

AN ANALYSIS OF THE SAME-DAY DELIVERY MARKET AND OPERATIONS IN THE UK

by

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ABOUT THE FREIGHT TRAFFIC CONTROL 2050 (FTC2050) PROJECT

This report has been produced as part of a research project entitled “Freight Traffic Control 2050 (FTC2050): Transforming the energy demands of last-mile urban freight through collaborative logistics”. It is an EPSRC-funded project that began in April 2016 and continues until August 2019.

Freight transport currently makes up around 16% of all road vehicle activity in our cities and by 2030, the EU would like to see largely CO₂-free logistics systems operating in our urban centres. With van traffic predicted to increase by 20% in London by 2030, and the uptake of alternatively fuelled and electric goods vehicles slow, more radical strategies are needed to reduce the numbers and impacts of freight vehicles in our cities.

Working with parcel carriers in London, this project will examine the potential for closer operational collaboration between carriers to reduce urban traffic and energy demand whilst maintaining customer service levels, and evaluate to what extent such relationships can develop naturally within a commercial setting or whether a 3rd party ‘Freight Traffic Controller’ (FTC) would be necessary to ensure equitable distribution of demand across a city. The key research objectives are to:

1. Investigate the collective transport and energy impacts of current parcel carrier activities in urban areas;
2. Create a database to gather and interrogate collection and delivery schedules supplied by different carriers;
3. Use the data with a series of optimisation algorithms to investigate the potential transport and energy benefits if carriers were to share deliveries and collections more equitably between them and develop tools to help visualise those benefits;
4. Evaluate what business models would be needed to enable carriers to collaborate in this way;
5. Investigate the role a 3rd party 'Freight Traffic Controller' could play in stimulating collaboration between carriers to reduce energy demand and vehicle impacts across a city;
6. Identify the key legal and privacy issues associated with the receipt, processing and visualisation of such collaborative schedules;
7. Consider the wider application of this approach to other sectors of the urban freight transport market.

The project is a multidisciplinary collaboration, led by the University of Southampton’s Faculty of Engineering and the Environment (CEE), and involving the Southampton Business School (SBS), Lancaster University’s School of Computing and Communications and Data Science Institute (LU), the University of Westminster’s Faculty of Architecture and the Built Environment (UoW) and University College London’s Bartlett Centre for Advanced Spatial Analysis (CASA). Two major carriers (TNT and Gnewt Cargo, (the latter operating for DX and Hermes)) have agreed to participate in the research along with Transport for London (TfL).

For further information about the FTC2050 project please visit the project website at:

<http://www.ftc2050.com/>

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ABOUT THE CENTRE FOR SUSTAINABLE ROAD FREIGHT (SRF) PROJECT

This report has been produced as part of a research project entitled “Centre for Sustainable Road Freight”. The Centre is a multidisciplinary collaboration, led by the University of Cambridge with Heriot-Watt University and the University of Westminster, together with organizations in the freight and logistics sector. Its purpose is to research engineering and organizational solutions to make road freight economically, socially and environmentally sustainable. The Centre has recently been awarded a new Grant from the UK Engineering and Physical Sciences Research Council (EPSRC) that will fund the core research activities of the Centre for the next 5 years from June 2018 to May 2023. This funding will enable the Centre to embark on an exciting new programme of research, building on the work of the past 5 years and tackling a range of new challenges in vehicle engineering and logistics including this time urban freight operations, as well as policy-making. The objectives of SRF are to:

1. Develop new fundamental insights into reducing fuel usage and GHG emissions from UK road freight, by applying a full systems understanding of the ways that commercial logistics operations, vehicle technologies and government policy measures interact in practice;
2. Develop and maintain a comprehensive roadmap for decarbonising the road freight sector in the UK, accounting for research needs, implementation strategies and policy interventions;
3. Reduce barriers to implementation of the most effective strategic, deep decarbonisation measures;
4. Maximise the effectiveness of targeted near-term decarbonisation solutions and technologies;
5. Demonstrate novel decarbonisation solutions and measure their performance in practice;
6. Develop decision-support tools and promote their implementation in practice.
7. Translate research findings into recommendations for corporate strategy and government policy.

A vital feature of the Centre is its close links with the freight industry. The consortium includes key freight operators such as John Lewis, Tesco, Sainsbury's, Turners and Wincanton, along with vehicle industry partners, including Volvo, Goodyear, SDC among others, and trade associations and professional bodies who help set the research agenda and spearhead the adoption of the results by the road freight industry.

More details and outputs are available from the project website: <http://www.csrf.ac.uk/>

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1. Introduction

This report contains a review and analysis of the same-day delivery market and its operations in the UK. It has been carried out as part of the EPSRC-funded FTC2050 project, which is investigating the scope for collaboration in order to facilitate greater efficiency in urban freight transport and logistics activities, and thereby reducing the cost of these operations to companies (resulting in greater profitability) while at the same time improving the sustainability of these operations in terms of road traffic levels, traffic casualties, CO₂ and air pollution emissions. See the website for further details of the project: <http://www.ftc2050.com/>

Same-day deliveries refer to goods that are transported from the seller's point of despatch (such as a shop, office, warehouse, or depot) to the buyer's / receiver's premises (such as an office or residential home). In the case of B2B same-day deliveries, these will be transported between two business addresses, whereas B2C deliveries take place from business addresses to residential homes or business addresses (depending on the chosen delivery location of the customer).

In the case of B2C same-day deliveries, the placing of the order, its picking and packing (or making in case of a hot meal), and its delivery all take place on the same-day. The lead-time (i.e. hours elapsed) between the time at which the order is placed and the time of its delivery varies depending on the delivery service level offered for that product type/sector, and the service level selected by the customer. B2C same-day deliveries involve the placing of an order on a retailer by a customer, and then the picking/packing/making and delivery of the goods purchased by either the retailer (i.e. in-house/own account logistics fulfilment and delivery services) or by a specialist third-party carrier working on the retailer's behalf (with the vast majority being subcontracted to a carrier for delivery). A small number of B2C same-day deliveries do not involve the placement of an order on a retailer, and instead simply involve a private individual requesting a carrier to perform the movement of a product between two locations on their behalf (such as the collection of keys or a wallet from one address and delivering them to another).

In the case of B2B same-day deliveries these therefore comprise a mix of:

- (i) the placement of orders on a retailer (such as the purchase of computing parts, or printed material) who then either carries out the delivery themselves or subcontracts the delivery to a specialist third-party carrier (with most subcontracting this work to a carrier, or
- (ii) no placement of an order on a retailer - instead simply involving a business customer requesting a third-party carrier to perform the movement of a product between two locations on their behalf (such as the movement of medical or legal documents from one business address and to another).

As with B2C same-day deliveries, the lead-time (i.e. hours elapsed) between the time at which the B2B order is placed / the transportation job is booked and the time of its delivery varies depending on the delivery service level offered by the retailer/carrier, and the service level selected by the customer.

Part I of the report presents information and data about the same-day delivery market in the UK and its sectors, including B2B non-food, B2C non-food, groceries and takeaway meals. It discusses market size, leading players and forecast growth rates in these same-day delivery sectors. **Section 2** provides an overview of the sectors comprising the same-day delivery market, while **sections 3-5** present information about non-food (B2B and B2C), B2C grocery, and B2C takeaway and restaurant meal delivery. **Section 6** considers future market prospects

of the same-day sector. **Section 7** discusses rates of pay for same-day couriers, while **section 8** investigates the employment status of couriers and current policy thinking on this matter.

Part II of the report considers same-day delivery operations. **Section 9** provides a history of same-day deliveries in the UK. **Section 10** discusses current operating patterns in each of the same-day delivery sectors, while **section 11** considers the variety of vehicle types used by couriers. **Section 12** considers technology developments in the same-day sector. **Section 13** provides a summary of a German study of operations in the same-day sector, while **section 14** summarises research into bicycle and cargo-cycle deliveries. **Section 15** discusses the courier subculture, which represents far more than a job to some involved. **Section 16** considers the transport, social, energy and environmental impacts of same-day deliveries, including courier behaviour, courier road safety, collisions involving couriers, Work Related Road Safety, Managing Occupation Road Risk and a Courier Code of Conduct. **Section 17** analyses the efficiency and the traffic, energy and environmental sustainability of current same-day deliveries in urban areas, the scope that exists for greater operational efficiency in same-day deliveries, and the operational innovations by which the efficiency and sustainability of same-day deliveries could be improved, to the benefit of carriers and the wider society. **Section 18** considers the challenges and prospects facing same-day delivery market and its operations, and reflects on the future of the provision of these services.

In this report, the companies offering same-day delivery services have been referred to as 'carriers'. The personnel physically carrying out these same-day deliveries have been referred to as 'couriers' for ease of terminology. However, in reality various terms are used for those performing these tasks in various same-day sectors including riders, drivers etc. This is discussed in greater detail in **section 10**.

PART I: SAME-DAY DELIVERY MARKET IN THE UK

2. The Same-Day Delivery Market

2.1 Overview of same-day deliveries

The history of same-day deliveries goes back many centuries when door-to-door hawkers and chapmen were a common sight. Door-to-door milk deliveries commenced in London in the last decade of the 18th century and were widespread by 1850 (Atkins, 1980). From the early 20th century butchers, bakers, grocers also provided home deliveries within their local catchment, typically by boys on bicycles. However all these deliveries were based on pre-arranged or regular orders. Ad hoc same-day orders and deliveries were only possible from door-to-door salesmen. Door-to-door selling acquired a poor reputation during the 20th century due to its associations with pressurised selling and criminality, and declined rapidly as household motorisation and public transport services increased and retailing became a leisure activity for the masses with more choice and lower prices available in-store. This led to the demise of home deliveries by milkmen and other local food retailers. Daily newspaper deliveries also reduced in the last twenty years with the coming of the internet.

The only mainstream form of same-day deliveries that persisted since the early 20th century to the present in the courier or despatch rider who transports urgent parcels, packages, documents and medical products typically between businesses (i.e. B2B deliveries). However, this form of same-day delivery also began to contract from its peak with the advent of new technologies such as fax machines during the 1980s and computer email during the 1990s.

Internet technology has revolutionised consumer retail ordering patterns, and provided numerous opportunities for new forms of same-day delivery. Some of the early 'gig economy' entrants failed to find a workable business model and disappeared quickly, such as Urbanfetch and Kozmo in the early 2000s. However, in the last couple of years, B2C same-day delivery services have grown strongly in the UK in sectors including takeaway meal deliveries, grocery retailing and non-food retailing. Many 'start-up' same-day delivery companies have entered the UK marketplace, competing with traditional same-day carriers that are repositioning themselves in the face of reducing business in their traditional B2B parcel sector.

