveries per year.

2.2.3 Money collection and delivery trips

Some establishments receive trips from specialist money collection and delivery vehicles in order to safely remove money from the establishments and to provide the establishments with a float and foreign exchange if required. In the Norwich/London study the 17 (out of 58) establishments found to be generating these regular specialist money collection and delivery vehicle trips were all part of large companies, with all branches in the company receiving this service. No independent establishments studied received visits from money collection/delivery vehicles. At all 17 establishments these visits by a money collection and delivery vehicles took place on a daily basis.

2.2.4 Waste collections from establishments

All urban establishments require some form of waste to be collected. These waste trips can include:

- general refuse collection services (provided by either the local authority or a private waste firm)
- specialist waste collection (e.g. chemicals, medical waste etc.)
- recycling collection services (e.g. for paper, cardboard, glass etc.)

In the Norwich/London study 38 establishments received collection from a single waste company, 13 received collections from two waste companies and 1 establishment received collections from three waste companies. Table 2.12 shows the frequency of waste collection vehicle trips to the establishments surveyed which were able to supply details.

Table 2.12: Number of vehicle trips per week to the establishments to collect waste in Norwich/London, 1999

Number of waste collection vehicle visits to the establishments	Number of establishments
1 trip or less per week	12
2-5 trips per week	13
6-10 trips per week	20
More than 10 trips per week	2
Not known	11

The time at which vehicles visit urban establishments to collect waste varies between establishments. Typically waste collection takes place outside normal working hours.

In the Norwich/London study there appeared to be little relationship between the size of the establishments and the frequency of waste collection at the establishments. In fact, some of the larger retail establishments studied had far less frequent waste collections (in some cases only twice per week) than many smaller establishments. In many cases the relatively high frequency of waste collection at smaller establishments would appear to be related to their limited waste storage capacity.

2.2.5 Postal collection and delivery by Royal Mail

Urban establishments also receive post from the Royal Mail on at least five days per week. The majority of centrally-located establishments receive their post from post workers visiting the establishments on foot (but often using a van to travel from the postal depot to the delivery location). However in some cases (especially larger establishments) the post is delivered directly by van into the establishments if it has off-street delivery facilities and receives/sends large quantities of post.

2.2.6 Home deliveries from urban establishments

Deliveries of goods purchased in shops to customer's homes (referred to as home shopping or home delivery services) have become more increasingly common in recent years and forecasts suggest that their popularity will continue to increase. Home delivery services have been offered by some companies for many years. For instance, when buying bulky white goods such as freezers and washing machines from some large, multiple retailer, these goods have been delivered direct from the distribution centre to the customer's home to avoid having to hold large stock at the shop. Florists have also offered home delivery services either to customers' homes or direct to special occasions such as parties, weddings and funerals for a long period of time. However, many other retailers have begun to offer home delivery services in recent year, including supermarkets.

An important distinction in home shopping/delivery services is where the goods are supplied from to the urban customer's home. Two different systems are currently being operated by retailers offering home shopping:

i. goods are delivered to customer's home from shops in the urban area
ii. goods are delivered to customer's home from other establishments (such as depots) in the urban area
iii. goods are delivered to customer's homes from establishments (including warehouses and picking centres) located outside the urban area

This distinction about where the goods are supplied to the customer from will have an important bearing on goods vehicle trip generation at urban establishments. In system (i), the goods are delivered to the shop in the normal manner and are then transported from the shop to the customer's home. This delivery from the shop to the customer will be organised by the shop. In this system the total goods vehicle movements generated by retail establishments are likely to increase with the advent of home shopping. In system (ii) the goods are delivered to the customer's home from another urban establishment where goods vehicles are based. In this system goods vehicle movements generated by retail establishments are likely to remain the same or decrease with the introduction of home shopping, but goods vehicle movements from the urban establishments from which the vehicle make their deliveries will increase. In system (iii) the goods are delivered to the customer's home direct from an establishment located outside the urban area. In this system goods vehicle movements generated by retail and other urban establishments are likely to remain the same or decrease with the introduction of home shopping, but goods vehicle traffic in the urban area may well still increase.

In the Norwich/London study in 1999 approximately half of all retail establishments studied to which home shopping/delivery is applicable already offered delivery services to customer's homes from the shop. In the Covent Garden study in 2001, 58% of retail establishments said that they offered home delivery services. By contrast, in the West Sussex towns study in 2005 less than 10% of respondents indicated that they undertook home deliveries

Table 2.13 from the Norwich/London study shows the method by which goods were transported from the 30 establishments surveyed which offered home delivery to customer's homes. The majority of these establishments use a motorised vehicle for delivering goods to customers, although other transport methods were used by some other establishments. Of the 23 establishments that either only used a vehicle or used a vehicle and other transport methods for home deliveries, 17 of these used a vehicle based at the establishments, while the other six paid a transport operator to provide this service.

Table 2.13: Method by which goods are transported from the shops interviewed to customer's homes/establishments, Norwich/London, 1999

Transport method	Number of establishments
Vehicle (either lorry, van, moped or car)	18
Post	5
Vehicle and staff on foot	3
Vehicle and post	2
Post and staff on foot	2

Table 2.14 shows the frequency of home delivery vehicle trips made by some of the establishments that provided data in the Norwich/London study.

Table 2.14: Home delivery vehicle trips made from the establishments in Norwich/London, 1999

Type of establishments	Number of home delivery vehicle trips per week made from the establishments
Florist	20 delivery rounds to 350 customers per week
Off-licence	20 delivery rounds per week to 100 customers plus deliveries on-foot
Pizza Restaurant	400 deliveries to customers per week
Printing and photocopying shop	15 delivery rounds per week
Variety store	Deliveries to 50-100 customers per week
Furniture shop	Deliveries to 75 customers per week
Builders merchant	55 delivery rounds per week

2.2.7 Comparison of core goods trips and other goods trips at the establishments

Table 2.15 shows the total number of goods vehicle movements at the urban establishments surveyed in a typical week in the Norwich/London study. It provides an opportunity to compare the number of core goods movements with other types of goods movements. As can be seen from the table, at some establishments the other goods movements are far greater than the core goods movements, thereby illustrating the importance of studying all goods movements if a better understanding of goods vehicle trip generation is to be achieved.

Table 2.15: Total number of goods vehicle movements in a typical week at urban establishments surveyed, Norwich/London 1999 (sorted by total of vehicle trips)

Type of premises	Ownership	Number of core goods vehicle collections and deliveries per week	Number of goods vehicle transfers with horizontal premises per week	Number of ancillary goods vehicle deliveries per week	Number of waste vehicle collections per week	Number of money collections & deliveries per week	Number of home delivery vehicle trips from premises per week	Total number of goods vehicle trips at premises per week
Bakery	Multiple	400	N/K	N/K	N/K	0	0	400
Pizza restaurant	Multiple	3	10	1	6	0	300 deliv. & rounds	320
Department store	Multiple	190	0	N/K	N/K	6	100 deliveries (15 rounds)	211
Convenience grocer	Multiple	159	1	1	13	7	0	182
Builders merchant	Multiple	100	N/K	N/K	N/K	7	55 rounds	162
Retail warehouse	Multiple	150	N/K	N/K	N/K	0	0	150
Furniture & carpets	Multiple	46	0	1	1	0	75 deliveries (40 rounds)	88
Chemical factory	Multiple	87	0	N/K	N/K	0	0	87
Large office	Multiple	80	N/K	N/K	N/K	0	0	80
Supermarket	Multiple	60	0	0	2	0	0	62
Large office	Multiple	50	5	N/K	5	0	0	60
Hotel	Multiple	50	0	N/K	3	7	0	60
Book shop	Multiple	40	0	4	8	7	0	59
Chemist	Independent	50	0	2	4	0	2 deliv. & rounds	58
Builders merchant	Independent	35	N/K	0	1	0	15 rounds	51
Record & CD shop	Multiple	30	5	0	6	7	0	48
Florist	Independent	6	10	0	6	0	20 rounds	42
Chemist	Multiple	24	0	0	12	6	0	42
Fruit & veg stall	Independent	36	0	N/K	6	0	0	42
Off-licence	Multiple	2	10	1	6	0	20 rounds	39
Book shop	Independent	25	10	1	3	0	0	39

Pub	Independent	26	0	1	2	0	6 deliv. & rounds	35
Computer shop	Multiple	18	3	1	2	7	3 deliv & rounds	34
Variety store	Multiple	15	N/K	N/K	2	6	75 deliv. (10 rounds)	33
Florist	Independent	10	0	1	1	0	20 rounds	32
Newsagents	Independent	25	0	1	6	0	0	32
Newsagents	Independent	25	0	1	6	0	0	32
Off-licence	Multiple	3	1	0	6	0	20 rounds	30
Convenience grocer	Independent	26	0	1	1	0	0	28
Baker	Independent	10	12	0	6	0	0	28
Hardware shop	Independent	18	0	1	N/K	0	8 deliv & rounds	27
Cinema	Multiple	12	0	1	6	7	0	26
Department store	Multiple	12	0	0	7	7	0	26
Convenience grocer	Multiple	15	0	0	2	7	0	24
Pizza restaurant	Multiple	17	1	3	3	0	0	24
Pub	Multiple	16	0	1	6	0	0	23
Electrical shop	Multiple	6	0	0	6	6	5 deliv. & rounds	23
Print/photocopy shop	Multiple	6	0	0	1	0	15 rounds	22
Stationers	Multiple	9	5	1	6	0	0	21
Furniture & carpets	Independent	10	0	N/K	1	0	25 deliveries (10 rounds)	21
Pub	Multiple	13	0	1	6	0	0	20
Off-licence	Multiple	2	5	0	2	0	10 rounds	19
Clothes shop	Multiple	2	1	1	6	6	3 deliv. & rounds	19
Double glazing factory	Multiple	18	N/K	N/K	N/K	0	0	18
Clothes stall	Independent	11	0	N/K	6	0	0	17
Electrical shop	Multiple	9	0	0	1	7	N/K	17
Shoe shop	Multiple	6	1	0	2	6	0	15
Clothes shop	Multiple	2	0	0	6	6	0	14

Gift shop	Independent	3	0	1	6	0	2 deliv. & rounds	12
Fruit & veg shop	Independent	7	0	1	1	0	3 deliv & rounds	12
Electrical shop	Multiple	4	N/K	0	1	7	N/K	12
Fast food restaur.	Multiple	3	N/K	N/K	6	0	0	9
Travel agent	Multiple	2	0	N/K	N/K	6	0	8
Shoe shop	Independent	5	0	1	1	0	0	7
Gift shop	Multiple	1	0	0	5	0	0	6
Clothes Shop	Independent	4	0	N/K	N/K	0	0	4
Furniture shop	Multiple	1	0	0	1	0	0	2
Dry cleaning shop	Multiple	1	0	0	1	0	0	2

Notes:
“N/K“ - not known (premises unable to provide data).

For home delivery vehicle trips column - “deliveries” are the number of premises delivered to, and “rounds” are the number of vehicle delivery rounds carried out from the premises (with each round representing one vehicle trip from the premises). Where the number of home deliveries and rounds are the same, each customer delivery is carried out as a separate single drop journey.

The table only includes goods trips made by vehicle, not good trips made by foot.

Each goods collection or delivery at the premises is counted as a single trip even though the vehicle makes a trip to and a trip from the premises as part of the collection or delivery. Similarly in the case of home delivery vehicle trips, each delivery round performed from the premises is counted as a single vehicle trip at the premises even if the vehicle departs the premises at the start of the round and then returns at the end.

2.3 Time and day of deliveries

2.3.1 Time of day

The various studies reviewed suggest slightly different peak times of day for deliveries and collections to retailers: however, the consensus view is that the morning (0600-1200 hours) is the busiest period (see Table 2.16). Many establishments appear to receive deliveries and collections throughout the working day. In the majority of surveys no more than 5% of deliveries and collection take place during the night/early hours of the morning when the establishment is closed. However, in the case of the Park Royal industrial estate study, 14% of deliveries and collections take place at night.

McKinnon (2002) reported that the proportion of night-time driving for freight, in terms of vehicle kilometres, had increased from 15.1% in 1996 to 19.4% in 2001, according to Department for Transport statistics. However, much of this freight activity takes place on motorways and other major roads rather than in urban areas.

Some of the surveys have only investigated delivery times at urban establishments while other have considered both delivery and collection times. Three of the studies (Park Royal, Catford and Wallington) that considered deliveries and collections have grouped the results for both together. However, two surveys have provided separate results for delivery and collection times (Norwich and Colchester). The results of these two studies indicate that while the majority of deliveries tend to take place in the morning, collections are more spread throughout the working day.

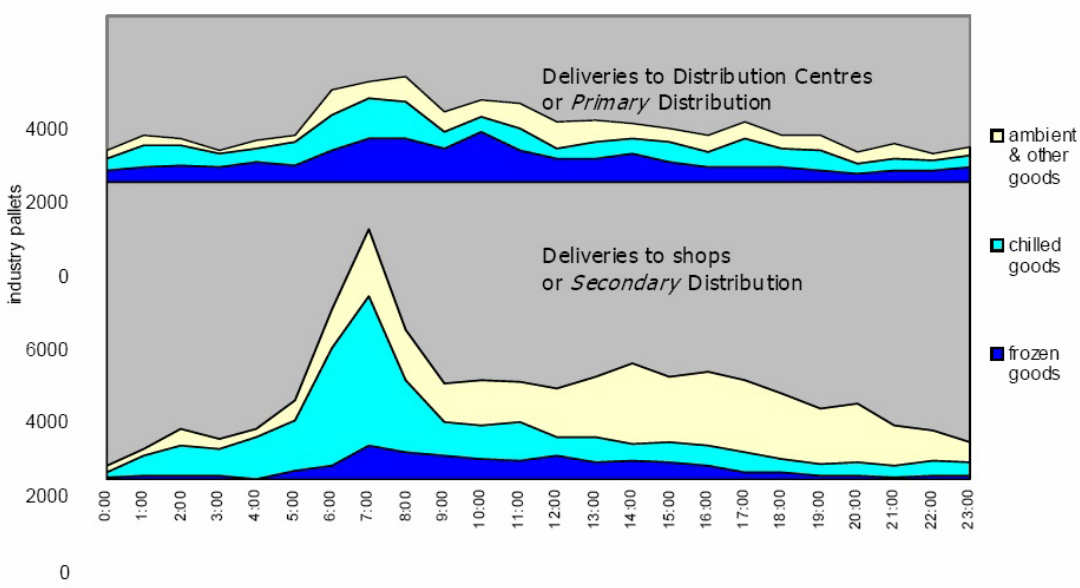
Table 2.16: Delivery and collection times at establishments in recent UK urban freight studies reviewed

Study	Year	Deliveries and/or collections	During morning (06:00 on)	During afternoon	Throughout working day	During evening/ night	Sample size	Survey
Norwich and London	1999	Deliveries	40%	2%	55%	3%	58 respondents	Establishment survey
Norwich	2001	Deliveries	71%	0%	24%	5%	21 respondents	Establishment survey
Norwich	2001	Collections	27%	27%	40%	6%	15 respondents	Establishment survey
Park Royal	2002	Deliveries & collections	48%	39%	-	14%	64 respondents	Establishment survey
Bexleyheath	2003	Deliveries	14%	8%	79%	0%	206 deliveries	Establishment survey
Broadmead, Bristol	2003	Deliveries	59%	2%	35%	4%	212 deliveries	Establishment survey
Chichester, W.Sussex	2005	Deliveries	59%	8%	33%	0%	14 respondents	Establishment survey
Colchester	2005	Deliveries	67%	30%	-	2%	322 respondents	Establishment survey
Colchester	2005	Collections	54%	43%	0%	3%	234 respondents	Establishment survey
Crawley, W.Sussex	2005	Deliveries	57%	6%	37%	0%	9 respondents	Establishment survey
Horsham, W.Sussex	2005	Deliveries	37%	8%	42%	6%	14 respondents	Establishment survey
Wallington**	2005	Deliveries & collections	58%	42%	-	n/a	267 deliveries and collections	Observation survey
Worthing, W.Sussex	2005	Deliveries	45%	13%	39%	0%	14 respondents	Establishment survey
Catford*	2006	Deliveries & collections	57%	43%	-	n/a	725 deliveries and collections	Observation survey
Bromley	2007	Deliveries	47%	7%	41%	5%	531 deliveries	Establishment survey
Croydon & Sutton	2007	Deliveries	45%	5%	40%	10%	777 deliveries	Establishment survey

Notes:
* - survey from 07:00-15:00
** - survey from 07:00-19:00
“n/a” – not applicable

Other research (McKinnon, 1999) has suggested that the peak for deliveries to food retailers is 05:00-09:00 hours (see Figure 2.1), so food deliveries, together with deliveries and collections at industrial establishments, and some deliveries to major non-food retail chains may account for the majority of goods vehicle movements at night and in the early morning. However for non-food deliveries to smaller retail establishments and for deliveries to other types of businesses a peak of 08:00-12:00 hours is probably more common.