It has also been recently suggested by some journalists that doorstep milk deliveries could stage a resurgence in the UK based on factors including a preference among some for reusable glass rather than plastic bottles, the range of other deliveries provided by milkmen including various foodstuffs provided by milkmen and an increasing number of elderly, immobile. Current milk deliveries only account for 3% of total milk sales in the UK, compared with 94% in the mid-1970s (Turns, 2018). There is no data available to suggest a return of any scale to this particular form of B2C same-day delivery. However, the other forms of same-day delivery reviewed in this report are showing substantial growth in the UK, and are likely to have important consequences for the British high street and road transport.

The term 'same-day' delivery has been used throughout this report to refer to parcel, grocery and meal deliveries that take place on the same day as the order is placed. Other researchers and commentators have adopted alternative terminology to refer to these same-day deliveries including: 'instant' deliveries, 'on-demand' deliveries, 'on-demand' logistics, 'rush' deliveries (McKinnon, 2015; Dablanc et al., 2017). However, these new terms are more often applied to B2C than B2B same-day deliveries. These terms were therefore not used in this report, given that it covers the history of same-day deliveries and both B2B and B2C sectors.

In these same-day services, the item ordered is moved from a point of production/stockholding to the final customer's address in a single continuous transport journey (i.e. a point-to-point journey). The final customer can be either a business or a consumer which determines whether it is a same-day B2B or B2C delivery. The term 'same-day' has been used in this report to differentiate it from 'next-day or economy' parcel delivery services, in which parcels are collected by vehicles, often vans, from multiple addresses as part of a single multi-stop vehicle journey. These vehicles operate from local depots (spokes) throughout the working day. Collections are then picked up from each local depot during the evening using larger, heavier goods vehicles and transported to a centralised hub depot for overnight sortation. Here the goods are unloaded, automatically sorted by destination, and loaded back onto these larger, heavier goods vehicles for transport back to the local depot in the early hours of the morning. These items are then delivered by the smaller, lighter vehicles based at the local depot as part of a multi-drop operation. By consolidating and sorting flows of parcels destined for the same and adjacent locations together, and by carrying out multi-drop vehicle collection and delivery rounds, it is possible for next-day and economy services to achieve operational cost savings compared to making direct, point-to-point same-day deliveries and collections.

The point-to-point, same-day delivery sector provides a faster delivery service compared to the hub-and-spoke, next-day and economy sector but has higher costs per item delivered given the lack of product consolidation on the vehicle, and the consequent vehicle and labour requirements per item handled. Due to the costs and prices of such point-to-point, same-day services have traditionally been limited to B2B items that are perceived as time-critical, and high-value by their shippers and receivers. However, the growth of ecommerce, together with the provision of lower-priced, same-day delivery services is leading to substantial growth in the B2C sector.

2.2 Economic and technological changes that have affected demand for same-day deliveries

The demand for same-day delivery between businesses grew strongly during the service sector expansion in the UK, especially in London from the late 1970s / early 1980s onwards. During this period there was a major realignment of the nation's economy, away from manufacturing and towards a post-industrial service-led economy. Also, over this time major growth took place in sectors including financial and insurance services, legal services, information and communication services, and advertising and media. These economic changes were most acute in London, resulting in substantial growth in the capital's economy and workforce. **Table 2.1** shows changes in employment levels in London by sector between 1971 and 2015. This led to rapid growth in the demand for same-day parcel, package and document deliveries between London businesses in these growing sectors in the 1980s.

Table 2.1: Jobs and Gross Value Added in London by selected sector

Sector	Change in total jobs in London 1971 – 2015 (%)	Total jobs in 2015 (% of London total)	Gross Value Added in 2014 (% of London total)
Professional, Real Estate, Scientific and technical activities	+214%	16%	24%
Other services	+173%	3%	2%
Arts, entertainment and recreation	+152%	4%	2%
Accommodation and food service activities	+102%	7%	3%
Information and Communication	+86%	8%	10%
Financial and insurance activities	+46%	7%	19%
Wholesaling	-30%	4%	7%
Primary and utilities	-56%	<1%	2%
Manufacturing	-85%	2%	3%

Source: calculated from data in GLA Economics (2016)

Until the advent of first fax machines in the 1980s, and email in the 1990s, vast quantities of information was sent between companies on the road network by same-day couriers on bicycles, motorbikes and in vans. The advent of these technologies has had a significant impact on the quantity of physical items requiring transportation on the road network between companies. However, in some sectors such physical flows of items persists, albeit at a lower level than previously. For instance, those working in law and certain branches of finance and insurance still have a requirement for couriers to move documents often due to standards in those sectors, or the need for physical rather than electronic signatures. The healthcare industry has continued to grow over recent decades, and the flows of test and blood samples as well as medicines and equipment that need to be moved on an urgent basis has increased. Some items cannot be sent electronically such as, for example, clothes for a photo shoot, fabric samples from a manufacturer, the lack of universal colour calibration for computer monitors and printers result in some photographs, proofs and other colour-sensitive items continuing to be sent physically in the advertising and media sector (Kidder, 2009).

In recent years, the internet has begun to revolutionise online consumer shopping, thereby providing numerous opportunities for new forms of same-day delivery. Although takeaway meal deliveries have existed for many years, until very recently this almost exclusively involved telephone orders to local restaurants with most customers collecting the order themselves, and a small proportion of these orders being delivered by the restaurant's own delivery service. Now, facilitated by the choice of restaurants available from a single website/app offered by platform providers such as Just Eat, Deliveroo, and UberEats, has led to rapid growth in total takeaway meal orders, all of which are facilitated by same-day deliveries. These deliveries usually take place within an hour of order placement and are carried out by couriers on bicycles, mopeds, motorbikes and in cars. Traditional grocery retailers as well as new online entrants have also begun to offer same-day grocery deliveries in the last 12 months in London and other dense urban areas. At the same time, some retailers, both with and without a physical high street presence have begun to offer same day deliveries of a wide range of non-food products. Many 'start-up' companies have entered the same-day delivery market in an

attempt to disrupt traditional carriers and gain a foothold by combining delivery services with sophisticated IT platforms that join customers, retailers and couriers together in an online application (Lee et al., 2016). Traditional non-food same-day delivery companies face a strong challenge to their market position and a need to diversify away from their long-established markets towards new, emerging opportunities in consumer-facing logistics.

There are also emerging examples of parcels couriers being used to perform temporary tasks that have nothing to do with delivering items or packages. Examples in the USA include couriers being hired to stand in queues to hold a place for someone, and to provide utility providers with access to the homes of those at work (Kidder, 2009).

These economic and technological changes are having a major impact on the people's lives and behaviours, and are leading to major developments in freight transport services. Although same-day delivery is new and only just commencing in many of these sectors, it is expected to grow substantially over time. If this growth happens it will lead to fundamental change in the nature of freight transport services in urban areas (as many same-day delivery services are unlikely to become as widespread in the near-future in rural locations due to distance, time and cost considerations). The transport activity associated with these same-day deliveries has the potential, if not thoughtfully organised, to lead to growing levels of freight activity and a rise in the associated impacts of traffic congestion, air quality pollution, and greenhouse gas emissions. At the Delivery Conference 2018 organised by Metapack, the leading commercial event for online retail shopping and deliveries in the UK, both retailers and freight carriers were preparing themselves and their customers for rapid growth in the importance of same-day deliveries, and unveiling the services they are positioning to cope with the expected increase in demand (Hare, 2018).

2.3 Sectors in the same-day delivery market

The UK same-day delivery market includes a range of different product types across various industrial sectors. The sectors served by these same-day operations can be sub-divided into the following:

- (i) B2B document, letter and parcel deliveries – this is a long-standing sector serving industries such as banking, insurance and law, which until recently by far the most important same-day sector in terms of volume of traffic, revenue generation and annual growth but which has fallen over the last twenty years as a result of technological change including first the fax machine and then email.
- (ii) Other B2B deliveries in industries including healthcare, retail, and field service (in which the courier provides parts and equipment to engineers and technical workers, or is trained to carry out the work themselves –such as parts for automotive, computing and other equipment). Same-day deliveries of fresh-cut flowers have also existed for a considerable period of time – some of these are B2C as well as B2B. This non-parcels B2B sector has been around for several decades but has showed more recent growth due to the faster response times required by and provided to businesses and private individuals.
- (iii) B2C parcels and packages – this same-day sector has been growing rapidly in recent years due to several factors including the rise of ecommerce and online shopping and its ethos of rapid response, the development of technology to support same day order processing, and the emergence of a niche of customers ordering online prepared to pay for premium same-day. This sector has been very small but until recently but is now growing rapidly as a premium internet retail delivery option. Same-day delivery services in this sector are supplied by a range of providers including traditional same-day courier companies, on-demand start-ups and crowdshippers using existing transport activity by private individuals.

- (iv) B2C grocery – a very recently established sector with online food retailers such as Tesco and Amazon starting to offer same day grocery deliveries in selected urban areas in the last year.
- (v) B2C restaurant meal / takeaway deliveries – this sector has existed for several decades but remained small and operated mostly by independent takeaway restaurants and a few pizza chains. It has grown rapidly in the last 3 years as a result of the formation of platform providers such as JustEat, Deliveroo and UberEATS.

2.4 Product categories in same-day delivery

A wide range of products and services are currently delivered on a same-day basis. These are listed below for each of the same-day delivery sectors.

B2B parcels and packages

- Legal documents for solicitors, courts, prisons
- Governmental papers and printed matter
- Banking, accountancy and other financial documents and packages
- Media and advertising industry materials – photographs, artwork, campaign material, print-outs
- Proposal and bid documents
- Urgent office and stationary supplies

B2C parcels and packages

- Small online shopping purchases
- Items that need returning to owners (keys, wallets etc.)