Figure 2.1: Food deliveries by time of day (McKinnon, 1999)



Earlier urban freight research (Allen *et al*., 2000) suggested that many retailers had a marked preference for morning deliveries so that they can begin their working day by unpacking and sorting deliveries while the premises are relatively quiet and so that customers do not have to wait for goods to arrive, as well as due to operating time restrictions. This work also noted that, although some deliveries take place during the very early morning, before the morning traffic peak, and in the later morning, after the morning traffic peak has subsided, a sizeable amount of deliveries coincide with the morning traffic peak, with its associated congestion problems.

A few of the UK urban freight studies reviewed have investigated who determines the time at which deliveries and collections take place. The Covent Garden study found that only approximately 40% of respondents at receiving establishments felt they had any control over delivery times, and half of these respondents felt their control was limited. In Colchester only 31% of respondents at receiving establishments felt they had any control over delivery times. When asked who controlled delivery times, approximately 40% of respondents believed it was the supplier and 30% believed the carrier. In Norwich, of the 17 respondents expressing a view on the organisation of delivery times, 11 respondents felt that the carrier controlled the timing, 3 thought it was the supplier and carrier, and only 4 felt that they (the receiver) had any influence on delivery times.

2.3.2 Day of week

The recent UK surveys reviewed indicate that the vast majority of collections and deliveries are made on weekdays (Monday to Friday) with comparatively little activity at the weekend. Table 2.17 shows the proportion of total weekly vehicle deliveries and collections (or just deliveries in some cases) on each day of the week at establishments in the 15 studies

reviewed that contain data about this topic. In the case of one study (Park Royal) it has been necessary to estimate the average number of vehicle collections and deliveries on each day from results provided in the study report that were grouped into ranges of collection and delivery dwell times (e.g. 1 delivery/collection, 2-5 deliveries/collections, 6-10 deliveries/collections etc.).

Friday is the busiest day for vehicle deliveries and collections at establishments in approximately half of the studies. Monday is quietest weekday for vehicle deliveries and collections in more of the studies than any other weekday, followed by Tuesday. Sunday is the least busy day in the week for deliveries and collections at establishments in all the studies. Saturday is quieter than weekdays in all but three of the studies, and these are all London wholesale produce markets. However, in general, the differences in the number of deliveries (and collections) at establishments between Monday to Friday are relatively small in many of the studies.

Table 2.17: Vehicle deliveries and collections at establishments by day of week in recent UK urban freight studies

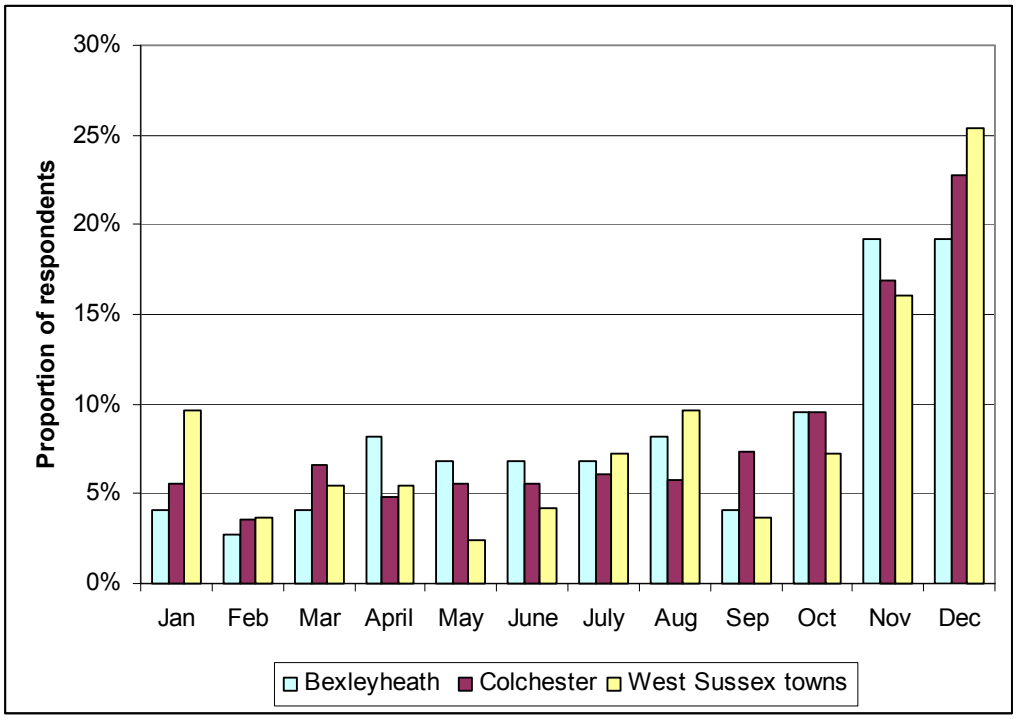
Study	Year	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Survey type	Just deliveries or deliveries & collections
Park Royal	2002	18%	18%	18%	18%	18%	8%	3%	Establishment survey	Deliveries & collections
Bexleyheath	2003	18%	19%	18%	19%	20%	5%	0%	Establishment survey	Deliveries
Ealing*	2004	17%	20%	23%	16%	17%	7%	n/a	Observation survey	Deliveries
Colchester	2005	18%	17%	19%	19%	21%	4%	1%	Establishment survey	Deliveries
Chichester, W.Sussex	2005	18%	22%	18%	18%	18%	5%	1%	Establishment survey	Deliveries
Crawley, W.Sussex	2005	13%	15%	22%	21%	15%	7%	6%	Establishment survey	Deliveries
Horsham, W.Sussex	2005	15%	14%	18%	18%	23%	9%	2%	Establishment survey	Deliveries
Worthing, W.Sussex	2005	18%	20%	11%	20%	17%	11%	2%	Establishment survey	Deliveries
Catford	2006	14%	19%	21%	16%	26%	2%	2%	Establishment survey	Deliveries
Western International	2006-7	13%	12%	14%	16%	20%	15%	9%	Observation survey	Deliveries & collections
New Convent Garden	2006-7	15%	15%	17%	19%	19%	11%	4%	Observation survey	Deliveries & collections
New Spitalfields	2006-7	14%	16%	17%	17%	20%	15%	1%	Observation survey	Deliveries & collections
Billingsgate	2006-7	4%	19%	17%	21%	22%	18%	0%	Observation survey	Deliveries & collections
Smithfield's	2006-7	12%	14%	18%	22%	21%	9%	5%	Observation survey	Deliveries & collections
Bromley	2007	18%	25%	15%	18%	17%	7%	1%	Establishment survey	Deliveries

Note: * - observation survey did not include Sunday

2.3.3 Time of year

As one might expect the run up to Christmas tends to be the busiest time of year for retail and other vehicle deliveries to establishments. The studies in Bexleyheath, Colchester and West Sussex towns (Chichester, Crawley, Horsham and Worthing) all confirm this (see Figure 4.2). Respondents in establishments were given the opportunity to indicate their busiest month(s) for deliveries, with more than one response allowed. Figure 2.2 shows the proportion of all responses accounted for by each month of the year. In each of these three studies, November received approximately twice as many responses and December three times as many responses as the average month.

Figure 2.2: Busiest month(s) of the year for receiving vehicle deliveries at establishments in UK urban freight studies (more than one response permitted), West Sussex towns, 2005



The West Sussex study showed that during the peak business periods of November and December the mean number of weekly core goods deliveries generated by the respondents' establishments increase by 46%.

Meanwhile, the Torbay survey indicated that the peak months for delivery were July and August, followed by June and December. Troughs occurred in November, January, February and March. This result reflects the fact that Torbay, being a holiday destination, is busiest during the traditional holiday period in the summer.

As well as the number of vehicle deliveries increasing during busy periods of the year, the quantity of goods delivered on each vehicle can also increase. The study of Broadmead, Bristol in 2003 investigated changes in delivery quantities with retailers. The results are shown in Table 2.18.

Table 2.18: Changes in average quantity delivered per vehicle in typical and busiest week, Broadmead, Bristol, 2003

Type of retailer	Sample size	Change in quantity delivered (%)
Accessories	2	150
Bank/building society	1	0
Card/gift retail	6	174
Clothes	38	144
Department store	5	49
Electronics	12	32
Entertainment retail	15	248
Food outlet	50	41
Food retail	4	115
Footwear	5	81
Hairdressers	15	84
Home furnishings	11	115
Jewellery	5	309
Optician	4	25
Other	7	93
Retail others	23	88
Sports retail	4	78
Toy shop	3	169
Travel agent	2	71
Total	212	
Average		91

Table 2.18 indicates that the change in quantity delivered per vehicle ranged from 0% at a Bank/Building Society to 309% at jewellery stores. Types of retailer expecting at least a doubling in the quantity delivered in the busiest week were cards/gift stores, clothes retailers, entertainment retailers, food retailers, home furnishings retailers, jewellery stores, and toy shops.

Similar survey work was carried out with retailers in the Bromley and Croydon/Sutton studies in 2007. On average, respondents in Bromley and Croydon/Sutton expected 28% and 50% increase respectively in the quantity delivered per vehicle in the busiest week compared with a typical week.

2.4 Vehicle types used to make deliveries

A cross-survey comparison of vehicle types used for delivering goods to establishments is shown in Table 2.19. The variations in vehicle types used at establishments in different studies reflect not only the different locations but also the varying characteristics of the studies. In some cases (e.g. Croydon/Sutton and West Sussex) deliveries by car do not appear to have been considered (it seems unlikely that none at all were made by car). Also, “other” vehicles were only included in a few of the studies. The type of businesses that were surveyed is another major contributory factor in vehicle types used (as the vehicle selection is related to the type of product that needs to be carried). The proportion of light good vehicles used in the Leeds and Winchester study of 1996 is notably low – this is explained by the fact that this study only included large multiple retailers, who are more likely to receive their goods in rigid and articulated goods vehicles.

Table 2.19: Vehicle types used for deliveries to establishments in recent UK urban freight studies

Study	Year of study	Articulated goods vehicle	Rigid goods vehicle	Light goods vehicle	Car	Other*	Total
Leeds	1996	17%	81%	2%	-	-	100%
Southampton	1996	45%	16%	38%	-	-	100%
Winchester	1996	30%	59%	11%	-	-	100%
Winchester	2001	16%	50%	33%	1%	-	100%
Reading (Market St)**	2002-3	1%	17%	75%	6%	1%	100%
Reading (Market St)**	2002-3	2%	28%	55%	15%	1%	100%
Reading (Friar St)	2002-3	16%	26%	51%	1%	6%	100%
Bexleyheath	2003	10%	39%	45%	6%	-	100%
Broadmead, Bristol	2003	21%	34%	45%	-	-	100%
Ealing	2004	4%	18%	60%	15%	3%	100%
Chichester, W.Sussex	2005	42%	39%	19%	-	-	100%
Colchester	2005	10%	26%	35%	23%	7%	100%
Crawley, W.Sussex	2005	48%	32%	20%	-	-	100%
Horsham, W.Sussex	2005	29%	23%	48%	-	-	100%
Worthing, W.Sussex	2005	24%	28%	48%	-	-	100%
Wallington	2005	2%	72%	25%	-	-	100%
Catford	2006	1%	31%	68%	-	-	100%
Bromley	2007	29%	41%	27%	-	2%	100%
Clapham Junction	2007	21%	32%	35%	-	-	100%
Croydon & Sutton	2007	26%	39%	25%	-	9%	100%
Kingston	2007	0%	55%	45%	-	-	100%
Lewisham	2007	0%	42%	58%	-	-	100%
Lisson Grove	2008	3%	42%	54%	1%	-	100%

Notes:
* - "Other" includes motorcycle, taxis and minibuses. In the case of the Bromley and Croydon and Sutton studies “other” includes private cars.
** - the first entry for the Reading (Market St) survey is a vehicle observation survey, while the second entry is based on an establishment survey.
In the case of Catford, Colchester, Reading and Wallington vehicles used for collections and deliveries are included.

The vast majority of the studies listed in Table 2.19 used establishment surveys to collect data about vehicle types used for deliveries. However four studies (Catford, Ealing, Wallington, and the first entry for Reading (Market Street)) used vehicle observation surveys. The establishment survey relies on the respondents in the establishment to have a good recognition of the mix of vehicles used to make deliveries to their site. Whether respondents have such knowledge is open to question. The two different entries in Table 2.19 for the Reading (Market Street) study suggest that respondents in establishments may not have very good insight into the vehicle types used to make deliveries to them. The first entry is based on an observation survey and the second on an establishment survey – the use of light goods vehicles is higher and rigid goods vehicles lower in the observation survey compared with the response provided in the establishment survey. In addition the use of cars is far greater in the establishment survey than in the observation survey. Either the

vehicle types used to make deliveries at the time of the observation survey differed from the norm or the respondent in the establishment provided incorrect information about the vehicle mix.

As one would expect, many different vehicle types are used for deliveries. In the Birmingham/Basingstoke/Norwich study, for example, (which is not shown in Table 2.19) the seven distribution companies that were interviewed used vehicles ranging in gross vehicle weight from 3.5 tonnes to 38 tonnes with each company using two or three different sizes of vehicle. From the retailers' perspective, the Norwich/London study indicated that 58% of the surveyed businesses were serviced by different vehicle types, ranging in size from light goods vehicles to large, heavy goods vehicles. Light goods vehicles were used exclusively for only 19% of these businesses and most of these were independent businesses rather than multiple outlets, many receiving relatively small average delivery sizes and sourced goods from several different suppliers, each of which either delivered the goods directly themselves or contracted an express/parcels company to make the delivery.

The Winchester study of 2001 provided a breakdown of the type of vehicle making deliveries at establishments by business type (see Table 2.20). The results indicated that for core food deliveries, rigid lorries were most commonly used, while light goods vehicles were the main vehicle of choice for the services sector. Articulated goods vehicles were used by warehousing and manufacturing premises in the more industrial areas of Winchester more than for deliveries to other types of establishments in the city centre.

Table 2.20: Core goods deliveries by type of establishment and vehicle type in Winchester, 2001

Establishment type	Articulated goods vehicles	Rigid goods vehicles	Light goods vehicles	Cars	Total
Food retail	21%	56%	23%	0	100%
Clothing retail	32%	42%	26%	0	100%
Other retail	8%	38%	50%	5%	100%
Restaurant	57%	14%	14%	14%	100%
Public House	0	70%	30%	0	100%
Hotel	0	100%	0	0	100%
Banks	0	0	100%	0	100%
Other Services	5%	21%	66%	8%	100%
Warehousing	22%	45%	33%	0	100%
Manufacturing	27%	34%	39%	0	100%
Personal Services	0	25%	60%	15%	100%

The Ealing and Wallington studies also examined the vehicle types providing collections and deliveries to various types of establishments. The results are shown in Table 2.21.

Table 2.21: Vehicle collections and deliveries by type of establishment and vehicle type in Ealing, 2004 and Wallington, 2005

	Shops	Financial and professional services	Pubs, cafes and restaurants	Office	Other*	Total
Wallington, 2005						
LGV	33%	29%	23%	13%	8%	25%
MGV	46%	58%	53%	78%	72%	57%
HGV	21%	13%	23%	9%	20%	18%
Total	100%	100%	100%	100%	100%	100%
No. of C&Ds**	132	24	30	55	25	266
Ealing, 2004						
LGV	58%	67%	58%	-	83%	60%
MGV	16%	15%	25%	-	0%	18%
HGV	6%	2%	3%	-	8%	4%
Car	17%	14%	12%	-	8%	15%
Other***	3%	2%	2%	-	0%	3%
Total	100%	100%	100%	-	100%	100%
No. of C&Ds	587	190	260	-	12	1049

Notes:
* - "Other" includes general industry, storage, entertainment and health centres.
** - "No. of C&Ds" – total number of vehicle collections and deliveries observed.
*** - in case of Wallington "other" includes motor cycles, bicycles, taxis. In case of Ealing "other also includes office.
LGV – light goods vehicles (up to 3.5 tonnes)
MGV – rigid goods vehicles (3.5 – 7.5 tonnes)
HGV – rigid goods vehicles over 7.5 tonnes and articulated goods vehicle

Table 2.21 indicates major differences in the types of vehicle used to service the same types of establishments in the Ealing and Wallington surveys. In general there was far less use of light goods vehicles in Wallington (25% of all collections and deliveries) than in Ealing (60%).

The Colchester study also examined the relationship between numbers of deliveries and the types of vehicles used and found that:

- Articulated lorries were most commonly used for those businesses receiving large numbers (more then 40) of weekly deliveries.
- Rigid lorries were most commonly used for those businesses receiving between 21-40 weekly deliveries.
- Light vans were prevalent in delivering to town centre premises.
- Cars were used to deliver to 20% of premises but were not allowed legally to use loading bays.

Allen *et al*., (2000) observed that vehicle size and weight restrictions or road widths might influence what vehicles are used in certain areas. For example, in Norwich some of the city centre roads are narrow which forces the use of smaller vehicles than might otherwise be used. They also observed that where the driver has to make a relatively large number of deliveries to different premises then it might be the amount of work that the driver can

perform in a day that constrains the volume of goods that can be delivered and hence the size of vehicle required.

2.4.1 Vehicles based at the urban establishment

The Colchester study in 2005 investigated whether vehicles were based at the urban establishments studied for the purpose of making goods collections and deliveries. Of the 242 urban establishments surveyed, 37% did have such a vehicle based at the site. Of all the vehicles used by establishments to make collections and deliveries, 46% were light goods vehicles, 40% were cars, 12% were rigid or articulated goods vehicles over 3.5 tonnes, and 2% were motorcycles.

2.5 Vehicle dwell times

Vehicle dwell times are of interest because they indicate the amount of time that goods vehicles occupy road space while carrying out loading and unloading activities. Shorter dwell times help to increase the number of deliveries and collections that a vehicle can make in a day and also help to reduce the traffic delays that vehicles stopping to load and unload can cause for other road users.

Several of the studies have collected data about average dwell times. Sometimes this has been gathered through vehicle observation surveys and in other cases by questioning an employee of the establishment. The use of establishment surveys to investigate dwell times is likely to provide less accurate results than a vehicle observation survey. This is because the respondent in the establishment: i) does not tend to know how long the entire process really takes from vehicle to establishment and back again instead they only witness the time the driver spends at their establishment, ii) does not know whether the person delivering/collecting goods from their establishment returns immediately to their vehicle and drives away or whether they make further collections/deliveries before moving the vehicle – i.e. once a vehicle is parked it may make more than one collection/delivery before being moved, and iii) will typically provide an average time taken for loading/unloading for all deliveries and collections rather than being able to provide information about whether dwell times vary for different sizes/weights of goods vehicle (and even if they do the accuracy of the data provided may be questionable).

The estimated average dwell times for all vehicles from the recent UK studies reviewed are shown in Table 2.22. In the case of some of the studies reviewed it has been necessary to estimate the average dwell time from results provided in study reports that were grouped into ranges of dwell times (e.g. less than 5 minutes, 5-10 minutes, 11-20 minutes etc.).

Table 2.22: Average vehicle dwell times for loading/unloading in recent UK studies (minutes)

Study	Year	Average delivery time (all vehicle types)	Survey technique
Norwich and London	1999	27	Establishment survey
Norwich	2001	11	Establishment survey
Reading (Friar Street)	2002-3	30	Establishment survey
Reading (Market Place)	2002-3	9	Observation
Reading (Market Place)	2002-3	15	Establishment survey
Broadmead, Bristol	2003	17	Establishment survey
Ealing	2004	16	Observation
Colchester	2005	14	Establishment survey
Chichester, W.Sussex	2005	33	Establishment survey
Crawley, W.Sussex	2005	29	Establishment survey
Horsham, W.Sussex	2005	17	Establishment survey
Worthing, W.Sussex	2005	22	Establishment survey
Wallington	2005	7	Observation
Catford	2006	25	Establishment survey
Catford	2006	8	Observation
Catford	2006	34	Driver survey
Clapham	2007	14	Observation
Croydon	2007	18	Observation
Kingston	2007	25	Observation
Kingston	2007	17	Establishment survey
Lewisham	2007	22	Observation
Merton	2007	14	Observation
Lisson Grove	2008	16	Establishment survey

The average dwell time in the various studies reviewed ranges from 8-34 minutes. Previous research has identified that vehicle dwell time when loading/unloading will depend on a wide range of factors including (Allen et al., 2000):

- The distance from the goods vehicle to the premises
- The location at which the vehicle parks (off-street v on-street)
- The size of delivery
- The weight of the goods
- The type of product
- Whether or not the goods are unitised
- The means of getting goods off the goods vehicle
- The means of conveying the goods from the vehicle to premises
- Whether the driver has to close and lock the vehicle
- The number of people performing the delivery
- Whether staff at the receiving establishment assist with loading/unloading
- Whether or not the goods have been pre-ordered by the establishment or not (i.e. van sales)

- Whether or not goods have been sorted for delivery prior to the vehicle despatch from the warehouse
- The extent to which receiver checks goods
- Whether or not staff at the receiving establishment need to be present at the time of delivery
- Whether or not the driver requires a signature for delivery
- Whether or not other deliveries/collections are taking place at the receiving establishment at the same time

Table 2.23 includes some studies in which both observation and establishment surveys were conducted into vehicle dwell times (Kingston, Catford and Reading – Market Place). In the case of Catford and Reading (Market Place) the observation survey provided a lower average dwell time than the estimates provided by respondents in establishments (8 compared with 25 minutes, and 9 compared with 15 minutes respectively). However in the case of Kingston observed average dwell times were 25 minutes compared with establishment survey results of 17 minutes respondents (but with a particularly small sample size). In the case of the Catford survey drivers were also interviewed about average dwell times, and this provided an even higher estimate than either the observation or establishment surveys of 34 minutes. This indicates the extent to which survey technique may also be a major factor in estimated dwell times.

It is important to note that usually in an establishment survey the respondents are only asked to provide the average dwell time for all deliveries rather than the average times for different vehicle sizes. However, in some establishment survey the respondent is asked to provide average dwell times for different sizes of vehicle that unless this information is used in conjunction with information about the importance of each of these vehicle sizes in making deliveries to the establishment, can result in a mis-estimation in the average dwell time for all vehicles delivering to the establishment.

Some studies collected data about the average dwell times by vehicle size/weight. Most of these have been vehicle observation surveys but some have been establishment surveys. These results are shown in Table 2.24. The results reflect that, in general larger vehicles making deliveries/collections, have longer dwell times than smaller vehicles.

Table 2.24: Average dwell times for loading/unloading in recent UK studies by vehicle type (minutes)

Study	Year	Type of survey	Articulated lorry	Rigid lorry	Van	Car	Motor-cycle
Winchester - Bar End	2001	Observation survey	50	20	8	7	-
Winchester - Winnall	2001	Observation survey	21	13	7	7	-
Winchester city centre	2001	Observation survey	31	21	9	9	-
Winchester High Street	2001-2	Observation survey	41	20	12	7	-
Reading	2002-3	Observation survey	11	11	9	6	6
Bexleyheath	2003	Observation survey	22	22	7	6	-
Bexleyheath	2003	Establishment survey	21-30	21-30	16-21	15	-
Ealing	2004	Observation survey	16	14	19	8	-
Chichester, W.Sussex	2005	Establishment survey	42	33	11	-	-
Crawley, W.Sussex	2005	Establishment survey	48	14	7	-	-
Horsham, W.Sussex	2005	Establishment survey	33	18	7	-	-
Worthing, W.Sussex	2005	Establishment survey	38	33	7	-	-
Wallington	2005	Observation survey	21	7	7	-	-
Catford	2006	Observation survey	5	13	11	-	-

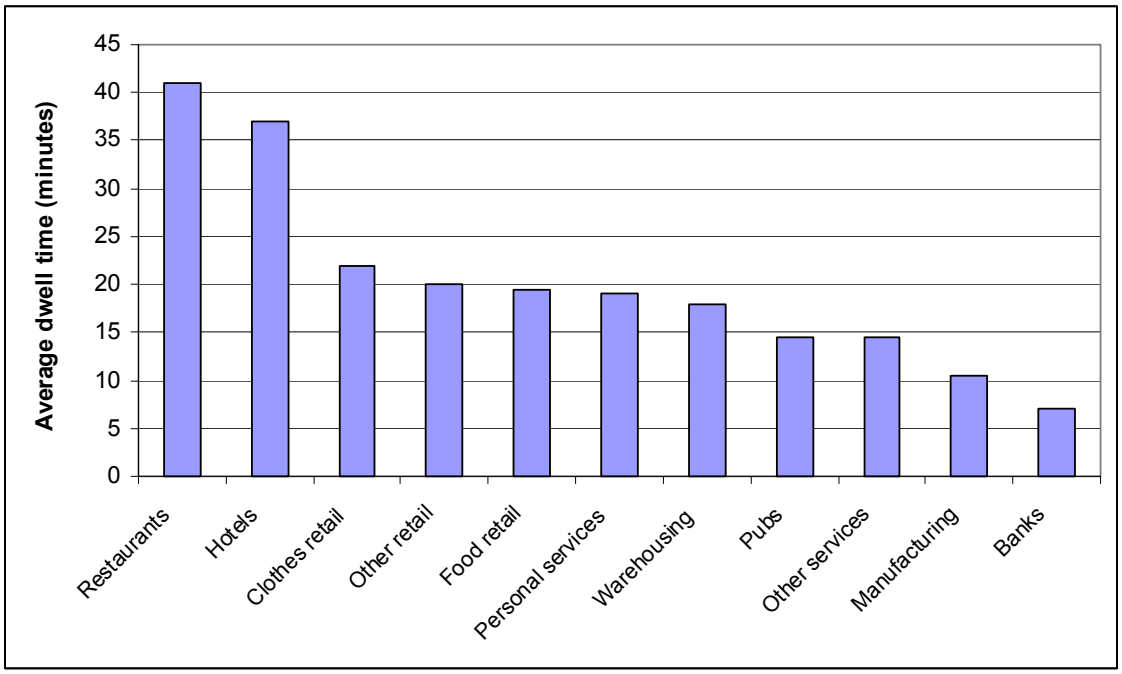
Some studies have examined dwell times by establishment types. Examples from Wallington and Winchester are provided in Table 2.25 and Figure 2.3.

Table 2.25: Dwell times for loading/unloading by type of establishment in Wallington, 2005

Type of establishment	5 minutes or less	6 - 10 minutes	11 - 20 minutes	21 - 30 minutes	Over 30 minutes	Total
Shops	52%	25%	15%	4%	4%	100%
Financial and professional services	50%	42%	8%	0%	0%	100%
Cafes and restaurants	57%	30%	13%	0%	0%	100%
Office	55%	27%	11%	5%	2%	100%
Other*	72%	16%	12%	0%	0%	100%
Total	55%	27%	13%	3%	2%	100%

Note: * - Other includes general industry, storage, entertainment and health centre.

Figure 2.3: Dwell times for loading/unloading by type of establishment in Winchester, 2001-2



2.5.1 Total time occupied on public roads by vehicles loading/unloading

Using data from the West Sussex towns study it is possible to calculate the average time taken on-street for core goods deliveries per establishments per week for each of the four towns (see Table 2.26). This ranges from 24 minutes per establishment week in Crawley to 119 minutes per establishment week in Worthing.

If thinking about a single parking space outside an urban establishment, the results indicate that, on average, each receiving establishment takes up 0.8% (Crawley) to 4.1% (Worthing) of the total parking time available in this on-street per week to receive its core goods deliveries (assuming 6 day week, 8 hour day). This calculation takes no account of the size of goods vehicles making these deliveries, which are typically larger than cars, and therefore occupy an even greater proportion of kerb space allocation than time allocation during a typical week. In addition, it should be remembered that establishments receive other collections, deliveries and services vehicle visits in addition to these core goods deliveries. Therefore the total proportion of available kerb space and time required by each establishment is even greater than suggested by these calculations.

As part of the West Sussex study it was calculated that the average establishment generates 54 minutes of standing vehicle time per day over a six-day trading week in receiving its core goods deliveries and service vehicle visits. However not all of this parking takes place on-street, especially in the case of service visits that take a long time to perform (58% of all core goods deliveries took place on-street across the entire sample of respondents).

Table 2.26: Average time taken on-street for core goods deliveries per establishment per week using data from the West Sussex study, 2005

	Chichester	Crawley	Horsham	Worthing	West Sussex towns
Number of establishments responding	14	9	14	14	51
Total core goods deliveries per week to all establishments	89	51	125	102	367
Ave core goods delivery trips per establishment per week	6.4	5.7	8.9	7.3	7.2
Total unloading time of core goods delivery vehicles per week (hours)	35.6	27.3	33.9	39	135.8
Unloading time on-street (%)	69	13	62	71	58
Unloading time on-street of core goods delivery vehicles per establishment per week (in minutes)	105.3	23.7	90.1	118.7	92.7

2.5.2 Presence of staff and checking goods at receiving establishment

As previously mentioned, if staff at the establishment need to be present at the time of delivery this can extend the time taken to make a delivery (especially if they are not immediately available on arrival of the driver). In the Winchester study in 2004, 89% of respondents at establishments receiving goods said that a member of their staff had to be present when a delivery from their main supplier took place (sample size of 74 respondents).