Other B2B/B2C non-food deliveries

Healthcare

- Supplying pharmacies, general practices, dentists, opticians, vets
- Delivering prescription medicine to private individuals
- Medical test samples to laboratories
- Blood supplies
- Organ transport for operations

Other

- Larger online retail purchases
- Automotive parts
- Engineering and computing parts
- Parts required by engineers and other field workers (including electricians, plumbers, telecom engineers, locksmiths, security consultants and other service personnel)
- Straightforward parts installation which a courier is capable of carrying out in addition to the parts delivery
- Lost luggage
- Dry cleaning
- Floral and alcoholic gifts
- Internal transport between the buildings of large organisations that share the same site or are located in the same urban area (such as schools, colleges and universities, hospitals, large companies, multiple retailers, council offices)
- Urgent catering supplies to restaurants and hotels
- Event and exhibition supplies and orders

- Holding customers' places in queues
- Providing home entry to workers on behalf of customers

B2C groceries

- Full range of supermarket groceries delivered on same day basis
- Specialist food suppliers (high-end butchers, bakers, confectioners)
- Milk deliveries
- Newspaper deliveries
- Door-to-door salespeople

B2C restaurant meal and takeaway deliveries

- Platform providers (Deliveroo, Uber Eats, etc.)
- Pizza delivery services (Dominos, Pizza Hut, Papa Joes etc.)
- Independent local restaurants providing their own transport services
- Meals on wheels (social services for the ill and house-bound)

There are anecdotal reports of other more illicit deliveries being made by same-day couriers, either knowingly or unknowingly. One London courier recounts being regularly asked by his controller to transport wraps of cocaine which he had to pick up from shady street dealers outside pubs and the deliver to those working in finance jobs in the City. The recipient would come out of the building to meet him on the street rather than the courier entering the building. He also used to often have to collect 'dodgy' tickets from touts to deliver to their clients (Day, 2015a).

How prevalent these more criminal transactions were and still are in current same-day delivery operations is unclear. However, in a recent court case it was revealed that a gang of three cocaine dealers used their own team of couriers on modified mopeds, disguised as London taxi cab drivers 'learning the knowledge' to distribute their wares to their clients. The mopeds were fitted with 'Knowledge Boards, which were used to transport the drugs. The gang was caught in a lock-up garage with 10 kilos of cocaine, six mopeds and 100 mobile phones. In a period of three weeks in 2016 they distributed more than 40 kilos of cocaine with a street value of £1.4 million (Kirk, 2018). Also in 2018, a businessman was jailed for using a seemingly legitimate courier business to illegally distribute sexual performance medicines. Over a two-year period he distributed approximately 8,500kg of unlicensed medicines (equivalent to somewhere between 1.7m and 2.9m packs and sachets (Lightfoot, 2018).

3. B2B and B2C Non-Food Same-Day Delivery Sectors

3.1 B2B and B2C non-food same-day delivery market size

There are various estimates of the size of the UK parcels market. Ofcom estimated that in 2016-17 the total national parcel volumes and revenues of major next-day carriers were 2.1 billion items and £8.7 billion respectively (Ofcom, 2017). By comparison, government estimates of the entire UK parcel sector (i.e. including carriers who provide services with less than entire national coverage) indicates that sector generated almost £9 billion in revenue in 2015, which represented a 6% increase on the previous year (Keynote, 2015). Another estimate (by Apex Insight) put the size of the parcel market in the UK in 2014 at £8 billion (Apex Insight, 2014; Ofcom, 2014). Another forecast estimated that 1.7 billion parcels were handled domestically in the UK by all parcel operators (Postal and Logistics Consulting Worldwide, 2015). Mintel estimated that the total parcel market handled 2.8 million items and generated revenues of £10.1 billion in 2016 (approximately 65% growth in items and revenues in 4 years). It was reported that nine out of 10 of the population had sent or received at least one parcel in the previous 6 months. Forecasts estimated a 33% increase in the volume of parcels handled by 2021, with a 22% increase in revenues, with much of this growth being contributed by ecommerce and online retailing (Mintel, 2017a).

The same-day parcel sector is a part of the total UK parcel market, but a relatively small part as most parcels are sent either for next-day delivery or slower, in order to reduce transport costs. Parcels sent on a same-day basis are by their nature deemed to be urgent, and time-critical. The B2B same-day parcel market has traditionally been subject to high levels of competition, with many small courier companies participating on a local and regional basis. This competition was due to two key factors: (i) local passenger taxi companies who also provided courier transport as an additional service with their existing fleets, and (ii) the low entry barriers that meant it was easy to enter the market – essentially only a vehicle and a means by which customers could communicate orders (originally telephone) was required. The vehicles used were usually no heavier than a van, and often smaller including bicycles, so operator licensing was not required.

As a result of a recent lack of growth in the demand for B2B same-day parcel delivery and the extent of competition in this market, the larger same-day parcel delivery companies have begun to search for more specialised services that they can offer that required a certain scale or investment level that would preclude smaller competitors, such as technical courier services and premium and bespoke B2C last-mile delivery services on behalf of top-end retailers. Such work requires a sizeable courier base to provide a reliable service. For instance, the largest same-day carrier CitySprint has also commenced restaurant and takeaway meal delivery services for Just Eat and thereby become a competitor to Deliveroo and Uber Eats in this same-day sector (CitySprint, 2017a).

Different market research reports have estimated varying sizes for the same-day document and packages deliveries and technical services markets. Some of these differences in estimates are likely to be due to the market definitions adopted, while others are likely to relate to survey techniques, and the difficulties posed by a sector comprising a large number of very small companies. However, despite these difficulties, a summary of these market estimates help to provide insight into the scale of the market and changes over time in its total size and the relative size of its B2B and B2C sub-sectors.

In 2006, the same-day parcels, medical and technical services market was estimated to have a total value of approximately £900 million (This estimate excluded same-day grocery and meal last-mile delivery services). Same-day B2B parcel delivery services accounted for by far the largest share of the UK same-day delivery market in 2006 (85% of the same-day market

by value – approximately £760 million). Same-day technical courier services accounted for 12.5% – approximately £110 million, and same-day B2C premium and bespoke last-mile delivery services accounted for 2.5% – approximately £20 million in 2006 (MSI, 2006).

The UK same-day parcel and technical courier market is estimated to have experienced 16% growth in value between 2002 and 2006. Even at this point, a decade ago, it was estimated that B2C parcel flows were increasing faster than B2B ones due to the growth in online retailing and associated premium last-mile delivery services. It was estimated that this B2C same-day delivery sector grew approximately 170% in the 5 years from 2002-2006 with the uptake of ecommerce and online retailing and the growing demand for same-day delivery albeit from a small base. Technical courier same-day services were also reported to be growing substantially between 2002-6 (by 175% in 5 years) as a result of the proliferation of outsourcing (MSI, 2006).

Another source estimated that the same-day parcel market alone had a value of approximately £500 million in 2013, and was growing rapidly at about 4-5 per cent per annum (Triangle Management Services and Royal Mail Group 2013, quoted in Royal Mail Group, 2015). Another estimate showed that the UK B2B and B2C same-day parcel delivery market generated a turnover of approximately £1 billion in 2016, which, based on this forecast, represented a doubling in size since 2012 (Intel, 2017a).

By contrast, another study estimated that the total UK non-food same-day deliveries (i.e. also including technical and fieldwork and other same-day services) had a market size of approximately £3.5bn in 2017 (Apex Insight, 2017). It should be noted that this market size estimate is far higher than the other estimates quoted above. Of this, B2B parcels accounted for approximately 85%, other B2B services including healthcare and technical services accounted for approximately 15%, and B2C parcels for 1.5%.

Unlike the B2B parcel same-day sub-sector, the B2C parcels and packages same-day sub-sector is expected to continue to grow rapidly over the next couple of years – while this sub-sector was estimated to have a value of approximately £50 million in 2016, it is forecast to expand rapidly to £687 million by 2020 (Apex Insight, quoted in CitySprint, 2017b). The market for other B2B services (including healthcare and technical services) is growing fast due to the continuation of outsourcing of many services by large organisations in both the public and private sectors.

Using these estimates, it is possible to calculate that the UK same-day parcel market generates turnover that accounts for approximately 5-10% of the total UK parcel market (i.e. including parcels sent next-day and economy). The price charged per parcel is considerably higher for same-day delivery than next-day and economy alternatives. This is due to same-day services requiring point-to-point transportation in order to meet this time requirement, often using vehicles with small carrying capacities such as bicycles and motorbikes. Same-day delivery does not offer the opportunity for overnight parcel consolidation as in next-day (and economy) parcel operations which improves drop density and facilitates multi-stop delivery rounds using vans. To illustrate these price differences, analysis of the next-day and economy parcel market indicates that the average revenue earned per parcel ranges from approximately £2-2.50 in the case of parcel carriers delivering parcels that typically have no specified delivery date (such as Hermes and Yodel) to £7-8 in the case of carriers typically providing next-day parcel services, some of which also have time guarantees associated with them (such as DPD, APC and Parcelforce) (Allen et al, 2016). Similar analysis of CitySprint, the market leader in same-day deliveries in the UK, shows that it generated revenue of £158 million in 2016 while carrying about 10 million documents, packages and parcels, thereby suggesting an average revenue per item of approximately £16 per item (Citysprint, 2017b). Even given these differences in average revenue it is important to note that the average same-day parcel, package or document is typically considerably lighter and smaller than the average

next-day parcel, and is also, on average, transported far shorter distances than next-day and slower parcels, with substantial flows between companies and organisations located in the same city as each other. Therefore on a per unit weight, size and distance basis there is a major difference in the prices (and costs) of items transported same-day compared with slower parcel services.

When its operating costs were taken into account, CitySprint achieved an EBITDA (operating profit before interest, taxation, depreciation, amortisation and non-recurring items) of £17.4 million, which is equivalent to approximately £1.70 per item handled (calculated using data in CitySprint, 2017b).

3.2 Major carriers in B2B and B2C non-food same-day delivery

The same-day B2B document, package and parcel delivery sector comprises a relatively small number of larger companies that offer comprehensive services, some of which offer national geographical coverage while others are focused on particular locations especially London. There are also many other, small companies offering same-day services on a more local basis. Research carried out in 2007 among carriers operating in London found that, on average, non-food same-day carrier respondents had 47 motorbike/moped couriers working for them. However, one-third of these companies had 10 or fewer such couriers, and only 23% of companies had 50 or more such couriers. The average number of cyclists used by these companies was far lower. In addition, 35% of companies reported making 100 or fewer deliveries (Synovate, 2007). **Table 3.1** shows the leading companies provide these services in the UK, and their turnover, operating profit and staffing, courier and fleet composition where available.

Of the leading couriers, some focus their business on same-day services (such as CitySprint, eCourier and Absolutely – with the latter also offering executive passenger taxi services), while others offer a range of other logistics services (e.g. Rico which has a large parts supply / field services division), while Addison Lee has a far larger passenger transport than parcel delivery division.

These traditional same-day couriers have been expanding their businesses through acquisition of local rivals. CitySprint has acquired approximately 30 rival business since 2010 (the year in which it was subject to a management buyout backed by private equity firm Dunedin – Taylor, 2015). These included the acquisitions of two major national same-day operators Medical Couriers and Lewis Day in 2011. These latter two acquisitions required approval by the Office of Fair Trading (OFT) to ensure it did not breach the mergers provision of the Enterprise Act 2002 and thereby warrant an investigation. The OFT accepted CitySprint's submission that the acquisition of Lewis Day would not result in it accounting for more than 10 per cent of the market share for same day courier services in the UK, and for not more than 15 per of the market share for same day courier services in London. It was also accepted by the OFT that CitySprint's acquisition of the medical courier business from Medical Services Limited that the combined market for this activity would be considerably below 25 per cent, given that the vast majority of medical courier services were provided by the NHS (Office of Fair Trading, 2012).

CitySprint, the largest same-day parcel carrier in the UK, works in several different sectors of the same-day parcel delivery market. Its revenue in B2B and B2C parcel deliveries in 2016 (which totalled £157.8 million) was broken down by sector as follows (CitySprint, 2017b): (i) B2B business services (including urgent parcel deliveries, baggage repatriation, and field technician support services) – 66%; (ii) healthcare including hospital samples and emergency surgical transport, as well as medicine deliveries to patients' homes – 33%; (iii) B2B and B2C retail deliveries (including meal delivery services) – 11% (CitySprint, 2017b).

Table 3.1: Leading B2B document, package and parcel same-day delivery providers in the UK (listed in alphabetic order)

Company	Turnover	Operating profit / EBITDA (and % of turnover)	Staff, couriers and depots	Comments
Absolutely	£15.5 million (2016)	£108,000 (1%) (2016)	110 staff + 100 taxis + 150 couriers; 4 London depots (2016)	London-focused
Addison Lee	£165 million (to end Aug 2016) (entire business)	£14.5 million (9%) (2016)	202 admin employees + 472 distribution employees + 600 couriers (200 motorcycles + 200 vans + 200 pushbikes) + 3700 minicab drivers (2016)	Approx. 1 million parcels per year. Also provides a passenger taxi service that is far bigger than its courier work. Reported turnover of £346 m for the entire business in 2016/17
Citysprint	£158 million (2016)	EBITDA £17.4 million (11%) (2016)	815 staff and 3200 couriers; 41 service centres (2016)	Market leader. Approx. 10 million parcels per year.
eCourier (Royal Mail-owned) (reg. name Revisecatch)	£13.2 million (9 months to end March 2017)	£1.0 million (8%) (end March 2017)	100 staff + 400 couriers; 3 London depots (Heathrow, West London and the City) (2017)	London-focused. Purchased by Royal Mail in 2015
Rico Logistics	£127 million (to end March 2017 in entire Rico Logistics Group)	£5.3 million (4%) (end March 2017)	1400 couriers, 40 depots / counters (2017)	Specialises in the parts supply, and fieldwork / technical same-day services. £109 million turnover in UK only (to end March 2017)
Royal Mail - Same Day Courier Service	£4.3 million (to end March 2017)	£462,000 (11%) 2017	Vehicle types used - motorbikes and vans	
UK Mail	UK Mail £247.8 million turnover to end March 2016 for parcels handling £194.3 million (Parcels - end Dec 2016 - 9 months)	£27.5 million (11%) (end March 2016) £15.4 million (8%) (end Dec 2016 – 9 months)	50 depots + 2400 vehicles (2016)	Also a major next day parcel carrier – same day only accounts for a proportion of its turnover. Part of DHL since 2016. 230,000 total parcels per night in year to March 2016

Source: from company accounts and information provided on company websites.

CitySprint established a retail brand called 'On the dot' in 2015 "as a result of a new business opportunity; to create a service where retailers could offer their customers delivery at a time best suited to them, through convenient 1-hour delivery timeslots" (On the dot, 2018). 'On the dot' has partnered with 35 retailer customers to provide deliveries including ASOS, Wickes and Currys PC World (On the dot, 2018). It also set up LastMileLink Technologies in 2016 to develop innovative computer software to improve processes and overcome on-demand and traditional last-mile same-day delivery challenges. This is firstly being developed for CitySprint's own operations, and then with a view to also selling such products to other customers (LastMileLink, 2018).

TVS SCS Rico was established in 1990 as a same-day courier based in Slough (called Ricochet at that time). It gradually expanded into servicing the requirements of major IT companies, delivering critical spares to their field engineers and stocking spare parts in its own strategic warehouse network. It changed its name to Rico Logistics in 2005. Rico Logistics purchased DHL's Express Same-Day courier business in 2013 which had many customers in the IT sector, and matched Rico's services well. In 2016 Rico Logistics became a majority shareholder in Circle Express, a carrier which provided local delivery and collection services to the air freight industry and which operated a fleet of 300 vehicles across eight airport depot locations. In 2017 it changed its name to TVS SCS Rico, and in the same year purchased a majority share in SPC International which specialised in repair and parts supply. Over time, the company's operations have become increasingly international and operates in three main sub-sectors: same-day courier, field engineering and spare part logistics (TVS SCS Rico, 2018). SPC International has operations in UK, France, Slovakia, USA and India. It offers hardware support with specialisation in IT spares and repairs, supporting multi-vendor maintenance contracts. SPC's services and solutions include repair and refurbishment, remarketing, reselling, warranty management and inventory management (consigned and owned). Products offered include retail, banking, barcode and data collection, PCs, printers, notebooks and many other products.

eCourier was set-up in 2003 by two former students who identified operational inefficiencies in the same-day courier market. eCourier varies from other traditional same-day couriers in that, working with operational research academics, it developed an automated allocation software algorithm (named "Larry") to distribute orders to couriers in real-time based on courier location, traffic, weather, and demand factors. This was intended to reduce the need for human controllers, reduce transactions costs, improve operations and increase the scalability of the operation. The majority of eCourier same-day deliveries take place in London but it also offers inter-urban services. eCourier was purchased by Royal Mail in 2015; as Royal Mail wanted to extend and improve its existing 'Sameday' service and increase its market involvement in same-day deliveries (Ecommerce News, 2015; Royal Mail, 2015). Royal Mail operates its two same-day delivery services (SameDay and eCourier) separately from each other, with eCourier run as a subsidiary. eCourier offers specialist medical same-day services as well as mainstream parcel transport.

UK Mail offers post and parcel operations on both a same-day and next-day delivery basis. In 2015, it set-up a new automated hub in near Coventry with an integrated parcels and mail operation. It was purchased in 2016 by Deutsche Post DHL Group (for US \$315.5 million) in efforts to increase its involvement in the growing UK ecommerce market (King, 2017). It has a strong presence in retail and IT sectors, and offers stockholding and inventory management services through its iStore services (UK Mail, 2018).

Meanwhile, Addison Lee has also acquired other taxi and courier companies to expand its coverage and share. It acquired London-operator Cyclone VIP Cars and Couriers in 2015, which had a substantial parcel operation (Professional Driver, 2015). The company had a sales turnover of £346 million in 2016/17 (a 31% increase on the previous year resulting from acquisitions as well as increased sales in London, its core market. Adjusted EBITDA was

£57.8 m. When depreciation, amortisation, and debt servicing were taken into account, the company recorded a pre-tax loss of £20.8m reflecting the long-term investments, acquisition integration and reorganisations that have taken place over the period (Addison Lee, 2018a).

Absolutely is a family-owned same-day courier company that has been in existence since 1865. It developed several different brands including Mach 1 Couriers, Pink Express, Destinations Green and A-Z Couriers but these were all rebranded as Absolutely in 2016. As well as offering same-day services the company also provides overnight and international parcel services through its membership of the APC network. Much of the company's same-day activity takes place in central London using a fleet of bicycles, motorbikes and vans. As well as transporting parcels, the company also handles same-day chilled food products. Executive car taxi services are also provided (Absolutely, 2018a).

Other same-day parcel delivery specialists in London include Swift (approximately 280 vehicles for same- and next-day services); Rush (approximately 120 couriers); Point-to-Point (approximately 80 vehicles); GLH (approximately 60 same-day vans), The Doctors Laboratory (approximately 80 couriers using bicycles, motorbikes and vans who provide services for this provider of medical testing required in its laboratories). In addition there are many other small carriers offering same-day services (many with less than five vehicles together with owner-drivers).

3.3 B2B and B2C gig-economy start-up same-day delivery companies

In addition to these traditional same-day couriers, there have also been many new 'on-demand' entrants who aim to serve the growing online (or 'gig') economy with rapid delivery services. In the early days of the dot.com boom several such companies were established, including Urbanfetch, BagsOfTime.com, and Kozmo. Urbanfetch commenced operations in 1999 with the vision of providing online orders of food and non-food products to customers by moped in less than one hour in both Manhattan and London. Urbanfetch provided free deliveries 24 hours per day and applied little, if any mark up to products and received much media attention. After a few months it imposed a minimum £20 order value. However, due to a lack of a sustainable business model it ceased trading in 2000 (Vickers, 2000). BagsOfTime.com which had a similar same-day service offer to Urbanfetch stopped trading within seven months of its launch, and on the same day as the demise of Urbanfetch (Smith, 2001). Kozmo, which offered a very similar range of online products service to Urbanfetch (including snacks, books, movies, and electronic equipment) and similarly offered a rapid-response delivery within an hour for free up until 01:00. Kozmo raised \$250 million in venture capital and offered its services in ten US cities (Frederick, 2000). The company went out of business in 2001.

Another American start-up in this sector that failed to survive was LicketyShip which launched in 2006 with the intention to deliver online orders to end consumers within four hours. The company attempted to charge users a delivery fee that reflected the cost of rapid delivery, making use of spare courier resource to achieve this. However, LicketyShip struggled to sign up deals with sufficient retailers in the locations served and then integrate its own website with the inventory management and ordering systems of these retailers. In 2007, the company gave up attempting to work directly with retailers, and instead focussed on selling aggregated local courier services to end consumers in an effort to integrate the fragmented courier market and offering it to users via a web service. The company attempted several further changes to its business model but ceased trading in 2009 (Arrington, 2008; Rao, 2009).

There have been a number of other new entrants to this 'gig economy' same-day market in the USA in the last few years. UberRUSH (the parcel delivery arm of Uber) was established in 2014, thereby allowing Uber's existing drivers to transport parcels as well as passengers. At the launch of this service, the general manager of Uber in New York described UberRUSH

as, 'an Uber for things' (Prigg, 2014). During 2015, UberRUSH was primarily a courier service by bike or on foot in New York City, but also quickly included a business-to-customer (B2C) service option. This vehicle-based delivery service was also extended to San Francisco and Chicago by UberRUSH in 2015, and delivers goods from retailers to consumers (Jinks, 2016).

Postmates was established in 2011 and provides same-day delivery services of online orders via a network of couriers who carry out local urban deliveries primarily for smaller and independent shops, restaurants and other businesses in many US cities. In 2015 it announced it had made its 2.5 million deliveries to date since its inception, had 1000 merchant clients and had a network of 13,000 couriers (REF). By 2017 it was reported that Postmates was delivering 2.5 million items per month and had a courier network of 100,000 people. In 2017 the company also announced that it had commenced its first same-day delivery services outside the USA, in Mexico City (Dickey, 2017).