The need for staff at the establishment receiving the delivery to check and sign for the goods can also extend the time taken to make deliveries. In the Norwich/London study in 1999, 78% of respondents at establishments said that all deliveries had to be checked, while 12% said that some deliveries required checking (sample size of 51 respondents). In the same study, 82% of respondents at establishments said that all deliveries had to be signed for, while 10% said that some deliveries required signing for (sample size of 50 respondents).

2.5.3 Delivery vehicle crew size

The vast majority of deliveries to urban establishments are made by a sole driver. However, some deliveries are made by a crew of more than one. Reasons for having a crew of more than one include: i) due to size and weight of goods to be delivered, especially when the goods have to be installed in the establishment and there is limited scope to use handling equipment, ii) to speed up the time taken to make each delivery especially in locations where it is difficult to find a parking space, and iii) when delivering to locations that are considering unsafe or delivering products that may be subject to attempted robbery and a person is required to remain in the vehicle to guard it while the delivery takes place.

Only three UK urban freight studies have been identified that have investigated the size of the delivery crew. A vehicle observation study in Covent Garden, London found that 9% of deliveries on the street observed involved a two-person crew, while the rest only involved a driver (sample size 35 vehicle observations) (Delgado, 2005). The Catford study in London in 2006 found that 28% of the delivery and collection trips observed involved a two person crew. The Wallington survey in London in 2006 found that 10% of all drivers interviewed were working in a two-person crew, while 90% while working by themselves (sample size of 77 drivers).

2.6 The loading/unloading process

2.6.1 Stopping locations while making deliveries

Several of the studies reviewed have examined where goods vehicles park while loading and unloading in urban areas. On-street stopping locations are potentially liable to cause more traffic delays to other road users compared with off-street locations. However off-street locations can also cause traffic problems if they are difficult to manoeuvre the vehicle in and out of. The availability of off-street loading/unloading locations in urban areas varies depending on the type of location served. Table 2.27 shows the proportion of loading/unloading that takes place on-street and off-street in the recent UK studies reviewed.

Table 2.27: Proportion of loading/unloading that takes place on-street and off-street in recent UK studies reviewed

Study	Year	On-street	Off-street	Comments
Norwich	2003	95%	5%	Retail street
Reading (Market Place)	2002-3	90%	10%	Town centre street
Wallington	2005	90%	10%	High street
Lisson Grove	2008	89%	11%	High street
Clapham Junction	2007	85%	15%	Retail street
High Street, Winchester	2001	82%	18%	High street
Worthing, W.Sussex	2005	71%	29%	Major retail chains in town centre
Colchester	2005	70%	30%	Town centre streets
Chichester, W.Sussex	2005	69%	31%	Major retail chains in town centre
Norwich and London	1999	64%	36%	Wide range of establishments across urban areas
Horsham, W.Sussex	2005	61%	39%	Major retail chains in town centre
Torbay	2003	59%	41%	Retailers plus hotels, supermarkets, manufacturers, and hospital
Park Royal	2002	22%	78%	Industrial estate
Broadmead, Bristol	2003	13%	87%	High proportion of respondents in shopping centre
Crawley, W.Sussex	2005	13%	87%	Most respondents in shopping centre
Sutton and Croydon	2007	13%	87%	High proportion of respondents in shopping centre
Bromley	2007	10%	90%	High proportion of respondents in shopping centre

Even when off-street loading facilities exist, this does not necessarily mean that they are always used. For example, in the Park Royal study, 14% of respondents said that their establishment did not have off-street facilities for goods vehicles, but 22% of respondents received deliveries from vehicle parked on-street.

2.6.2 Legal and illegal loading/unloading

Three of the studies reviewed have examined whether or not on-street loading/unloading is carried out legally by drivers. The results are shown in Table 2.28.

Table 2.28: Contraventions of loading regulations in UK urban freight studies reviewed

Study	Proportion of on-street deliveries/collections that contravene loading regulations
Reading (Market Place) – 2002/3	86%
Ealing – 2004	69%
Wallington – 2005	20%

The results show a wide variation in the proportion of on-street loading/unloading that contravened loading regulations. Obviously the degree of illegal activities is related to the adequacy of the specific loading infrastructure and regulations at the study location as well as the degree of parking enforcement.

In the Wallington study the type of loading contravention was also examined. The most common contravention was stopping in a location in which no loading was permitted (75% of all contraventions), followed by stopping on a yellow line for more than 20 minutes (11%), stopping on a bus stop (9%), and double parking (4%). Vehicle types (i.e. LGVs, MGVs, and HGVs) involved in these loading contraventions were also recorded. The involvement of vehicle types in loading contraventions were found to be proportional to the amount of collection and delivery work they carried out.

2.6.3 Goods handling

Some types of goods might require the use of special types of vehicle or in-vehicle equipment. For example, some foods might require refrigeration; some clothes might need to be hung to avoid creasing. The method of moving goods from the vehicle to the establishment has a bearing on the time taken for the delivery and also on the disruption and potential for accidents with pedestrians when making deliveries from on-street and having to transfer the goods across the pavement.

The most detailed urban freight survey work on the topic of goods handling from the vehicle to the establishment has taken place in the surveys of Bromley and Sutton/Croydon in 2007. Both of these surveys involved a high proportion of major retail chains many of whom were located in shopping centres. Table 2.29 and 4.30 show the results of these two surveys in which establishments provided details of each delivery they received and the method by which this was moved from vehicle to establishment.

Table 2.29: Type of packaging used in deliveries to establishments, Bromley and Croydon/Sutton, 2007

Packaging type	Bromley (% of deliveries)	Croydon & Sutton (% of establishments)
Loose boxes	68%	56%
Combination of two or more	20%	25%
Pallets	5%	11%
Roll cages	4%	1%
Other	3%	6%
Hanging rails	0%	1%
Total	100% (531 deliveries)	100% (183 establs)

Table 2.30: Type of packaging used in deliveries to establishments, Bromley and Croydon/Sutton, 2007

Packaging type	Bromley (% of deliveries)	Croydon & Sutton (% of deliveries)
Loose boxes	61%	60%
Loose boxes & hanging rails	8%	2%
Pallets & roll cages	7%	0%
Pallets	6%	9%
Roll cages	6%	3%
Loose boxes & pallets	5%	7%
Other	3%	7%
Hanging rail, roll cages & other	2%	0%
Loose boxes & other	1%	9%
Loose boxes & roll cages	0%	0%
Hanging rails	0%	2%
Total	100% (409 deliveries)	100% (641 deliveries)

Tables 2.29 and 2.30 indicate the high proportion of goods that are delivered in loose boxes. These can take time for the driver to locate on the vehicle if there are several, depending on the extent to which they have been sorted prior to departure from the depot. Sometimes loose boxes are simply carried by the driver into the establishment if there are few, but in the case of many boxes the driver will often use a trolley to transport them. Table 2.x indicates the diversity of packaging types on each separate delivery, which is an important consideration when thinking about any reorganisation of urban freight deliveries which would require additional handling of goods and possibly storage (such as the use of consolidation systems in the supply chain).

A number of other urban freight studies have also considered the method by which goods are transported from vehicle to establishment, either by use of an establishment survey or by driver survey. The results are shown in Table 2.31. Some of these surveys allowed respondents to provide more than one method of goods handling, while others only permitted a single method – this is indicated in the table. The results indicate that transport by hand from the vehicle to point of delivery is by far the most common method in all studies. This indicates the relatively small size of most deliveries to urban establishments. However, the results indicate that trolleys, cages, and hand, pallet and forklift trucks are also widely used.

Table 2.31: Method of transporting goods delivered from vehicle to establishment in recent UK studies reviewed

Method of transport from vehicle to establishment	Norwich 2001	Colchester 2005	Bristol, Broadmead 2003	Catford 2006	Catford 2006	Reading (Market Place) 2002	Reading (Friar Street) 2002	Wallington 2005
By hand	95%	99%	67%	78%	56%	52%	47%	83%
By wheeled cage / roll cage	29%	50%	19%	22%	4%	8%	24%	-
By hanging / wheeled rail	14%	-	21%	4%	-	-	-	-
By hand/pallet/forklift truck	57%	72%	34%	15%	8%	2%	5%	8%
By trolley / tray trolley	24%	-	-	22%	12%	38%	24%	9%
By barrow	-	-	-	24%	16%	-	-	-
No of respondents	46	232	119	45	25	31	30	77
More than one answer allowed?	Yes	Yes	Yes	Yes	No	No	No	No
Survey technique	Establishment survey	Establishment survey	Establishment survey	Establishment survey	Driver survey	Establishment survey	Establishment survey	Driver survey

2.6.4 Access to the receiving establishment

Only two of the studies reviewed have investigated where the deliveries and collection enter and leave the establishment. These results are shown in Table 2.32.

Table 2.32: Where goods delivered/collected enter/leave establishment (% of respondents)

Where goods delivered/ collected enter/leave establishment	Norwich and London, 1999	Lisson Grove, 2008
Through front door	45%	74%
Through back door	41%	23%
Through side door	7%	-
Through cellar hatch	-	8%
Through front door & cellar	5%	-
Through front and side door	2%	-
Total	100%	100%

2.6.5 Destination for goods delivered to the establishment

The location at which the driver hands the goods over to the receiving establishment is the point at which responsibility for the goods transfers from the delivery company to the receiver. The further the distance from the vehicle that goods must be delivered by the driver, the greater the time taken for unloading, and the greater the effect on vehicle utilisation. In general, of the various locations to which drivers can have to transport goods, the longest distance is to the receiver's shop floor or stock room.

Three of the recent UK urban freight studies reviewed have examined the location to which the driver needs to convey the goods as part of the delivery process using establishment surveys. The results are shown in Table 2.33.

Table 2.33: Location the driver delivers goods to in recent UK urban freight studies reviewed (% of respondents)

Driver delivery to	Bromley, 2007	Croydon & Sutton, 2007	Bristol, Broadmead, 2003
Stock room	84%	58%	25%
Service area	7%	1%	3%
Loading bay	4%	13%	13%
Sales floor	4%	22%	55%
Other	1%	1%	3%
Total	100%	100%	100%
Number of respondents	98	183	87

In the case of Bromley and Croydon/Sutton the majority of delivery end destinations were retailer's stock rooms. However in the case of Broadmead the most popular location for delivery is straight to the sales floor, followed by the stock room. Some of respondents with smaller retail stores did not have stock rooms and this accounted for some deliveries direct

to sales floor. The delivery process ends at the loading bay at the establishment for drivers at 13% of respondents' establishments in Broadmead and Croydon/Sutton, but only at 4% of respondents' establishments in Bromley.

2.7 Vehicle rounds

2.7.1 Type of delivery vehicle operator

Several urban freight studies have examined the type of vehicle operator responsible for making deliveries at the urban establishments surveyed.

The Bromley freight study in 2007 identified that of the 470 deliveries for whom the vehicle operator was known to the receiving establishment, 66% were operated by the receiver (or a third party logistics company on their behalf) and 34% were operated by the supplier of the goods (or a third party logistics company on their behalf). This study including mostly large multiple retailers, so the proportion of deliveries made by vehicles either operated by the retailer or contracted by it to a logistics company is likely to be far higher than would be the case for smaller and independent retailers.

In the Winchester freight study of 2004 managers at urban establishments receiving goods deliveries were asked who made these deliveries – respondents were allowed to identify more than one party making deliveries to them. The most common response from these managers was that they received deliveries from express parcels and courier companies (representing 44% of responses made), followed by the receiving establishments' own company vehicles (30% of responses), suppliers' vehicles (18%), third party logistics companies (6%), and 3% of respondents were unsure.

In the Reading study in 2002-3, 63% of respondents in Market Place stated that deliveries to their establishments by suppliers' vehicles, 11% by third party logistics providers' vehicles and 8% by their own vehicles. Meanwhile on Friar Street, 40% of respondents stated that deliveries to their establishments were made by third party logistics providers' vehicles, 37% by their own company's vehicles, and 23% by suppliers' vehicles. These differences between responses from establishments in the two streets are likely to be related to types of businesses – Friar Street respondents were mostly multiple retailers and pubs/bars, while Market Place respondents comprised mostly independent establishments and offices.

The results of the Leeds, Winchester and Southampton study of 1996 are shown in Table 2.34. This study focused mainly on multiple retailers in the three cities.

Table 2.34: Proportion of deliveries to multiple retailers by type of operator, 1996

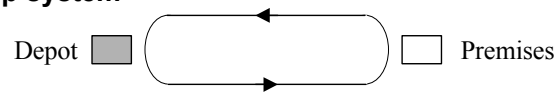
	Own account	Supplier	Logistics company	Express parcels	Total
Leeds	40%	12%	1%	47%	100%
Southampton	41%	12%	30%	16%	100%
Winchester	3%	41%	30%	26%	100%

2.7.2 Types of vehicle rounds

Goods vehicles making deliveries in the urban area can either perform *single-drop* or *multi-drop* journeys.

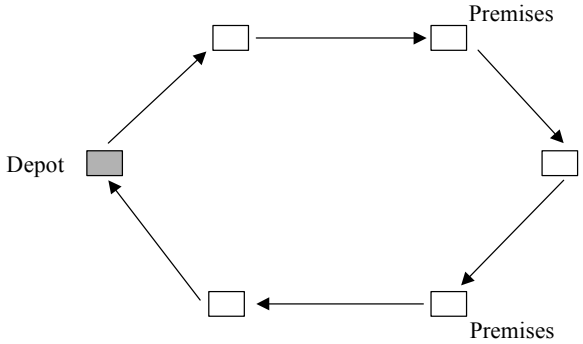
Single-drop journeys (see Figure 2.4) involve the vehicle collecting a load and then transporting it and delivering it to its destination (i.e. the entire load is destined for one establishment). The vehicle then collects another load and delivers it and so on.

Figure 2.4: Single-drop system



Multi-drop journeys (see Figure 2.5) involve the vehicle calling at more than one establishment during the delivery round. The vehicle will collect a load and then makes deliveries to several different establishments, (i.e. each establishments receives part of the vehicle's load). Goods vehicle journeys in which the vehicle calls at more than one establishments to deliver goods are usually referred to as *rounds*.

Figure 2.5: Multi-drop delivery system



Similarly goods collections can be made by either single or multi-pick-up journeys. A single pick-up journey will require a vehicle to call at only one establishment to collect its entire load, whereas a multi- pick-up journey will involve the vehicle in collecting goods from several different establishments on the round.

Whether a goods vehicle performs single- or multi-drop journeys is influenced by a number of factors including:

- The size of each collection/delivery
- The origin and destination
- The time sensitivity of the goods
- The degree of centralisation in the supply chain involved (which affects the opportunity for consolidation goods from different suppliers)
- The size of the goods vehicle to be used

In the Norwich/London study, 48 of the 58 urban establishments surveyed received their deliveries from goods vehicles performing a multi-drop round, 8 received deliveries from vehicles performing a single drop round, and 2 received deliveries from vehicles on both multi- and single-drop rounds.

The Reading study showed that 87% of urban establishments on both streets in the survey work received their deliveries from vehicles performing multi-drop rounds, compared with 13% of respondents receiving deliveries from vehicles on single drop rounds.

The driver survey carried out in the Wallington study found that 42 of the 77 drivers interviewed were on multi-drop rounds, with 35 on single drop rounds.