Deliv offers its same-day delivery services to businesses which includes the transport of food and non-food. It operates in 17 US cities, and has acquired competitors including Zipments and WeDeliver as part of its growth strategy (Ha, 2015).

Dropoff, which launched in 2015, is attempting to establish a national same-day delivery gig-economy brand, which competitors have not managed to do. By 2017 it has operations in 12 US cities. It focuses on working with healthcare, grocery, retail, legal, real estate and hospitality clients but also carries out traditional parcel courier work. Like its rivals it uses a network of self-employed couriers. Like its rivals, it provides clients with a mobile dashboard that allows them to a courier anytime, review prices, obtain expected times of arrival and then track the package as it is moving. However all Dropoff's orders are placed by businesses rather than by end consumers (Crook, 2014; Carson, 2017).

In the last couple of years, several similar 'on-demand' delivery operators have been formed in the UK (usually with investment from venture capitalists and other investors – such as Quiqup, Stuart and Jinn) with the intention of gaining business and market share in the non-food same-day market as a result of the growth in ecommerce and online shopping. These start-ups are mainly targeting the B2C sub-sector (i.e. deliveries to private individuals) but are also attempting to enter the B2B package and parcel market where possible. Some also provide grocery and takeaway meal delivery services. During the initial phase of these companies, as they seek to win market share, they are making losses due to the investment needed to gain customers, build delivery infrastructure and IT systems. As a result, at present these companies are unprofitable. Whether they can avoid the fate of Urbanfetch, Kozmo and BagsOfTime.com and develop a sustainable business model remains to be seen. The largest and best-known of these start-ups with UK operations are summarised below.

Shutl was set-up in 2008 and was purchased by ebay in 2013. It provides same-day deliveries on behalf of online retailers via a network of couriers. Those retailers currently using Shutl's service include (according to their websites): Maplin, Trouva, The Perfume Shop, The Entertainer, MedExpress (Shutl, 2018).

Quiqup has scoped out its potential users as including both B2B and B2C customers. B2B sectors that it has identified for work opportunities include: independent retailers, other retailers, grocery, restaurant chains, and other third parties. Its research indicates that potential B2C target audience are working professionals aged from 25-34 earning above £40,000 per year (Anon, 2016). In 2017 it had 110 office-based employees and a network of 2000 self-employed bike couriers (O'Hear, 2017a)

Jinn was launched in London in 2014 offering a same-day courier service for consumers who could purchase from a range of food and non-food online retailers via its app. The start-up had raised a total of \$20m over its three-year life. It had a network of 1800 self-employed bike and

moped couriers and car drivers together with 100 office-based employees. However, the company ceased to trade in October 2017 and at the time of its demise had debts of almost £7 million to riders, staff, retail clients, investors and the HMRC despite having raised millions of pounds of funding earlier in the same year. Prior to its ceasing to trade, Jinn executives claimed it had a financially viable business model in which it charged its retail clients a commission on the order value, which was used to reduce the cost of delivery charged to end consumer (for purchases from non-member retail clients this was suggested to be 10 per cent of the price of the order plus a distance-based delivery fee, while for member retail partners a lower delivery fee of approximately £2.50 was charged together with a commission of approximately 25 per cent of the order value). Its IT platform has reportedly been purchased by Rico Logistics (Field, 2017; O'Hear, 2016a).

Henchman is a so-called 'personal concierge' app through which customers can order online goods (food and non-food) and services and have them delivered within 60 minutes. The app provided customers to track their products in real-time as the courier delivered them. Their concept was to put customers wanting such rapid services in contact with small businesses providing such services that did not want to operate their own deliveries. Henchman provides the app and the delivery services. Customers are charged a fee per delivery, and retailers are charged a commission of 20-30% of order values. Henchman has positioned itself as a luxury service that is available only to members (Anon, 2015). Henchman was purchased by the established same-day courier Rico Logistics in 2016, which is reorganising its service (O'Hear, 2017b).

Stuart was established in 2015. It provides its own app and a network of self-employed bicycle, motorbike and van couriers that allows customers the ability to purchase goods from a range of independent and local businesses and have them delivered within an hour. It is aiming to work with a wide range of retailers and goods providers across various sectors to avoid peaks in demand that can come from a product base that is too narrow, such as takeaway meals. Its charging model to retail customers is intended to reflect transport mode and journey distance in such a way that the cost of each delivery is fully covered. Stuart was acquired in 2017 by Geopost, the former French postal service. It had previously raised €22 million in investment funding. It currently operates in London, Paris and Barcelona (O'Hear, 2016b; Taylor, 2017).

Gett (previously GettTaxi) has launched an app intended for UK black cabs that lets drivers access online demand for parcels (up to 5 kg in weight and dimensions of up to 35x25x25 cm) (in addition to its existing service for passengers). Called Gett Courier, this app is the latest response to the challenge to black cabs posed by Uber (Shead, 2016a; Gett, 2018). Uber has not yet commenced same-day parcel services in the UK (unlike in the USA where it has its UberRUSH service), but provides these services in addition to passenger services in some other countries. Uber Eats and Deliveroo have to date focused exclusively on the same-day hot meal delivery market rather than the parcels sector.

Gophr is another start-up same-day delivery provider operating across the whole of London with a network of bike, motorcycle and van couriers. The company provides same-day transport services to the general public as well as to retail clients and has developed its own app and tracking system for customers to follow courier progress (Gophr, 2018a).

Amazon has established approximately 16 fulfilment centres in the UK. Traditionally, Amazon worked with several national parcel carriers to carry out its last-mile delivery of products to consumers (including Royal Mail, Citylink, DPD) who collected parcels from Amazon fulfilment centres, transported them to their own sortation centres, sorted them and transported them to a local delivery depot, and then made local deliveries to Amazon's customers. In recent years, Amazon has established its own technology and logistics platform (which it calls Amazon Logistics), through which independent carriers (usually local or regional businesses) work with Amazon to deliver parcels to consumers. Amazon Logistics consists of these fulfilment

centres, together with eleven local delivery stations and make use of Amazon-developed technology. Amazon Logistics sorts goods by region and transports them from its sortation centres to its local delivery stations. These independent carriers, who have their own vehicle fleets and drivers, collect pre-sorted packages from Amazon's local delivery stations, and deliver them to consumers in a local area, following a route determined by Amazon's own algorithms and using a hand-held device incorporating a scanner and a GPS. These carriers provide Amazon with additional capacity and the flexibility to alter the speed of delivery, allowing Amazon to achieve next-day delivery. In total Amazon Logistics works with about 30 parcel carriers, both national and local independent ones, across the UK (Amazon, 2014). However, over time, Amazon is placing greater emphasis and putting ever-greater parcel volume through its independent carrier network. These independent carriers often make use of a casual workforce that are employed as independent contractors. Whether Amazon offers to deliver parcels on a same-day basis depends on the customer's address (and its proximity to their fulfilment centres), the time at which goods are ordered, and the availability of the items ordered.

Crowdshipping involves, 'enlisting people who are already travelling from points A to B to take a package along with them, making a stop along the way to drop it off' (US Postal Service, 2014). It therefore makes use of members of the public who are making journeys to act as couriers for the distribution of parcels and other small items, thereby creating new informal logistics networks (McKinnon, 2016, Sampaio et al., 2017). Many of the start-up courier services of recent years including those reviewed claim to be crowdshippers, but true crowdshipping involves the use of journeys that would have been made anyway (for another purpose) to also carry goods, rather than dedicated journeys to deliver package such as happens in the case of UberRUSH, Postmates, Instacart, and Deliv in America, and Stuart, Quiqup, Deliveroo, and Amazon Flex in the UK. Therefore pure crowdshipping on an item will not create any more transport activity than would have been generated by the courier-passenger anyway (or possibly only slightly more is the dispatch and delivery collections differ a little from the courier-passenger's starting and ending locations for their own journey). In addition, crowdshipping did not originally require additional transport vehicles than those already used by the courier-passenger for their own journey that they intended to make anyway, regardless of whether or not they had a parcel or other goods to transport. The courier-passengers who collect and deliver the parcels only provide this service on a part-time basis in accordance and conjunction with their already planned passenger journeys.

An example of crowdshipping is provided by Nimber which provides an online matching service between those who needs items transported and those willing to do so (called "bringers"). Bringers log regular journeys they make online, and Nimber then notifies them when a potentially suitable delivery opportunities become available. The company was founded in Norway in 2010, and commenced operations in UK in 2015. Nimber describes itself as a "collaborative peer-to-peer service that connects people who need to send something from one place to another with people going that way anyway. Whether they are on the road, taking the train or traveling by other means, they can use their mobile phone to pick up and deliver, make some money and maybe save the environment as well" (Nimber, 2018). It was reported in 2015 shortly after commencing its UK operations that 3,000 Bringers had signed up in this country. Many of the items sent via Nimber are large and bulky and would attract high prices from standard parcel carriers. Nimber provides £500 insurance per item shipped via its service. However, even Nimber it is not a pure crowdshipper with only private individuals already making journeys acting as bringers. The company has reported that in Norway here it began approximately 40% of bringers do fall into this category, while the other 60% are commercial operators such as courier companies, or individuals with a vehicle looking for dedicated transport work (Hickey, 2015).

In addition to parcel deliveries, many of these new, on-demand start-ups have also targeted the grocery and meal delivery sectors in an effort to acquire sufficient volume throughput and

revenue generation in order to grow their companies and provide their networks of self-employed couriers with sufficient work.

Most non-food same-day deliveries are made directly to the person receiving the goods as they are deemed time-critical. However, some companies provide locker bank and collection point services that can be used in the provision of same-day deliveries, and some store-based retailers offer click and collect services. Providers of these locker bank and collection point solutions include Amazon, InPost, Collectplus, Pass My Parcel, Doddle, and Parcelly. However, these delivery solutions are more commonly used in next-day and economy services than in same-day operations. Locker banks and collection points can also be used for B2B same-day deliveries, especially in relation to the provision of parts to service engineers (see **section 10.1.2** and Allen et al., 2017 for further details of these solutions).

3.4 Non-food retail customers' use of B2C same-day delivery services

Research in recent years has suggested that there is a sizeable potential demand for same-day deliveries among UK non-food retailers' customers. A 2014 study of almost 2,400 adults found that 21% of respondents would prefer same-day deliveries if the price charged was what they were willing to pay (Ampersand, 2014). However, follow-up research by Ampersand in 2017 found that the proportion of respondents preferring same-day deliveries at the right price had fallen to 12% (Ampersand, 2017). Another international survey in 2015 suggested that 76% of respondents felt they were likely to use same-day delivery services in future (but the extent to which they expected to use this service was not provided) (Metapack, 2015). A UK survey of online shoppers in 2016 showed that 41% of respondents had already used same-day delivery services for an order, 47% expected to use the option more in the future (Verdict, 2016).

In terms of what UK online shoppers are prepared to pay for same-day deliveries, a survey in 2017 found that 40% of respondents were prepared to pay £0-5, 13% would pay £6-10, and 2% would pay £11-20, and 1% would pay £21-30. However, 34% of respondents were not prepared to pay anything for same-day deliveries (Ampersand, 2014).

In a 2014 survey by McKinsey in the UK, Germany, France and Sweden, 50% of respondents said they were prepared to pay delivery charges of EUR 6-7 for a same-day delivery of an item costing EUR 59, and 70% said they were prepared to pay EUR 3.50 to 4.50. However, approximately 30% of respondents saw no need for same-day deliveries (Hausmann et al., 2014). It has been suggested that same-day delivery is attractive to about one-third of consumers if it costs no more than 7-8% of basket value. This makes same-day delivery more viable for expensive items with relatively low delivery costs (i.e. for consumer electronics rather than grocery orders, as the latter are far larger and heavier and often have lower values (Hausmann et al., 2014). More recently, in a 2016 survey of 4700 consumers in China, Germany and the USA, 23% of respondents would pay more for a same-day delivery service and 2% who would pay more for instant deliveries, compared with 5% who would pay a premium for delivery time reliability, and 70% who are content with the cheapest form of home delivery available (McKinsey, 2016).

An international survey of approximately 3,500 consumers in 2017 found that while 65% of respondents wanted free delivery of non-food retailing, they also had high expectations of the delivery service, with 67% wanting to be able to track the delivery online, 58% wanting fast delivery, and 47% wanting to be offered multiple delivery options at checkout. However, approximately 60% of respondents said that their attitudes to delivery cost and/or speed were related to the value of the items purchased (Metapack, 2017). In this same survey, when questioned about same-day delivery, 54% of respondents wanted to be offered delivery within one-hour in urban areas (with this increasing to 66-68% among those below 38 years of age) (Metapack, 2017).

A 2014 study of 239 online retailers and visits to 100 retail stores in the UK found that the proportion of retailers offering a same-day delivery service increased for 4% in 2010 to 7% in 2013. Among the 69 largest of these 239 online retailers that were listed on the IMRG Hitwise Hot-Shops List, the proportion of those offering same-day delivery increased from 2% in 2010 to 10% in 2013 (Micros, 2014).

However, data concerning the proportion of UK non-food retail currently being shipped to customers on a same-day basis suggests that it is currently an extremely small proportion of total orders placed. IMRG / Metapack delivery data for the online orders completed by more than 220 retailers (which represent approximately 6 million orders in any one month and £4 billion order value in any 12 months) shows that over the twelve months from August 2016-July 2017 only 0.04% of parcels were shipped on a same-day basis (IMRG Metapack, 2017). This compares with an average of 0.04% of parcels shipped same-day between May 2013-April 2014, implying no increase in the proportion of orders delivered on a same-day basis (IMRG Metapack, 2014). However, given the growth in the total number of online non-food orders placed over time this will result in a growing number of same-day deliveries. Given an estimated annual total of 1.334 billion orders shipped by UK retailers during the year, this suggests that approximately 530,000 non-food retail orders were shipped during 2017 on a same-day basis (calculated using order data from (IMRG Metapack, 2017).

The current spending on B2C same-day parcels deliveries only represents a very small proportion of all expenditure on B2C parcel deliveries. One study estimated that B2C same-day deliveries accounted for £50 million in 2017 (Apex Insight, 2017). Based on the estimated 530,000 non-food retail orders shipped on a same-day basis in 2017, this would suggest an estimated spend per delivery (either by end consumer or retailer) of approximately £95. If the estimated number of same-day orders is accurate, a delivery spend of £95 seems rather high. Assuming a delivery spend of £15-20 per delivery (given that virtually all these deliveries are taking place over relatively short distances in urban areas) this would suggest a figure of approximately £10-20 million.

By comparison, analysis has suggested that carriers working in the B2C retail delivery sector charge an average of approximately £2.50 for economy (i.e. non time- or day- guaranteed) parcel deliveries. Meanwhile carriers providing premium services (including next-day, time-guaranteed, and international services to both B2B and B2C clients) typically charge on average of £4-8 per parcel delivered (Allen et al., 2016). Data suggests that approximately 35% of B2C retail orders in the UK were delivered nationally using economy parcel services in 2016-17, 30% were delivered internationally, and 35% were delivered on a next day or time-guaranteed basis (IMRG, 2017). **Table 3.2** shows the total amount estimated to have been spent on B2C deliveries in the UK by consumers and/or retailers depending on type of delivery service used based on the estimated 1.334 billion online orders placed in the UK in 2017.

Table 3.2: Estimated quantity and spending on B2C deliveries in the UK in 2017, by type of service

Service type	No. of parcels (approx.)	% of total parcels	Total expenditure on delivery services (£ billion)	% of total expenditure
Same-day	530,000	0.05%	0.01-0.02	0.3%
Next-day or time guaranteed	470 million	35%	2.8	44%
International	400 million	30%	2.4	37%
Economy	470 million	35%	1.2	19%
TOTAL	1.3 billion	100%	6.4	100%

Source: Calculated by the authors using data from IMRG, 2017 and Allen et al., 2016.

3.5 Retailers' provision of non-food B2C same-day delivery services

Amazon has led the way in same-day retail deliveries of non-food products in the UK. As early as 2014 it was stating that on a job listing that, 'Our long-term vision is that customers can order and receive a sellers' product the same day anywhere in the world' (quoted in Seetharaman, 2014). The company was keen to increase its same-day delivery offering as although in 2014 same-day delivery was only used by 4% of Amazon customers, the customers spent 15% more than others (Seetharaman, 2014). It has been estimated that 63% of Amazon users in the USA are Prime members, and that Amazon has doubled the number of Prime users in the USA from 47 million in September 2015 to 90 million in September 2017, with Prime members spending on average, \$1300 per year with Amazon compared with \$700 for non-members (Consumer Intelligence Research Partners, 2017). Increasing the number of customers using same-day delivery services and the number of third-party sellers on Amazon to offer same-day services could help to offset the costs associated with the delivery operations and fulfilment centres required to serve urban markets on a same-day basis (Jarrett Streebin quoted in Seetharaman, 2014).

Since Amazon launched its same-day Prime Now trials in parts of London in 2015 many retailers have been considered offering same-day delivery to customers in an effort to match this level of customer service, and some have implemented a same-day delivery offer.

Amazon has now made its same-day service available to non-Prime customers depending on their location (it is only available to certain postcodes) (see **section 3.3** for further discussion of Amazon's same-day delivery operation).

Argos responded to Amazon's introduction of same-day delivery, by introducing its own same-day delivery service in 2015. Called 'Fast Track' it provides same-day deliveries seven days per week on thousands of Argos items ordered before 18:00. Initially it was trialled in London but was then rolled-out to 90% of UK postcodes (Argos, 2018; Simpson, 2015).

Only a relatively small number of retailers are currently offering their customers same-day delivery services. It should be noted that even those retailers that have begun to offer same-day delivery typically only offer this service to customers living within a defined geographical

coverage, usually urban areas and in some cases only in London at present. However, these same-day services by retailers have generally only commenced in the last 12 months.

A study of the top 100 UK non-grocery online retailers in 2014 showed that only 11 offered same-day delivery services (Argos, Next, Currys, House of Fraser, PC World, Maplin, Schuh and Appliances Online) (Ampersand, 2014). Variation in the offering of same-day services appeared to exist in the UK in 2015 with 7% of all store-based retailers with an online presence offering same-day deliveries, compared with 4% of fashion retailers and 13% of department-stores (Ampersand, 2016).

Table 3.3 lists major retailers in the UK with a major online presence (both pure-play retailers and those with physical stores as well) and shows whether they provide a same-day delivery service for online purchases of non-food items in February 2018 and, if so, its cost and the comparative costs of next-day and other delivery services provided. It shows that eight of the 31 listed retailers (25%) have already implemented same-day services, with more considering following suit in order to match their competitors' service offer. This suggest growth compared with the 11% of top 100 UK non-grocery retailers offering same-day deliveries in 2014. However, many of the retailers in this 2018 exercise differ from those in 2014, so some caution should be exercised.

Table 3.3: Selected major retailers in the UK and whether they offer same-day delivery of non-food products in 2018

Retailer	Pure-play only or physical stores as well	Same day delivery service?	Cost of next-day and other delivery services
Amazon	Pure play	Yes, £6.99	Next-day: £5.99 Standard: £1.99-3.99
EBay	Pure play	Yes (from selected sellers provided by Shuttl – prices varies)	Price varies
Argos	Stores	Yes, £3.95 7 days a week (2-3 Hour slot)	Next-day: £3.95 Standard : free
Shop Direct Group Very / Littlewoods (excl. large items)	Pure play	No	Next-day: £4.99 Standard: £3.99
John Lewis department store (excl. large items)	Stores	No	Next day: £6.95-9.95 Standard: £3.50 (fee over £50)
Next	Stores	No	£3.99
Dixons Carphone	Stores	No	Next day: Free
N Brown Group Plc	Pure play	No	Next-day: £6.50 Standard: £3.50
AO.com	Pure play	No	Next-day: from £10 Standard: from £5
ASOS	Pure play	Yes, £9.95	Next-day: £5.95 Standard: £3
Sports Direct	Stores	No	Next-day: £6.99 Standard: £4.99
Boots	Stores	No	Next-day: £4.75 Standard: £3.50 or free on orders over £45
Top Shop	Stores	No	Next-day: £3.00 Standard: free

Table 3.3: Selected major retailers in the UK and whether they offer same-day delivery of non-food products in 2018 (cont.)

JD Sports	Stores	Yes	Next-day: £3.99 or £4.00 with 1-hour slot Standard: £2.99 and free on orders over £60
Findel plc Express Gifts – Studio	Pure play	No	£4.99 for standard delivery
House of Fraser	Stores	Yes, £8	Next-day and standard: free (current offer)
Avon	Pure play	No	Next-day: £5.50 Standard: £3.50
YNAP group Net-a-Porter	Pure play	Yes, £12	Next-day: £8 Standard: £5
Wiggle	Pure play	No	Next-day: £4.99 Standard: £2.99 and free on orders over £12
Ebuyer	Pure play	No	Next day: £4.99
The Hut Group	Pure play	No	Next-day: £3.99; £4.99 with 1-hour slot; free on orders over £50 Standard: £1.99 and free on orders over £30
Boohoo	Pure play	No	Next-day: £4.99 Standard: £3.99
JP Boden	Pure play	No	Next-day: £8.00 Standard: £4.00
Currys	Stores	£9.95 (2-hour slot) Done by CitySprint – on the dot	Next day (all day) - £3.95 Next day (with time slot) - £9.95 Standard (longer than next day) - free
Wickes	Stores	Yes, £9.95	Next day: £7.95 plus free on orders over £75

Source: Online research by the authors from companies' websites.