2.7.3 Vehicle delivery patterns, utilisation and operational efficiency

The Birmingham/Basingstoke/Norwich urban freight study of 2001 examined the operations of seven distribution and logistics operators in these three urban areas in detail, with the intention of comparing different types of freight operations and investigating the impact of geographical and socio-economic differences on these operations. Table 2.35 shows the different vehicle round patterns of local, regional and national distribution operations observed in the seven companies.

Table 2.35: Type of operations and vehicle round patterns observed in the project

Type of operation	Patterns of vehicle round
Urban distribution operation (4 patterns)	• Collections/deliveries wholly within city centre; • Collections/deliveries wholly within rest of urban area (i.e. not in city centre); • Collections/deliveries in city centre and rest of urban area; • Collections/deliveries in urban area and outside urban area.
Regional distribution operation (2 patterns)	• Collections/deliveries wholly within one urban area; • Collections/deliveries in more than one urban area.
National distribution operation (3 patterns)	• Full load delivery for one destination in urban area; • Collections/deliveries wholly within one urban area; • Collections/deliveries in more than one urban area.

Table 2.36 provides a summary of the operating characteristics of the rounds performed by these seven companies during the study. All of the companies' vehicles performed multi-drop rounds. In total, 120 vehicle rounds were studied, and 2286 collections and deliveries were made on these rounds.

As can be seen, the average number of collections and/or deliveries varied significantly between companies. This is related to the distribution operations of the companies. As would be expected, the parcels carrier (company F) had a far higher average than the other companies. By contrast, the two companies involved in dedicated distribution operations from a single national distribution centre for retailers (companies B and D) had, on average, only 2 and 4 deliveries per round, while the company delivering beers and other drinks (company G) had, on average, only 3 deliveries per round. These companies were delivering far more product (in terms of weight and volume) at each delivery point than company F.

Table 2.36 also shows the proportion of total time per round accounted for by driving time and stationary time. The results reflect that the companies delivering goods over quite long distances to relatively few delivery points (i.e. companies A, B, D and E) tend to spend the majority of their time driving. Meanwhile vehicle involved in many local deliveries (i.e. company E) or delivering heavy products (company G) spend a greater proportion of their time stationary while the driver makes deliveries.

The average time taken per delivery (i.e. the time it takes the driver to take the goods to each delivery point and then return to the vehicle and commence driving again) varied widely between companies. This is a reflection of the type and quantity of products delivered by each company.

Table 2.36 also shows the proportion of total collections and deliveries that take place on-street compared with off-street. The results show that the parcel carrier was the only company with a greater proportion of collections/deliveries in which the vehicle was parked on-street rather than off-street.

Companies operating from a single national distribution centre (companies B and D) or a regional distribution centre (companies A and E) can be seen to have far longer average distances per vehicle round than the other companies.

The average distance travelled per collection/delivery reflects the density of addresses served on the vehicle round. This is well illustrated in the case of companies B, C and D. All three companies had similar average distances per vehicle round. However, company G had a far higher average distance per collection/delivery due to the lower delivery density on its rounds, and hence the greater distance between addresses served.

The average speed excluding stops achieved by the companies varied depending on the geography of the vehicle rounds and hence the types of roads used. For companies C and F with depots and virtually all collections/deliveries in the urban area, their average speed was far lower than companies using motorways and “A” roads outside the urban area on the round.

The average speed including stops can be seen far lower than the speed excluding stops. This reflects the total amount of time spent making collections/deliveries on a round, which varied between companies.

Table 2.36: Operating pattern of the seven companies during the study in Birmingham/ Basingstoke/Norwich, 2001

	Company A	Company B	Company C	Company D	Company E	Company F	Company G
Type of operations	Storage & distribution of wines & spirits	Contract distribution for major non-food retailer	General storage & distribution services	Contract distribution for major non-food retailer	General storage & distribution services	Express parcels carrier	Storage & delivery of beer & other drinks
Total number of rounds studied	8	5	12	5	4	41	45
Location of rounds	BM	BM/BE/NW	NW	BM/BE/NW	BE	BM/BE/NW	
Urban, regional or national delivery rounds	Regional	National	Urban	National	Regional	Urban	Urban / Reg
Total coll'ns & deliveries on rounds studied	64	8	212	21	28	1803	150
Weight of vehicles on rounds(gross tonnes)	7.5 /18 / 23	17 / 32	3.5 / 7.5 / 12	32 /35 / 38	7.5 / 17	3.5 /6.5 / 7.5	5/10/23
Average no. of coll'ns/ deliveries per round	8	2	18	4	7	44	3
Average time taken per round (mins)	553	548	247	592	376	276	157
Ave driving time as % of total round time	68%	65%	53%	68%	69%	41%	38%
Ave stationary time as % of total round time	32%	35%	47%	32%	31%	59%	62%
Ave time taken per delivery (mins)	17	111	7	36	15	3	45
Ave time taken per collection (mins)	8	n/a	9	n/a	n/a	6	n/a
Coll'ns/deliveries on-street (% of total)	Not available	0%	41%	10%	14%	58%	Not available
Coll'ns/deliveries off-street (% of total)	Not available	100%	59%	90%	86%	42%	Not available
Average distance travelled per round (km)	285	371	41	361	208	46	45
Ave.distance travelled per coll'n/delivery (km)	37	279	3	87	30	1	23
Ave speed per round (excl. stops) km/hour	46	60	21	50	53	23	45
Ave speed per round (incl. Stops) km/hour	31	39	11	34	36	9	18
Average vehicle fill at start of round (%)*	Not available	79%	61%	74%	43%	63%	61%
Ave vehicle utilisation: time idle (empty) at home depot	Not available	22%	51%	58%	31%	55%	Not available
Ave vehicle utilisation: time vehicle out on coll'n/delivery	Not available	35%	34%	38%	40%	36%	Not available
Ave vehicle utilisation: time (un)loading or waiting at depot, or rest period	Not available	43%	15%	4%	29%	9%	Not available

Notes:
* - Vehicle fill measured in either volume or weight depending on measurement appropriate to company. Collection rounds excluded from this analysis.
"BM" – Birmingham; "BE" – Basingstoke; "NW" - Norwich
"Not available" – data unavailable.

2.7.4 Light goods vehicle operating patterns

Research has taken place into light goods vehicle (LGV) operations in four London boroughs in 2005 and 2006: one in central London (Westminster), two in inner London (Southwark and Lewisham), and one in outer London (Croydon). The research included a survey of establishments that operated LGVs based in the four boroughs to find out about their fleet and fleet replacement strategies, the sectors in which they work, vehicle operating patterns, fuel consumption, driver training and difficulties faced.

In Southwark and Lewisham almost 50 per cent of respondents use LGVs solely for delivery and collection work, approximately 30 per cent use them only for service-related activities, while the remaining 20 per cent of respondents use them for both collection/delivery and service activities.

Responses were obtained from companies in more than twenty different business sectors to indicate the wide range of businesses that make use of LGVs. The sectors that provided most responses were: courier/parcels, construction, catering, wholesaling, florists, glazing, printing and graphics, transport and communication and cleaning services.

The majority of Southwark and Lewisham respondents' LGVs start operations between 06:00 and 09:00 and finish between 16:00 and 19:00. However, approximately one in ten respondents use their LGVs 24-hours per day. On average, LGVs leave and return to their base in Southwark, Lewisham and Westminster four times per day. In Croydon the average was three times per day.

Respondents in Southwark, Lewisham and Croydon estimated that, on average, approximately 30 per cent of their LGV trips are carried out within the borough, and 70 per cent are carried out elsewhere. They reported that, in terms of trips outside their home boroughs, they carry out most trips to Westminster and the City of London. By contrast, Westminster respondents reported that approximately half of their trips were made within the borough. The most frequent location for out of borough trips by Westminster respondents was the City of London.

In terms of overnight parking for their LGVs, operators in Southwark and Lewisham reported that 65% of vehicles were taken home by the driver, 33% were parked off-street at the establishment, and 2% were parked on-street at the establishment.

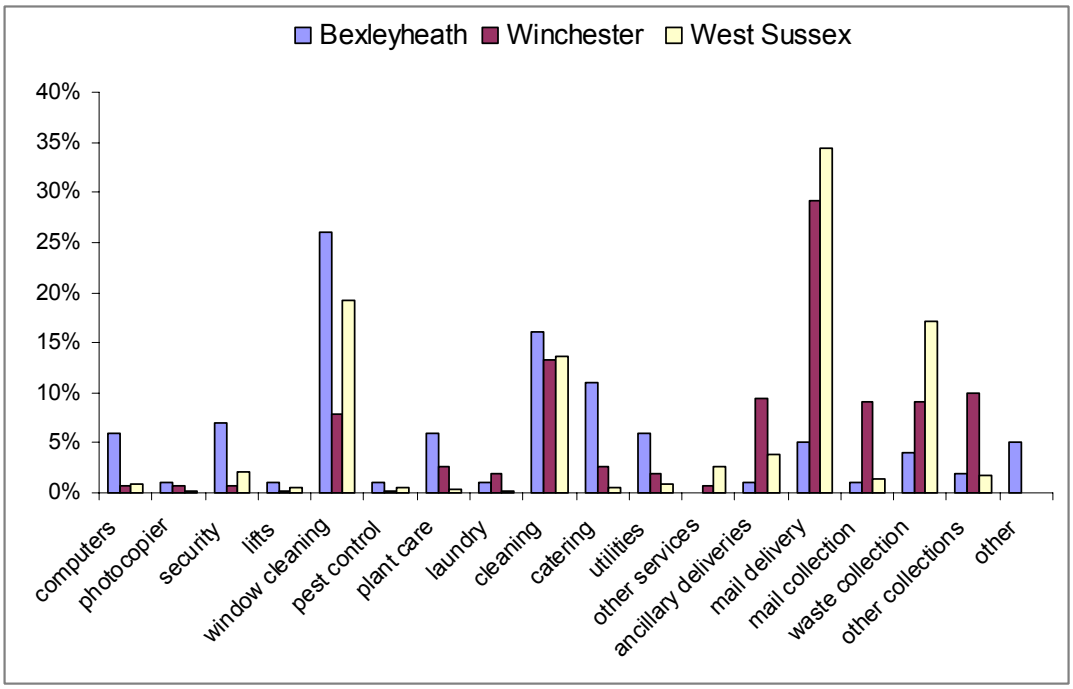
2.8 Service trips to urban establishments

2.8.1 Types of service trips

The Bexleyheath, Winchester and West Sussex surveys all produced a breakdown of service visits by the type of service provided. The results are summarised in Figure 2.6. From Figure 2.6 it can be seen that:

- Mail deliveries were the most common service visit type in Winchester and West Sussex; the definition of mail delivery in Bexleyheath may have been different from Winchester and West Sussex as the proportion of mail deliveries in Bexleyheath is disproportionately small.
- Window cleaning and general cleaning were next most common.
- Waste collection was the third most frequent type of service visit in West Sussex but was lower in Winchester and in Bexleyheath.
- Catering was the 4th most frequent type of service visit in Bexleyheath but was considerably lower in Winchester and West Sussex.

Figure 2.6: Frequency plot of service visits by type, Bexleyheath 2003, Winchester. 2001 and West Sussex towns, 2005



2.8.2 Numbers of service trips

Several of the recent UK urban freight studies reviewed have examined the total number of service trips made to urban establishments. The results are shown in Table 2.37; the number of service trips vary widely between survey locations. The results indicate that service trips to urban establishments are an important trip generator.

Table 2.37: Service trips made to urban establishments in recent UK freight studies reviewed

Study	Year	Number of establishments	Average no. of service trips per establishment per week
Norwich	2001	18	2.7
Central Winchester	2001	112	7.3
Bar End, Winchester	2001	6	14.5
Winnall, Winchester	2001	19	14.0
All Winchester	2001	137	8.6
Bexleyheath	2003	21	5.7
Chichester, W.Sussex	2005	14	7.9
Crawley, W.Sussex	2005	9	7.1
Horsham, W.Sussex	2005	14	8.7
Worthing, W.Sussex	2005	14	12.6

Table 2.38 compares the number of service trips per urban establishment with the number of goods deliveries per urban establishment for those studies were both are available. Service trips as a proportion of all commercial trips (service trips plus goods delivery trips) range from 11% in the Norwich study to 63% in the Worthing study. However, it is important to bear in mind that not all service trips take place in motorised vehicles, some are provided on bicycle or on foot.

Table 2.38: Comparison of service trips and goods vehicle delivery trips to urban establishments

Study	Average no. of service trips per establishment per week	Average no. of delivery trips per establishment per week	Service trips as a % of total service and delivery trips
Norwich	2.7	21.6	11%
Winchester	8.6	8.3	51%
Bexleyheath	5.7	16.2	26%
Chichester, W.Sussex	7.9	6.4	55%
Crawley, W.Sussex	7.1	5.7	55%
Horsham, W.Sussex	8.7	8.9	49%
Worthing, W.Sussex	12.6	7.3	63%

2.8.3 Vehicle types used to provide services

The Winchester and West Sussex studies were the only ones providing a breakdown of service visits by vehicle type (see Table 2.39). The two surveys show a similar pattern, although there were slightly more cars used and slightly fewer articulated lorries used in West Sussex compared to Winchester.