In addition, several smaller retailers have begun offering their customers same-day delivery (or click and collect). In 2016, luxury fashion retailer Matches Fashion commenced a service in London that offered deliveries within 90 minutes of orders being placed (Matches Fashion, 2018). The Perfume Shop provides a same-day delivery service with a £7.50 fee (compared with a £3.99 charge for next-day delivery and a free 3-5 day delivery service (The Perfume Shop, 2018). Hotel Chocolat provides same-day delivery either within 90 minutes of ordering or at an agreed time-slot within a 20 mile radius from £5.95, compared with £4.95 for next-day delivery, and £3.95 for 3-5 day delivery. (Hotel Chocolat, 2018). Med Express provides same-day delivery in London for £4.95-19.95 (depending on journey distance), compared with a next day service for £5.95, and a standard 3-5 day service for £2.90 (Med Express, 2018).

3.6 Provision of same-day deliveries in the fresh-cut flowers and automotive sectors

Same-day delivery in some sectors such as fresh-cut flowers and automotive car parts has existed for a considerable period of time. These deliveries are made on both a B2B and B2C basis. For fresh-cut flowers, the delivery can be made using vans, cars, bicycles and motorbikes. The vehicle selection will usually depend on the location of the delivery point and the prevailing traffic conditions in that location. Some retailers include free same-day delivery

(incorporating the cost into the price charged for the flowers, while others have an explicit same-day delivery charge. Some offer various service levels for same-day delivery. There are differences between these online retailers in terms of: i) whether the retailer offers a national service or a more geographically limited area over which deliveries can be made (such as a single town or city, or part of a city); ii) whether the retailer prepares the orders themselves or is a broker / platform provider that passes the order to a florist based near to the delivery location; iii) the time of day by which orders must be made for same-day delivery; and ii) whether the florist carries out the deliveries themselves or passes the flowers to a third-party carrier for delivery. **Table 3.4** provides a summary of the current services provided by a selection of prominent same-day, fresh flower online retailers.

Table 3.4: Same-day delivery services provided by a selection of fresh flower online retailers in 2018

Retailer	Geographical coverage of same-day delivery service	Does the retailer supply the flowers or pass order to local florist?	Time order must be placed by for same-day delivery	Cost of same-day delivery	Other products sold
Apple Yard Flowers	Central London	Pass to local florist	09:30 for delivery between 10:00-15:00. 12:30 for delivery between 13:00-18:00. 16:30 for delivery between 17:00-22:00. (Mon-Fri only)	£6.99	Wine Hampers
Bloom & Wild	Central, south and west London	Prepares themselves	18:00 (Mon to Fri) Two-hour response time – deliveries fit through letterbox.	Free	None
Eflorist	National	Pass to local florist	15:00 (Mon-Sat)	£5.95 (next-day)??	None
Floom	London	Pass to local florist	Midday (delivery by 17:00)	£9.99	Plants
Flowerstation	Whole of London	Prepares themselves	18:00 (7 days per week)	Same Day Anytime: free Same Day Within 3 hours: £12.95	Plants Soft toys
Interflora	National	Pass to local florist	15:00 (Mon-Sat)	Delivery Today (Anytime between 8am - 6pm): £8 Express Delivery (Within 3 hours of ordering): £13	Plants Chocolate Drinks Fruit Balloons
Waitrose	National	Pass to local florist	14:00 (Mon-Sat)	£8.95	Drinks Chocolate Biscuits

Source: Online research by the authors from companies' websites.

In terms of automotive parts, Euro Car Parts is the market leader for spare parts across a diverse range of car makes. It offers a substantial range of car parts for all makes and models. The company's spare product range is the largest of any independent motor factors in the UK. It has a network of more than 200 branches across the UK. A same-day Delivery service is offered to customers located within a specified radius of these branches from which the same-day deliveries are made. Same-day deliveries are made between 08:00-18:00 on weekdays only. Orders must be placed before 15:00, and are delivered by 18:00. Same-day deliveries are £3.95 but order values over £10 receive free same day deliveries (Euro Car Parts, 2018).

4. B2C Grocery Same-Day Delivery Sector

The online grocery and food shopping market in the UK is a relatively small but established and growing part of total food sales. It was estimated to have generated total annual online sales of £9.9 billion in 2016, which accounted for 6.1% of all grocery sales in the UK (this includes sales by online-only (i.e. pure-play) as well as store-based retailers). The annual growth rate in online grocery sales was approximately 15% in 2016, compared with 1.5% growth in the supermarket sector as a whole (i.e. including sales in physical shops) (Mintel, 2017b).

The online grocery market comprises two types of retailer: those that are store-based and those that are not (i.e. pure-play). The former includes major grocery retailers such as Tesco, Sainsbury and Asda. The main player in the online-only sector is Ocado. Other suppliers in this pure-play sector include fresh food box suppliers and Amazon. Store-based retailers accounted for 75% of total online grocery sales in the UK in 2016, compared with 25% of sales by online-only retailers. The leading store-based online grocery retailer is Tesco, which accounts for approximately 35% of all online grocery sales in the UK, followed by Sainsbury's (15%), Ocado (13%) and Asda (11%) (Mintel, 2017b). Amazon entered the online grocery market in the UK in 2015 increasing its product range to approximately 15,000 items in 2016.

The online grocery sector has grown rapidly in both absolute and relative terms in recent years, having only accounted for approximately £5 billion of sales (4% of total grocery sales) in 2011. The sector is forecast to continue growing at annual rates of about 10% for the next few years, but to still only account for approximately 9% of total grocery sales by 2021 (Mintel, 2017b). Future pressures on online grocery sales growth rates include: (i) growth in the restaurant and takeaway food delivery sector, (ii) growing food product lines and competitive pricing from store-based discount retailers, and (iii) efforts by food manufacturers with branded products, such as Unilever and Reckitt Benckiser, Unilever and Diageo to sell online directly to consumers (Fung Global Retail & Technology, 2016). Other concerns among existing and potential users to online shopping in general include delivery charges, minimum order value requirements, the quality and expiry dates of the products supplied, the convenience of delivery time availability, and the availability of a mix of food and non-food products in the same order (Mintel, 2017b). The hygiene standards of delivery vehicles is another concern among some shoppers, especially following a BBC Watchdog investigation in 2016 that found that the majority of delivery crates used in Asda operations had unsatisfactory hygiene standards. Further investigations suggested similar problems at Tesco and Sainsbury's (BBC Watchdog, 2016a, 2016b; Bowden, 2016; Jahshan, 2016).

Market research has shown that almost half (48%) of shoppers in the UK use grocery online shopping to a greater or lesser degree. It is estimated that 14% of UK consumers do their grocery shopping exclusively online (Mintel, 2017b). Another barrier to future growth in online grocery shopping is its ability to go beyond providing users with their main weekly shop. At present even most online shoppers continue to use physical stores to acquire goods needed at short notice to satisfy their immediate demand. Therefore, in the last 12 months, online grocery retailers have decided to offer ever-more responsive delivery services, with some of these retailers providing same-day delivery services (typically in specific geographical locations with large urban populations to begin with). Research has indicated that approximately half of all existing online grocery shoppers and almost 70% of those aged 16-34 describe the offer of same-day deliveries as important (Mintel, 2017b). However, providing such same-day services is more expensive than current delivery offers for retailers. Given that online grocery shoppers view delivery charges and minimum spend requirements as key barriers to increasing their online grocery shopping, achieving uptake of same-day services beyond the time-poor, cash-rich is likely to prove a significant challenge.

There are no estimates available for the size of the grocery same-day delivery market in the UK. However, given that the total online grocery market is estimated to be worth approximately £10 billion and that same-day grocery delivery services only commenced in the last 12-18 months and mostly only in certain parts of London (with the exception of Tesco) it is unlikely that they represent more than 1-2% of the total online grocery market. Average reported basket values for online grocery shopping in the UK include £108.45 for Ocado in 2017 (Goldsmith, 2017); and \$83.40 (equivalent to approximately £59) and £64 in recent surveys of consumers using a range of different retailers in 2016 and 2017 respectively (Kantar Worldwide data quoted in Gerrard, 2016; Him, 2017). Assuming an average of £64 (from the general survey of 2017) this suggests that there are currently approximately 150 million total annual online grocery orders in the UK. An alternative estimate can be derived from data for the number of weekly orders received by grocers for whom data is available: Tesco apparently received approximately 500,000 and online orders per week in 2015 (Clark, 2015). Given that Tesco accounted for approximately 35% of market share in 2016 (Mintel, 2017b) this provides an estimate of 2.0 million online grocery orders nationally per week, which is equivalent to about 100 million order per year.

These estimates suggest that there are between 100-150 million grocery orders in the UK annually. Assuming same-day orders do account for 1-2% of this total, that is equivalent to 1-3 million same-day orders per year. Given that same-day orders have delivery charges of £5-10, this would suggest an estimated £10-20 million expenditure on delivery charges for same-day groceries in the UK, which may represent approximately 2-3% of total expenditure on online grocery deliveries (given that next-day deliveries have a lower average price than same-day deliveries ranging from free to £7 per delivery).

Grocery retailers currently offering same-day deliveries in all or part of the UK include the store-based operators Tesco, Sainsbury's and Asda, together with online retailers including Amazon, and a couple of few small-scale retailers including Efety and Home Run. The Co-op and Marks & Spencer have also been involved in same-day delivery trials.

Tesco is the market leader in same-day grocery deliveries in terms of geographical coverage for this service. It introduced a same-day delivery service in London and the south-east in 2017. Then in July 2017 it announced plans to launch a same-day delivery service across the entire country by the end of August 2017. With the exception of Tesco, other grocers providing same-day deliveries, currently only do so in selected locations, typically parts of London. Sainsburys offers the second largest catchment area, operating from 100 of its stores and reaching approximately 40% of the UK population.

Tesco offers two same-day services, the national same-day service which utilises its existing network of delivery vans, and another rapid service only available in inner London which provides up to 20 items from a limited range within sixty minutes of order placement, and which is fulfilled on behalf of Tesco by moped couriers from the start-up carrier Quiqup.