Table 2.39: Comparison of service vehicle types

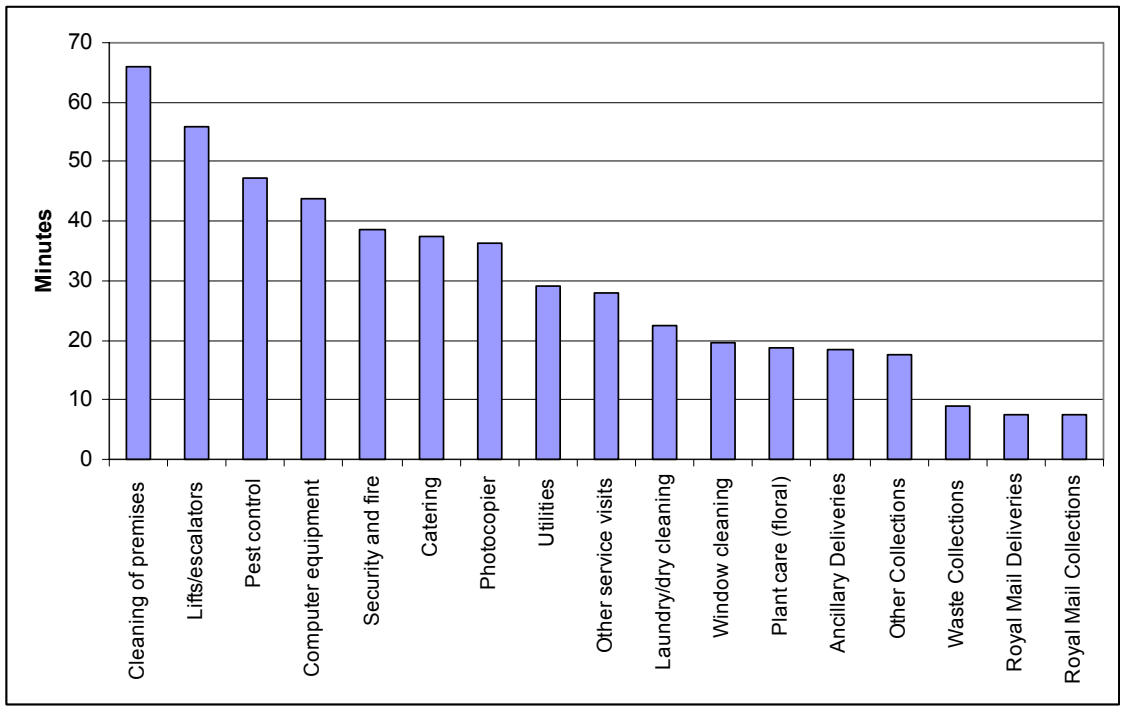
Service vehicle type	Winchester	West Sussex towns
Articulated goods vehicle	8%	3%
Rigid goods vehicle	8%	8%
Van	53%	50%
Car	14%	22%
Motorcycle	0%	0%
Bicycle	2%	1%
On foot	15%	16%
Total	100%	100%

2.8.4 Dwell times for service trips

The West Sussex indicated that mail deliveries and collections took the least time (all being in the 1 to 15 minute category). Specialist waste collections were also very short, highlighting that many retailers will use specialist containers and skips compatible with their waste contractor's collection vehicle, making them easy to collect and deliver. The average cleaning visit took the longest time, at 65 minutes, with lift maintenance taking 56 minutes on

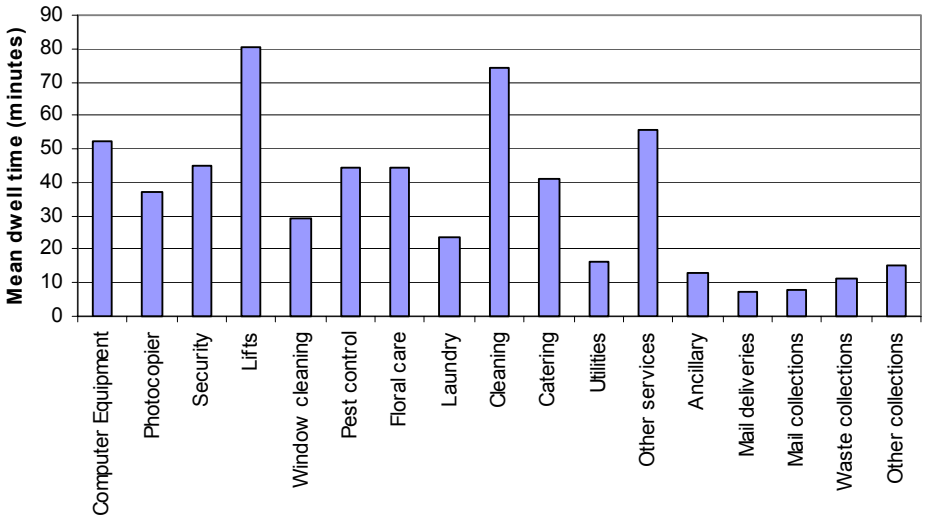
average (see Figure 2.7). The total weekly service visit time for the 47 surveyed businesses was estimated to be 142 hours of service activity. Given that 83% of these service visits were undertaken by motorised transport, this implies that each business would generate 2.5 hours of service vehicle stationary time per week which could be directly outside the premises or in local car parks.

Figure 2.7: Mean dwell time for service visit to establishment in West Sussex towns, 2005



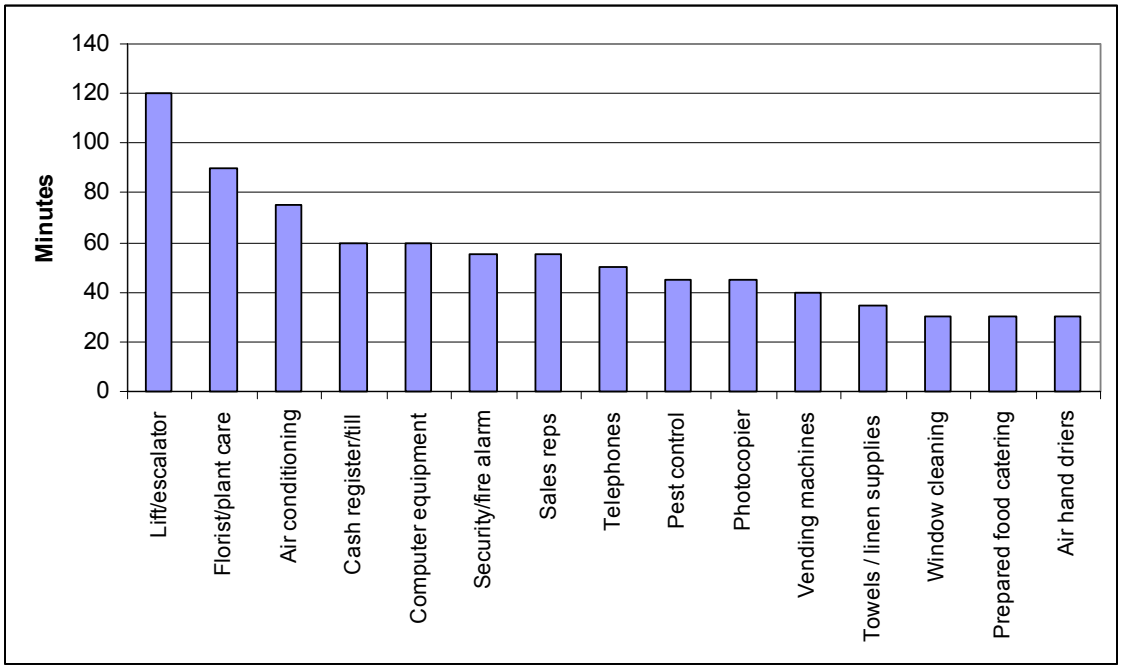
The Winchester study also measured the average dwell time by the type of service visit (see Figure 2.8). The results indicate that lift servicing had the greatest average dwell time, followed by cleaning services.

Figure 2.8: Mean dwell time for service visit to establishment in Winchester, 2001



The Catford survey also examined the average time taken for different types of service visit at establishments. These results indicated that lift and escalator servicing had the greatest average dwell time (of two hours) followed by floristry and plant care, and air conditioner servicing. The results are shown in Figure 2.9.

Figure 2.9: Mean dwell time for service visit to establishment in Catford, 2006



2.8.5 Where service vehicles are parked

Two of the studies reviewed have examined where services vehicle are parked while the service activity at the establishment is carried out. A survey of 13 service providers in Winchester indicated that they parked: on a public road for 38% of all service visits; off-road, at the client's premises for 31% of visits; in a pay-and-display public car park for 28% of all visits (the remaining 3% was described as 'other').

In Colchester, establishments reported that 76% of service providers' vehicles were parked on a public road while the service was carried out, while 24% were parked off-street.

3. Comparison with UK urban freight studies from the 1970s

A comparison between the results of the recent UK urban freight studies presented in section 2 and earlier UK urban freight studies from the 1970s was carried to see whether the results provided insights into how urban freight transport operations have changed over this 25-35 year period. The decision to compare recent UK urban freight studies with studies from the 1970s studies was made for two main reasons: i) the 1970s was a particularly rich period for urban freight studies in the UK, with a research programme backed by the Department for Transport and carried out by the Transport Research Laboratory, as well as studies funded by the Greater London Council. The 1970s therefore provides more studies for comparison than the 1980s, during which time far fewer UK studies took place; and ii) by going back to studies that took place 25-35 years ago it is possible to consider changes in the way in which urban freight operations are carried out and the extent to which these are reflected in the study results.

In addition, these 1970s studies were examined to see if they contained any data collection that has not been used in more recent studies. This involved an analysis of the results of seven urban freight carried out in the UK between 1970 and 1975. All but one of these studies (Greenwich-Lewisham) were primarily concerned with retail establishments. These studies that were analysed are summarised in Table 3.1.

Table 3.1: Summary details of UK urban freight studies from the 1970s that have been analysed

Study	Location	Date	Survey type	Sample size and response rate	Types of businesses	Reference
Hammersmith	Main shopping street and street market	1970	Establishment survey; vehicle observation survey; driver survey; traffic counts	174 establishments and 2041 vehicle observations	Shops including food, newsagents, clothing & shoe, household goods, general stores, service stores and other retailers	Metra Consulting Group, 1973a
Wembley	Main shopping street and pedestrianised central square	1970	Establishment survey; vehicle observation survey; driver survey; traffic counts	103 establishments and 1487 vehicle observations	Shops including food, newsagents, clothing & shoe, household goods, general stores, service stores and other retailers	Metra Consulting Group, 1973b
Watford	"Service-only" shopping precinct	1971	Establishment survey; vehicle observation survey; driver survey; traffic counts	40 establishments, 80 drivers (from 45 asked = 88% response rate)	Shops including food, clothing, shoe, furniture and other retailers	Jennings et al., 1972
Camberley	High Street - main shopping street	1973	Establishment survey; vehicle observation survey	84 establishments	Shops (food, clothing, household, other non-food), pubs, cafes, restaurants, banks	Christie et al., 1973a
Newbury	Northbrook Street - main shopping street	1973	Establishment survey; vehicle observation survey	80 establishments	Shops (food, clothing, household, other non-food), pubs, cafes, restaurants, banks	Christie et al., 1973a
Putney	High Street , Putney, south west London - main shopping street	1973	Establishment survey; vehicle observation survey	79 establishments	Shops (food, clothing, household, other non-food), pubs, cafes, restaurants, banks & factory	Christie et al., 1973b
Greenwich and Lewisham	Greenwich and Lewisham (about one half of each borough in south east London)	1974-5	Establishment survey; vehicle observation survey; traffic counts	455 establishments; 301 vehicle trip logs, 686 interviews with visiting drivers	Shopping areas, mixed shopping and commercial areas, major building sites, and industrial areas	Hasell and Christie, 1978

3.1 Number of vehicle deliveries and collections at establishments

Most of the urban freight studies from the 1970s that were reviewed collected data about the number of goods vehicle trips to establishments in urban areas to provide deliveries. This information was captured by vehicle observations surveys and establishment surveys. Table 3.2 provides details of the number of goods vehicles deliveries to establishments in the UK surveys reviewed.

In the studies focusing on retail, the average number of vehicle deliveries per establishment in a typical week ranges from 8.9 in Putney to 15.8 in Newbury. These results are similar to many of the recent studies reviewed. The two industrial locations studied found average number of vehicle deliveries per establishment in a typical week of 24.5 and 27.5 (see Table 2.2).

On average, establishments in Hammersmith and Wembley received goods from vehicles operated by 12-13 different companies. This is higher than in the majority of recent studies for which comparable data is available.

Table 3.2: Goods vehicle delivery and collection trips to urban establishments in UK studies from the 1970s

Study	Year of study	Number of Establishments	Ave delivery and collection trips per establishment per typical week	Ave. no of sources for deliveries per establishment	Survey technique used
Hammersmith	1970	174	9.2	12.2	Observation & establishment survey
Wembley	1970	103	11.5	12.9	Observation & establishment survey
Camberley	1973	84	11.9	-	Observation & establishment survey
Newbury	1973	80	15.8	-	Observation & establishment survey
Putney	1973	79	8.9	-	Observation & establishment survey
Woolwich Road industrial estate	1974-5	30	24.5	-	Establishment survey
Westminster industrial estate	1974-5	98	27.5	-	Establishment survey

3.1.1 Goods supply system used

In the Hammersmith and Wembley studies respondents provided data about the source of the goods despatched to their establishments. This provides insight into the types of goods supply system used (see Table 3.3). The results indicate that manufacturers and wholesalers were the main source of goods despatched to establishments in Hammersmith, while in Wembley, companies' own warehouse were the main source of goods.

Table 3.3: Main source of goods despatch to establishments in Hammersmith and Wembley, 1970

Main source of goods despatch	Hammersmith (% of establishments)	Wembley (% of establishments)
Manufacturers	25%	22%
Wholesaler's warehouse	26%	17%
Company's own warehouse	41%	59%
Voluntary chain	0%	0%
Other	8%	2%
Total	100%	100%

Table 3.4 shows the type of distribution system used by shops and frequency of use of the system, based on ownership and the base of the vehicles for establishments in Hammersmith. These results reflect the lack of third party distribution and logistics, with “Other” (which includes transport contractors) representing a minor proportion of the distribution systems used. This is very different from the distribution systems currently used on the high street with third party logistics operators responsible for much goods distribution to establishments on behalf of manufacturers and also multiple retailers, and a lesser importance of wholesalers (as the number of independent retailers has diminished).

Table 3.4: the type of distribution system used by shops and frequency of use of the system at establishments in Hammersmith, 1970

Ownership/base of vehicle	Seldom	About half the time	Mostly	Total
Vehicles based at shop	3	3	13	19
Vehicles not based at shop but operated by the company owning the shop	7	9	52	68
Manufacturer controlled vehicles carrying company products	14	23	32	69
Wholesaler controlled vehicles carrying company products	10	15	22	47
Other	0	1	14	15
Total	34	51	133	218

3.1.2 Effect of business type and size of establishment on number of deliveries and collections

Table 3.5 shows the number of goods vehicle visits to establishments in Camberley, Newbury and Putney by type of business. The data was collected via observation period and only includes collection and delivery trips through the front door of the establishments. Comparing these results with those from the recent Winchester study, food retail can be seen to generate more deliveries than other types of retail business (with the exception of general stores which are not very prevalent today since the rise of the large grocery retail chains supermarket).

Table 3.5: Number of front goods visits per five-day week per establishment by type of business

Type of business	Newbury	Camberley	Putney
Food retailers	8.1	10.9	11.1
Tobacconists/newsagents	6.3	10.7	2.0
Clothing & shoe shops	1.8	1.7	2.3
Household goods shops	6.9	15.3	3.7
Other non-food retailers	6.0	4.4	3.3
General stores	8.7	8.0	24.3
Service trades	1.0	0.6	0.7
Other categories	4.6	2.5	6.9
All businesses	5.0	5.5	5.1

Table 3.6 shows the total number of goods vehicle trips to establishments per weekday by establishment type and floor area. The results for all establishments in the four studies for which the data is available (0.5-1.0 vehicle trips per 100 sq. m.) are comparable to the results from the recent Ealing and Wallington studies (0.9 and 1.5 respectively).

Table 3.6: Total number of goods vehicle trips per weekday by establishment type and floor area (per 100 sq m.)

	Based on sales area			Based on total area		
Type of establishment	**Newbury**	**Camberley**	**Putney**	**Putney**	**Hammersmith**	**Wembley**
Grocers/provision dealers	2.1	2.3	2.3	1.8	3.3	1.1
Other food retailers	2.9	2.0	1.4	1.1	1.5	1.1
Tobacconists/newsagents	2.0	3.7	1.0	0.8	2.5	2.5
Clothing & shoe shops	0.5	0.9	0.3	0.2	0.3	0.2
Household goods shops	1.8	2.0	0.3	0.2	0.5	0.8
Other non-food retailers	0.7	1.6	0.8	0.7	0.5	0.9
General stores	0.4	0.4	0.7	0.5	0.5	0.3
Service trades	0.3	1.2	0.9	0.7	0.2	0.1
Other categories	0.7	0.7	0.5	0.4	0.8	0.6
All establishments	0.9	1.0	0.6	0.5	-	-

3.1.3 Delivery trip origins

The Hammersmith and Wembley studies asked drivers about the origins of their trips. The results are summarised in Table 3.7. The trip origins vary depending on product type. However, on average for all products, approximately three-quarters of trips to Hammersmith and Wembley originate in London boroughs, with approximately 10% of trips originating more than 50 miles away.

In the more recent studies a lower proportion of trips originated from as near to the establishments visited (in the Bromley study 47% of delivery vehicles had been despatched from either London or Kent depots, with 25% of vehicles travelling from depots at least 50 miles away; and in the Bexleyheath study 35% of delivery vehicles had been despatched from either London or Kent depots with at least 50% of vehicles coming from more than 50 miles away). The Torbay freight study found that only 29% of delivery trips originated from within Devon.

This comparison suggests that over the period from 1970 to the 2000s the distance over which the majority of vehicles are travelling to make deliveries to urban establishments has increased substantially. At a national level, many companies have centralised their distribution operations over this period, resulting in substantial increases in average trip length, which would appear to tie in with the results presented here.

Table 3.7: Origin of depot from which goods vehicle was despatched, Hammersmith and Wembley, 1970

Vehicle trips to Hammersmith					Vehicle trips to Wembley				
Commodity	**London borough**	**Less than 50 miles from London**	**More than 50 miles from London**	**Total**	**Commodity**	**London borough**	**Less than 50 miles from London**	**More than 50 miles from London**	**Total**
Food & drink	80%	17%	3%	100%	Food &drink	74%	23%	3%	100%
Furniture	53%	26%	21%	100%	Clothes	61%	9%	30%	100%
Clothes	59%	0%	41%	100%	Furniture & carpets	67%	25%	8%	100%
Soap & cosmetics	100%	0%	0%	100%	Electricals	75%	25%	0%	100%
Electricals	89%	11%	0%	100%	Household	75%	17%	8%	100%
Builders merchants	100%	0%	0%	100%	Pharmaceuticals	80%	20%	0%	100%
Household	83%	17%	0%	100%	Newspapers	100%	0%	0%	100%
Other	69%	22%	9%	100%	Other	68%	26%	5%	100%
Transport	94%	6%	0%	100%	Transport	94%	6%	0%	100%
Unidentified	71%	19%	10%	100%	Unidentified	63%	38%	0%	100%
Total	75%	16%	9%	100%	Total	72%	20%	8%	100%

Note:

“Transport” - depots owned by transport contractor carrying other firms' goods

3.1.4 Combined delivery and collection trips

In the vehicle observation surveys carried out in the Newbury and Camberley studies the surveyors recorded whether the trip to the establishment was a delivery, collection or combined delivery and collection. The results shows that in Newbury and Camberley 3% and 1% respectively of all delivery and collection trips were for combined delivery and collection trips.

In the recent study in Colchester 11% of respondents said that combined delivery and collection trips always happened, 13% said that collections often happened as part of delivery trips, and 58% said that this sometimes happened. In the Bexleyheath study respondents at establishments said that approximately 85% of vehicle deliveries are also involved in making collections (such as product returns, packaging, and waste) from the establishment as part of the trip. In the West Sussex study the responses indicated that 39% of establishments 'always' had returns collected by delivery vehicles, 57% 'sometimes' and only 4% 'never'. For waste collection, the responses were that 31% of establishments 'always' had their waste collected by delivery vehicles, 16% 'sometimes' and 53% 'never'.

Comparing these survey results suggests that the prevalence of combined collection and delivery trips may have increased since the 1970s. Such trips have become more possible with the growth of centralised distribution systems in which delivery vehicles are operating on a dedicated basis and thereby returning to a depot operated on behalf of the retailer. However, further data collection would be necessary to determine if the occurrence of combined collection and delivery trips has increased over this period.

3.2 Other delivery and collection trips at establishments

None of the 1970s studies reviewed examined core goods transfers between premises in the same company or attempted to disaggregate ancillary goods deliveries from all deliveries, and none investigated money collection and delivery trips.

3.2.1 Waste collections from establishments

The Hammersmith and Wembley studies collected data about waste collections from establishments. It was found that waste collections represented 2% of all goods vehicle visits to establishments in Hammersmith and 4% in Wembley.

3.2.2 Postal collection and delivery by Royal Mail

The Hammersmith and Wembley studies also collected data about Royal Mail (GPO) vehicle deliveries. These represented 4% of all goods vehicle visits to establishments in Hammersmith and 1% in Wembley.

3.2.3 Home deliveries

The Hammersmith and Wembley studies also collected data about vehicle trips made from the establishments (using vehicle based there) to make deliveries to customers. The results are shown in Table 3.8.

Table 3.8: Shops operating vehicles for deliveries to customers Hammersmith and Wembley, 1970

	Hammersmith	Wembley
Shops operating vehicles for delivery to customers	29	19
Total shops in study	174	103
% of shops operating vehicles for delivery to customers	17%	18%
Total no .of vehicles based at shops	137	19
Ave. no of home delivery vehicles per shop	4.7	1.0

Table 3.9 shows the types of vehicles based at the shops for making deliveries to customers and the average rounds that these vehicle made per day.

Table 3.9: Number of delivery vehicles based at shops and the rounds they make per day, Hammersmith and Wembley, 1970

	Hammersmith		Wembley	
Vehicle type	**Number operated**	**Vehicle rounds***	**Number operated**	**Vehicle rounds***
Estate cars	6	2.7	1	1.0
Other cars	24	2.9	3	0.4
Vans under 30 cwt	96	4.9	12	1.1
Vans over 30 cwt	11	3.4	3	0.8
Total	137	4.3	19	0.9

Note:
* - Average number of vehicle rounds per vehicle per weekday

In Hammersmith, 98 of these home delivery vehicles were operated by two department stores and the other 39 vehicles by the other 27 shops. Nine of the shops shared vehicles with other shops.

3.3 Time and day of deliveries

3.3.1 Time of day

It would appear that, as now, the morning (06.00-12.00 hours) was the busiest period for deliveries to establishments in the 1970s. Table 3.10 provides the results from these studies. It is important to note that all these results were derived from observation surveys and that the start and end times of these surveys varied between study. This will affect the results to some extent.

Deliveries arriving before 10.00 accounted for between 21% and 30% of all deliveries in the five studies. However it is important to note that in the only survey commencing before 08.00 (Putney) deliveries between 06.00 and 08.00 accounted for 20% of all deliveries. It is possible that a similar proportion of deliveries to establishments in the other studies took place before 08.00 but this information was not captured due to the survey start time. Morning deliveries account for 53%-67% of all deliveries in the five studies. Deliveries arriving between 10.00 and 14.00 accounted for between 52% and 63% of all deliveries in

the five studies. Deliveries from 14.00 onwards make up a relatively small proportion of the total in each study. None of these 1970s studies examined the amount of delivery work that took place outside the observation period (i.e. during the night).

Comparing the results with the recent studies that involved observation surveys, the studies in Catford and Wallington showed that 57% and 58% respectively of all deliveries took place during the morning. In the other recent studies (which used establishment surveys) the proportion of deliveries made during the morning ranged from 27-71%, with most studies showing results between 40-60% of deliveries exclusively in the morning.

Table 3.10: Delivery and collection times at establishments in recent UK urban freight studies reviewed

Time period	Newbury	Camberley	Time period	Putney	Time period	Hammersmith	Wembley
			06.00-06.59	13%			
07.30-07.59	3%	1%	07.00-07.59	7%			
08.00-08.59	12%	9%	08.00-08.59	1%	08.00-08.59	9%	11%
09.00-09.59	13%	11%	09.00-09.59	9%	09.00-09.59	16%	16%
10.00-10.59	12%	16%	10.00-10.59	16%	10.00-10.59	22%	20%
11.00-11.59	15%	17%	11.00-11.59	14%	11.00-11.59	20%	18%
12.00-12.59	12%	10%	12.00-12.59	10%	12.00-12.59	12%	12%
13.00-13.59	12%	11%	13.00-13.59	13%	13.00-13.59	9%	9%
14.00-14.59	8%	12%	14.00-14.59	9%	14.00-14.59	7%	7%
15.00-15.59	7%	8%	15.00-15.59	5%	15.00-15.59	5%	6%
16.00-16.59	4%	4%	16.00-16.59	3%	08.00-15.59	100%	100%
17.00-17.30	0%	2%	17.00-17.59	1%			
07.30-17.30	100%	100%	18.00-18.59	1%			
			06.00-18.59	100%			
Deliveries observed (no.)	479	519		576		1331	1040

3.3.2 Day of week

The 1970s studies show that the vast majority of collections and deliveries are made on weekdays (Monday to Friday) with comparatively little activity on Saturdays. There were no Sunday deliveries at this period. Table 3.11 shows the proportion of total weekly vehicle deliveries and collections on each day of the week at establishments in six studies. There is no weekday that is obviously busy than others in terms of deliveries and collections. Fewer trips were made on Wednesdays and Thursdays than on other weekdays, typically due to half-closing days, which is no longer common practice in the UK (for example see Thursday in Hammersmith).

Table 3.11: Vehicle deliveries and collections at establishments by day of week in 1970s urban freight studies

Day of week	Newbury	Camberley	Putney	Hammersmith	Wembley	Watford
Monday	24%	18%	20%	21%	18%	16%
Tuesday	20%	24%	18%	21%	20%	18%
Wednesday	16%	17%	15%	20%	15%	16%
Thursday	22%	23%	19%	12%	21%	20%
Friday	18%	18%	20%	20%	21%	23%
Saturday	-	-	8%	5%	6%	6%
Total	100%	100%	100%	100%	100%	100%

Note: Surveys in Newbury and Camberley only took place Monday-Friday

3.3.3 Time of year

As would be expected, during the 1970s, as now, the greatest monthly peak in deliveries typically occurred near to Christmas. However, whereas the results from recent studies shows that the Christmas peak in deliveries takes place in November and December, data from these earlier studies suggests that the peak was confined to December (with retailers marketing efforts starting later than now). Table 3.12 shows the results for respondents in establishments receiving deliveries in Hammersmith and Wembley. The most surprising aspect of the results is the proportion of respondents who report no discernable peaks in any months, which suggests that 36% of respondents in Hammersmith and 58% in Wembley did not experience a peak in deliveries even during December.

Table 3.12: Proportion of establishments estimating the months of highest and lowest delivery frequency, Hammersmith and Wembley, 1970

	Hammersmith		Wembley	
Month	**Highest**	**Lowest**	**Highest**	**Lowest**
Jan	0%	19%	0%	3%
Feb	0%	10%	2%	2%
Mar	3%	0%	1%	1%
April	2%	0%	3%	0%
May	2%	0%	1%	0%
June	2%	3%	0%	1%
July	2%	4%	2%	3%
Aug	3%	6%	2%	2%
Sep	2%	3%	2%	2%
Oct	5%	0%	0%	1%
Nov	9%	0%	0%	0%
Dec	33%	1%	18%	0%
No month outstanding	36%	54%	58%	74%

3.4 Vehicle types used to make deliveries

Vehicle types used for collections and deliveries to urban establishments has been compiled for Newbury, Camberley and Putney (Table 3.13), Hammersmith and Wembley (Table 3.14), and Watford (Table 3.15).

Table 3.13: Vehicle types used for collections and deliveries to establishments in Newbury, Camberley and Putney, 1973

Type of vehicle	**Newbury**	**Camberley**	**Putney**
Car	0%	0%	5%
Light goods vehicle	9%	34%	13%
Goods vehicle with 2 axles	84%	64%	80%
Goods vehicle with more than 2 axles	7%	2%	3%
Total	100%	100%	100%

Table 3.14: Vehicle types used for collections and deliveries to establishments in Hammersmith and Wembley, 1970

Vehicle type	Hammersmith	Wembley
Estate cars	1%	1%
Car size vans	5%	6%
Vans under 30 cwt	16%	19%
Goods vehicle over 30 cwt - 2 rear tyres	9%	9%
Goods vehicle over 30 cwt - 4 rear tyres	66%	57%
Goods vehicle over 30 cwt - 3 axles, rigid	1%	1%
Goods vehicle over 30 cwt - 3 axles, articulated	2%	7%
Total	100%	100%

Table 3.15: Vehicle types used for collections and deliveries to establishments in Watford, 1971

Vehicle weight	% of vehicles
0-3 t gvw	27%
3-5 t gvw	22%
5-7 t gvw	15%
7-10 t gvw	22%
10-14 t gvw	8%
14-20 t gvw	5%
20-26 t gvw	3%
26-32 t gvw	0%
Total	100%

Tables 3.13-3.15 indicate that a smaller proportion of both light goods vehicles and relatively heavy goods vehicles (3 axles rigid vehicles and articulated vehicles) were used for deliveries and collections to urban establishments in the 1970s compared with now. Instead greater use appears to have been made of 2 axle rigid vehicles. This is in line with trends in the vehicle fleet at a national level, from rigid vehicles to both lighter and heavier vehicles.

3.4.1 Vehicles based at the urban establishment

Table 3.9 shows the types of vehicles based at the shops for making deliveries to customers and the average rounds that these vehicle made per day. In the Hammersmith and Wembley studies 17% and 18% respectively of respondents had vehicles based at their establishments to make deliveries to customers. In the Colchester study in 2005 of the 242 urban establishments surveyed, 37% had a vehicle based at their site. Obviously further survey work would be necessary to obtain more insight into current vehicle fleets at urban establishments.

3.5 Vehicle dwell times

Table 3.16 shows the average duration for loading/unloading by type of establishment from the Newbury, Camberley and Putney studies. These indicate that, on average, the types of establishments with the longest loading/unloading times were food retailers, and household goods shops.

Table 3.16: Average duration for loading/unloading by type of establishment in Newbury, Camberley and Putney, 1973 (minutes)

Type of business	Newbury	Camberley	Putney
Food retailers	14.0	10.0	10.2
Tobacconists/newsagents	10.9	5.9	7.8
Clothing & shoe shops	9.2	7.1	7.4
Household goods shops	11.2	12.3	9.5
Other non-food retailers	11.7	9.2	8.5
General stores	9.3	6.5	12.8
Service trades	7.5	6.5	8.3
Other categories	10.0	6.8	15.6
All businesses	11.3	9.5	9.9

Note: the data above is only for vehicles loading/unloading in street outside shop and entering via front door (i.e. rear and side deliveries are excluded).

The Hammersmith and Wembley studies showed average loading/unloading times of 12.4 and 13.6 minutes respectively, which are slightly longer than those shown for Newbury, Camberley and Putney. This may be due to the omission of loading and unloading at rear and side doors in these studies.

These average loading/unloading times are generally lower than those in the recent urban freight studies reviewed. However, this may be due to the greater vehicle size (and potentially average delivery size) that is now used.

3.5.1 Delivery delays

Unlike the more recent freight studies reviewed, the Hammersmith and Wembley studies from 1970 examined the causes of delivery delay. In Wembley, 11% of deliveries were found to have been delayed, compared with 4% in Hammersmith. Table 3.17 shows the analysis of these delays.

Table 3.17: Delivery delays in Hammersmith and Wembley, 1970

	Queue	Shop closed	Driver meal break	Other or not known	Total
No. of deliveries delayed					
Hammersmith	15	12	10	24	61
Wembley	63	6	3	43	115
% of deliveries delayed					
Hammersmith	25%	20%	16%	39%	100%
Wembley	55%	5%	3%	37%	100%
Average delay (minutes)					
Hammersmith	9	15	37	17	17
Wembley	17	13	18	11	14

Overall, vehicle queuing to make deliveries was the greatest cause of delivery delay in these studies. Fifty seven of the 115 delays in Wembley occurred at two supermarkets.

3.5.2 Delivery vehicle crew size

The Hammersmith and Wembley studies analysed the crew sizes in goods vehicles visiting urban establishments. In Hammersmith, 83% of deliveries observed were made by a sole driver, 16% were made by two-person crews and 1% were made by three-person crews. In Wembley 81% of deliveries were by a sole driver, 18% by a two-person crew, and 1% by a three-person crew.

3.6 The loading/unloading process

3.6.1 Goods handling

Table 3.18 shows the method by which goods were moved from the vehicle to the establishment from freight studies during the 1970s. By hand can be seen to be the dominant, accounting for between 68% and 86% of deliveries in these five studies.

Table 3.18: Method of transporting goods delivered from vehicle to establishment in UK freight studies in the 1970s

Method of transporting goods	Newbury	Camberley	Putney	Hammersmith	Wembley
By hand	79%	86%	68%	80%	66%
By trolley	21%	14%	32%	20%	34%
Total	100%	100%	100%	100%	100%

There is no evidence of the wide range of handling equipment used today, as reflected in review of the recent studies, such as roll cages, wheeled rails, hand and pallet trucks. These introduction of these devices have helped to reduce loading/unloading times and to reduce the risk of injury to the driver.

3.6.2 Access to the receiving establishment

Table 3.19 shows the availability of side and rear delivery access at shops and catering establishments and the extent to which this was made use of in Newbury, Camberley, and Putney. The results show that even where side and rear access facilities existed these were not always used.

Table 3.19: Availability and use of side and rear access at urban shops and catering establishments in Newbury, Camberley and Putney, 1973

	Newbury	Camberley	Putney
Availability of side and rear access			
Total number of shops and catering establishments	77	62	70
Total number with side or rear access	39	30	23
Proportion with side or rear access	51%	48%	33%
Use of side and rear access			
Goods visits made to side or rear as % of all visits to these shops	74%	58%	77%
Goods visits made to front as % of all visits to these shops (that have side or rear access)	26%	42%	23%

Several of the other studies also provided details of the proportion of urban establishments with side or rear access for deliveries and collections:

- Hammersmith - 57% of establishments
- Wembley pedestrianised square - 9% of establishments
- Wembley High Road - 15% of establishments
- Watford - 19% of establishments

3.7 Vehicle rounds

3.7.1 Type of delivery vehicle operator

Table 3.20 shows the ownership of vehicles making trips to urban establishments in the Hammersmith and Wembley studies. This suggests that approximately half of the establishments in the study received their main deliveries from vehicles owned and operated by manufacturers or wholesalers. The "other" category includes third party logistics and distribution companies, which can be seen to operate to a very small proportion of establishments. This pattern is likely to be very different today, with a substantial increase in the importance of third party logistics companies, however the data is not available to make a comparison.

Table 3.20: Ownership of main vehicles supplying establishments, Hammersmith and Wembley, 1970 (% of establishments)

Vehicle ownership	Hammersmith	Wembley
Based at shop	9%	1%
Own company but not based at shop	31%	45%
Manufacturer	32%	26%
Wholesaler	22%	21%
Other	7%	7%
Total	100%	100%

3.7.2 Types of vehicle rounds

Table 3.21 shows the average number of deliveries made by drivers on their entire vehicle rounds by vehicle type in the Hammersmith and Wembley studies. No information was provided about the split between single- and multi-drop rounds.

Table 3.21: Average number of deliveries per round by vehicle type, Hammersmith and Wembley, 1970

Vehicle type	Hammersmith	Wembley
Estate cars	3	3
Car size vans	5	5
Vans under 30 cwt	8	6
Goods vehicle over 30 cwt - 2 rear tyres	15	9
Goods vehicle over 30 cwt - 4 rear tyres	11	9
Goods vehicle over 30 cwt - 3 axles, rigid	7	6
Goods vehicle over 30 cwt - 3 axles, articulated	3	3
All vehicle types	10	7

Table 3.22 shows the average number of deliveries made by drivers on their entire vehicle rounds by type of establishment in the Hammersmith and Wembley studies.

Table 3.22: Average number of deliveries per round by type of establishment, Hammersmith and Wembley, 1970

Vehicle type	Hammersmith	Wembley
Grocers	13	5
Other food	7	4
Confectionery/news	15	35
Clothes & shoes	12	8
Household goods	7	8
Other non-food	15	6
General stores	12	8
Service	17	0
Other	5	15
All establishments	10	7

3.8 Service trips to urban establishments

3.8.1 Numbers of service trips

The Hammersmith and Wembley studies distinguished service visits (defined as gas, electricity, telephone and laundry services) to establishments from goods vehicle deliveries and collections. These studies showed that service trips accounted for 3% of all commercial vehicle trips to establishments in Hammersmith and 6% in Wembley. This was equivalent to 0.4 trips per establishment per week in Hammersmith, and 0.8 trips per establishment per week in Wembley.

This is far lower than the number of service trips reported in the recent UK freight studies reviewed, which ranged from 2.7 – 14.5 service trips per establishment per week.

In the Camberley and Newbury studies, 11% and 8% respectively of goods vehicle trips were recorded as involving no goods collection or delivery – these trips may also refer to service trips, but insufficient information is available to be certain of this.

The number of service trips is expected to have increased significantly at establishments since the 1970s as a result of outsourcing of a wide variety of service tasks together with the major growth in the use of equipment that requires regular maintenance and repair.

4. Concluding thoughts and observations

The survey results analysed in sections 2 and 3 of this report indicate that urban freight studies in the UK (and elsewhere) are producing varying freight transport activity results in terms of topics such as the average number of deliveries and collections made at establishments, the types of vehicles used, dwell times etc. Although this data is likely to be correct in the specific location in which the study was conducted, it makes comparison between different studies difficult and makes it very hard to predict the nature of urban freight activities in another unstudied urban location.

It is unlikely that the geography of the urban areas studied is totally responsible for determining the pattern of urban freight activities (although it is likely to play a role). Instead, variations in patterns of urban freight activities are more likely to be related to factors such as types of establishments in an urban area, the scale of the premises, their supply chain organisation and goods supply systems, and the range of products they require. This suggests that it would be worthwhile to carry out a pilot study that attempts to investigate the importance of these and other variables in determining the pattern of urban freight activities. If sufficient quantities of data were collected about vehicle trips to and from urban establishments that contained suitable variables with comparable classification systems it may be possible to use this data to forecast commercial vehicle trips an various an urban scales (e.g. for a high street, town centre, entire urban area) without the need for detailed and expensive survey work in the location being studied. To achieve this is likely to require the collection of sufficient, good quality data relating vehicle trip generation at establishments to other attributes of the establishment such as floor space, number of employees, product range, goods supply system and supply chain operation. A pilot study could be set up for these purposes.

Where there are two survey techniques that can be used to collect the same urban freight data (such as establishment surveys and vehicle observation surveys) there is a need to compare and validate these techniques to determine the accuracy of each, and to investigate how both can potentially be enhanced to make up for any shortcomings they have.

In the recent UK studies reviewed there has been relatively little focus on urban vehicle rounds, and far more of the attention has been placed on studying freight vehicle activity at urban establishments. Further research into urban vehicle rounds would be welcomed as this information is required in order to assess freight vehicle activity at an urban-wide scale. This round data cannot be readily disaggregated from trip diaries collected from operators nationally in the CSRGT, and even if it could would be limited by the fact that in this survey only summary details are provided about multi-drop rounds with five or more stops. Such rounds are likely to feature significantly in many types of urban freight activity.

When presenting data about goods vehicle trips to and from urban establishments, many of the studies reviewed are rather unclear about what is included and not included (in terms of the various types and deliveries and collections that occur). Relatively few of the studies reviewed have collected data about service trips to urban establishments despite the growing importance of these trips in terms of sustaining the establishments, traffic flow, and parking issues. Some of the studies that have collected details about service trips indicate that these can be equal to or greater than the total number of collection and delivery trips at an establishment. There is a need to collect information about these service vehicle trip data at urban establishments if we are to fully understand urban freight activity.

In addition there is a lack of agreed classifications for collecting urban freight data. Producing classifications for variables such as types of establishments, types of goods, types of packaging/items, types of handling equipment, vehicle type categories, and time

periods analysed, studied would help to ensure greater comparability between the results of different studies. It would also allow the opportunity to pool together the results of relatively small studies to obtain a far larger urban freight transport activity dataset.

There is a need for those researching urban freight and carrying out studies that collect urban freight data to help improve understanding and provide policy makers with information to make decisions, to work closely with freight modellers. This would help to ensure that the potential data needs for urban freight modelling were reflected in data collection efforts. At present many urban freight surveys are not carried out for the purposes of modelling. However if this data is to be useful to modellers at a later date then it may well be missing important variables about the establishments and their supply chain operation.

Urban freight transport studies have only been taking place for approximately 50 years and in relatively small numbers according to the results of this review. The research and consultancy community that is engaged in collecting urban freight data is still relatively small and they are still learning how to make improvements. There is major scope to learn from the studies, and data collection techniques of others. For instance, making available survey forms and methodologies from previous studies will assist current and future researchers in determining a suitable survey design for their studies. We intend to produce another report to accompany this one that contains all the urban freight survey forms that we have obtained during the course of this work as a starting point.

There is a need to ensure that reports and other publications on urban freight studies are pooled in an accessible place so that they can be referred to by other researchers now and in the future. At present many of the UK study reports are not publicly available (many have not been published as they were commissioned by a client and were only ever provided to that client), and none of the raw data from these studies is publicly available. Trying to locate urban freight study reports for the purposes of producing this review has been time consuming. Trying to obtain publications and data after the completion of such studies is currently extremely complicated and difficult as often both the individual managing the project in the commissioning body as well as the personnel in the body carrying out the survey are no longer working in these organisations (and often they are the only people able to locate such documents and data). As most urban freight studies are commissioned using public funding it would seem sensible that a repository is established to house both publications related to these studies and data sets (in a similar manner to American traffic count data and reports that are now made available online).

References

Allen, J. and Browne, M., 2008, Review of Survey Techniques in Urban Freight Studies, Green Logistics Project Report, University of Westminster.

Allen, J., Tanner, G., Browne, M., Anderson, S., Christodoulou, G. and Jones, P., 2003, Modelling policy measures and company initiatives for sustainable urban distribution – Final Technical Report, project carried out as part of the EPSRC/DfT Future Integrated Transport Programme, University of Westminster.

Allen, J., Anderson, S., Browne, M., and Jones, P., 2000, A Framework for Considering Policies to Encourage Sustainable Urban Freight Traffic and Goods/Service Flows: Summary Report, University of Westminster.

Bartlett, R. and Christie, A., 1978, The Hull Freight Study, Traffic Engineering and Control, November 1978, pp.498-502.

Bartlett, R. and Newton, W., 1982, Goods vehicle trip generation and attraction by industrial and commercial premises, TRRL Laboratory Report 1059.

Browne, M. and Allen, J. 2006, Urban freight data collection - synthesis report, Deliverable 3.1 Best Practice in data collection, modelling approaches and application fields for urban commercial transport models I, BESTUFS project.

Browne, M., Allen, J. and Anderson, S., 2005, Freight Transport Project in Southwark and Lewisham: Final Report, University of Westminster.

Cherrett, T.J. and Hickford, A.J., 2005, Freight and the economy. The effects of freight movements associated with retailers common to Chichester, Horsham, Worthing and Crawley. Final report in response to the brief set out by West Sussex County Council as part of their second Local Transport Plan.

Cherrett, T. and Smyth, K., 2003, Freight Vehicle Movements in Winchester: Issues affecting supplier, courier and service providers, Final Report, University of Southampton.

Cherrett, T., McLay, G. and McDonald, M., 2002, Effects of Freight Movements in Winchester, Final Report, University of Southampton.

Christie, A., Bartlett, R., Cundill, M. and Prudhoe, J., 1973, Urban freight distribution: studies of operations in shopping streets at Newbury and Camberley, TRRL Report LR603.

Christie, A., Prudhoe, J. and Cundill, M., 1973, Urban freight distribution: a study of operations in High Street Putney, TRRL Report LR556.

Devon County Council, 2004, Torbay Freight Quality Partnership: Business and Driver Survey, private communication.

Edwards, S., 1997, Distribution in City Centres: Investigating the Logistics Impacts of City Centre Retail Strategies, paper presented at Universities Transport Studies Group Annual Conference, Bournemouth, 1997.

Hasell, B. and Christie, A., 1978, The Greenwich-Lewisham Freight Study, TRRL Supplementary Report 407

Hitchcock, A., Christie, A. and Cundill, M., 1974, Urban Freight: Preliminary results from the Swindon freight survey, TRRL Supplementary report 126UC, Transport and Road Research Laboratory.

Intermodality, 2004 IMT J0015 Business Survey Report

Jennings, A., Sharp, C. and Whibley, D., 1972, Delivering the Goods: A study of the Watford service-only precinct, Research Report No.2, Freight Transport Association, Croydon.

McKinnon, A., 2002, Freight transport and logistics in west central Scotland, Report to West of Scotland Transport Partnership.

McKinnon, A., 1999, Vehicle utilization and energy efficiency in the food supply chain. Full Report of the Key Performance Indicator Survey.

Metra Consulting Group, 1973a, Supplying Shopping Areas: The Operation and Cost of a Transhipment Depot Serving a Pedestrian Shopping Area, Volumes 1-2, London.

Metra Consulting Group, 1973b, Supplying Shopping Areas: The Operation and Cost of a Transhipment Depot Serving a Pedestrian Shopping Area, Volumes 3-4, London.

MVA and Preston Solutions, 2007, London Wholesale Markets Freight Study: Final Report.

MVA, 2002, Park Royal Freight Survey, MVA.

MVA, 2004, West London FQP - Ealing Town Centre Detailed Freight Survey, MVA.

MVA, 2005, Freight Quality Partnership Studies at Wallington Town Centre, MVA.

Peter Brett Associates, 2006, Catford Freight Delivery Study

Peter Brett Associates, 2003, Reading Town Centre Freight Access Plan: Market Place Freight Accessibility Study

Salgado, R., 2005, Is there room for improvement in the management of loading/unloading bays in the Seven Dials Area, MSc dissertation, University of Westminster.

Steer Davies Gleave, 2005, Freight in Colchester Town Centre: Outputs of Town Centre Business Survey.

Synovate, 2006, Business Van Usage in Croydon & Westminster: Quantitative Research Report, Synovate.

TTR, 2004, VIVALDI Freight Consolidation Centre - Survey Responses, Report, TTR.

TTR, 2007, Out-of-hours Deliveries in Central London, TTR

TTR, 2007, Site survey analysis: Deptford High Street - London Borough of Lewisham, TTR.

TTR, 2007, Site survey analysis: London Road - London Borough of Merton, TTR.

TTR, 2007, Site survey analysis: High Street - London Borough of Croydon, TTR.

TTR, 2007, Site survey analysis: Market Square - London Borough of Kingston, TTR.

TTR, 2007, Site survey analysis: Northcote Road - London Borough of Wandsworth, TTR.

TTR, 2007, South London Retail Distribution: Bromley Survey Report, TTR.

TTR, 2007, South London Retail Distribution: Croydon and Sutton Survey Report, TTR.

Tyler, A., 2001, Sustainable Goods Distribution: The Possibilities for Clear Zones, MSc dissertation, University of Westminster.

Westminster City Council, 2008, Church Street Freight Study, Brief 7583, Feasibility Report

Wilbur Smith and Associates and P-E Consulting, 1977, Hull freight study: collection of data and construction of computer model, TRRL Supplementary report 315, Transport and Road Research Laboratory.

WSP and Katalysis, 2002, Report B4: Review of Data Sources, Review of Freight Modelling Project, Department for Transport