Sainsburys offers two similar same-day services to those provided by Tesco, with its inner London service offering deliveries of up to 25 items within 60 minutes of ordering, provided by couriers hired by Sainsburys on bikes and mopeds.

Amazon entered the online grocery market in 2015 by offering a small ambient food product range, through a division called Amazon Pantry. Expanding on its existing Amazon Pantry offer, Amazon introduced Amazon Fresh in the UK in June 2016. This service offers approximately 15,000 items, including fresh food, perishables as well as branded goods. As part of this service, Amazon has also signed a deal with Morrisons to supply fresh and packaged private-label products as well as products from about fifty premium local producers, shops and markets in London. The Amazon Fresh service is available to Amazon Prime members (a subscription service that costs £79 per year in the UK. Members pay an additional

£6.99 per month for Amazon Fresh). Amazon Fresh provides same-day delivery to customers in London and Hertfordshire for orders placed before 16:00 (with deliveries between 14:00-23:00).

Efety is a UK start-up company providing grocery deliveries within 60 minutes of ordering, where traffic permits. Orders can be placed and delivered at any time day or night, and on every day of the week. There are currently no delivery charges. The company has a substantial range of healthy, organic, and vegan products. Services are currently only available in London and are served from three warehouses in Brent Cross, Dulwich and Barking. Its drivers deliver my moped (Efety, 2018).

Home Run is a UK start-up grocery delivery business. Customers can request items from a selection of retailers (Waitrose, Whole Foods Market, Marks & Spencer and Tesco). A personal shopper will then make these purchases on behalf of the customer deliver within as little as one hour where possible. Cars and mopeds are used to make these deliveries. At present the service is available in southwest and west London (Home Run, 2018a). The business model it is using is similar to that provided by Instacart and Shipt in the USA (see below).

In 2018 the Co-op teamed up with Deliveroo to trial offering same-day grocery deliveries from five of its stores in Greater Manchester. Deliveroo couriers will collect items from Co-op stores and then make deliveries on bicycles, mopeds and motorbikes. Orders are placed via a Deliveroo webpage which contains a limited range of beers, wines, spirits, snacks and confectionary products (Hadfield, 2018).

Marks & Spencer commenced a home delivery trial in London and Reading in 2017, in which same-day deliveries within two hours of ordering (one hour if only a ready meal or pizza was required) were offered. The London trial took place from one store in Camden with deliveries offered in a three-mile radius. In the case of the Reading store customers have to collect their orders rather than having them delivered, with orders ready for collection within two hours. There was no delivery charge for this trial and deliveries in Camden were carried out on behalf of Marks & Spencer by couriers of the start-up carrier Gophr (Glenday, 2017).

In America there were some early company casualties in online grocery shopping services such as webvan and Peapod. In terms of current same-day delivery services, Instacart provides a same-day grocery delivery service which is purchased on behalf of consumers from a selection of grocery retailers. The service is available in more than 30 US cities and has also now been expanded to Toronto and Vancouver in Canada. Initially, Instacart added approximately a 10-20% mark-up to the prices charged. However, over time, through building relationships with grocers, Instacart can now offer its users the shop prices. The company has received approximately \$400 of million dollars of funding to date and was valued at \$3.4 billion in 2017 (Wikipedia, 2018). Its couriers are mostly self-employed, but due to recent legal action some can now choose to be part-time employees.

Shipt was launched in America in 2014, with a similar approach to Instacart of using personal shoppers who visit shops on behalf of customers to purchase groceries and then deliver these on a same-day basis. Shipt provides services in over 100 American cities (Shipt, 2018). Shipt was purchased in December 2017 for \$550 million by US grocery retailer Target. This is reported to be Target's attempt to compete with Amazon in the same-day grocery delivery market (Resinger, 2018).

Table 4.1 shows the delivery services offered by major grocery retailers in the UK including whether or not they offer same-day delivery services. **Table 4.2** shows the services provided by grocery retailers and start-ups offering same-day grocery delivery services in the UK.

Table 4.1: Online grocery shopping and delivery services offered by major retailers in the UK, February 2018

Retailer	Online shopping and delivery	Next-day or slower delivery charge	Next-day Click & Collect	Delivery pass	Same-day delivery	Same-day Click & Collect
Aldi	Only on wines and large non-food items	Free (£4 if next day required)	No	No	No	No
AmazonFresh	Yes	Have to be Amazon Prime member with a £6.99 per month AmazonFresh add-on. Orders over £40.00 are then free.	No	Yes	Yes	No
Asda	Yes	£40 minimum over value. Deliveries: £1-6, depending on slot.	Yes, free.	Yes	Yes, £24-55 per year, minimum £40 spend.	Yes, free.
Co-op	No		No	No	No	No
Iceland	Yes	£2.00 next day delivery for orders £23-35; free next day on orders over £35.	No	No	No	No
Lidl	No		No	No	No	No
M&S	Only wine	Delivery: £3.99. Free on orders over £50		No	No	No
Morrison	Yes	£40 minimum order value. Deliveries: £1-5 depending on delivery slot	No	Yes	No	No
Ocado	Yes	£40 minimum order value. Deliveries £2.99–6.99 depending on slot	No	Yes	No	No
Sainsburys	Yes	£25 minimum order value. Orders under £40: £7 delivery. Orders over £40: £1-7 delivery depending on slot.	Free on orders over £40; otherwise £4	Yes	£25 minimum order value. Orders under £40 - £9 delivery. Orders over £40 charged a delivery fee of between £1 and £7.	No
Tesco	Yes	£3-5.95 per delivery depending on slot	£0-2	Yes	Yes	£2-4
Waitrose	Yes	Free delivery on spend of £60 or over.	Free on orders over £40; otherwise £2	No	No	No

Source: Online research by the authors from companies' websites.

Table 4.2: Same-day delivery services provided by online grocers in the UK, February 2018

Retailer	Same-day delivery charge	Ordering and delivery arrangements	Geographical coverage	Other details	Vehicle type used
Tesco	£3-8 per delivery. Also subscription service available: £12.99 monthly, no contract OR £9.99 monthly, 6-month contract.	Order by 13:00 for deliveries after 19:00	UK-wide (from 300 stores covering 99% of population).	Available 7 days per week. Same-day Click+Collect service also available Mon-Sat from 261 collection locations nationwide.	Van
Tesco Now	Delivery within 60 minutes - £7.99; delivery within 2 hours - £5.99	Delivery within 60 mins of placing order. Deliveries take place 07:00 to 22:00 Mon-Sat and 10:00 to 21:00 Sun	Central London (Zones 1 and 2)	Max 20 items (depending on size). 1,000 products available.	Quiqup riders visit Tesco store by moped and then deliver
Sainsbury's	Orders of £25-40 charged a delivery fee depending on time slot. Orders over £40 charged a max.£9 per delivery. No delivery charge for orders over £100 booked for same-day delivery on Mon-Thur after 14:00.	Minimum £25 order value. Orders must be placed by 12:00 with deliveries from 18:00 onwards.	Deliveries from 100 stores (covering 40% of population)	Available 7 days per week.	Van
Sainsburys Chop Chop	£4.99 per delivery.	No minimum order value.	London travel zones 1 and 2 (customer must live within 3 km of store)	Maximum of 25 items from specific limited range. Deliveries made by bike or moped within 60 minutes.	Couriers pick in store and then deliver on bicycle or moped.
Amazon Fresh/ Morrisons partnership	£6.99 per delivery for non-Amazon Prime members. No charge for Amazon Prime members.	Introduced in 2016. Inner London: Latest order time 16:00. Delivery times 14:00-23:00. Outer London & Herts: Orders must be placed by 12:00. Deliveries made 19:00 and 23:00 Mon to Sun.	London and Hertfordshire		Van

Table 4.2: Same-day delivery services provided by online grocers in the UK, February 2018 (cont.)

Retailer	Same-day delivery charge	Ordering and delivery arrangements	Geographical coverage	Other details	Vehicle type used
Etefy	No delivery charge.	No minimum order value. Deliveries 24 hours per day, 7 days per week. Deliveries usually arrive within 60 minutes of order.	Anywhere in London, within the M25	Sells organic as well as regular food plus gluten-free & vegan products. Supplied from warehouses in Brent Cross (NW2), Dulwich (SE21) and Barking (LG11).	Mopeds
Home Run	£4.99 per delivery fee regardless of delivery time chosen.	No minimum order value. All deliveries same-day. Depending on order size and distance from store to home, deliveries within 1-2 hours from time of order. Delivery times: 09:00–22:00 Mon-Sat.	Central and inner south-west and west London.	41,600 supermarket products. Driver visits Marks & Spencer, Tesco, Whole Foods or Waitrose to purchase goods and then delivers. Some products charged at same rate as shop retailers, others have a mark-up on no more than 15%.	Mopeds and cars

Source: Online research by the authors from companies' websites.

5. B2C Takeaway and Restaurant Meal Delivery Sector

All deliveries of ready-to-eat restaurant and takeaway meals take place on a same-day basis – an order is placed by telephone or online and within a specified period of time the meal is delivered to the home or location of choice of the customer. This sector has existed in the UK for several decades but until recently was dominated by independent takeaways that took their own orders and made deliveries themselves. Then, since the 1990s, takeaway chains especially in the pizza sector (including Dominos, Pizza Hut, and Papa Johns) became important drivers of growth. In the last three years, the sector has been revolutionised by ‘on-demand’ start-up platform providers that take orders online on behalf of restaurants and takeaways and in some cases also carry out deliveries on their behalf. These start-ups include Just Eat, Deliveroo, Uber Eats and Amazon. These changes are reflected in a 2007 study carried out in 2007 among companies making meal deliveries in London. This work found that, on average, these companies had eight motorbike/moped couriers working for them, with 56% of these companies having four or fewer such couriers, and only 4% of companies had 50 or more such couriers (Synovate, 2007).

This market in the UK was estimated to be worth £3.6 billion in 2016, which was an increase of 6% on the previous year, and approximately 50% growth since 2008 (NPD, 2017). Meanwhile, the market for eating out in restaurants only grew by 1% in 2016 (NPD, 2017). Research by the loyalty card provider Nectar has indicated that 43% of consumers are eating out less often now as a result of the growth of online meal delivery options (Price, 2017a). This ready-to-eat food delivery market is forecast to achieve an annual growth rate of 10-15% over the next few years (Hirschberg et al., 2016; NPD, 2017). The five leading companies in this market globally had a combined valuation of more than €10 billion in 2016 (Hirschberg et al., 2016).

The major online platform providers (who provide access to multiple restaurants) are estimated to account for 80% of these deliveries (compared with orders taken and deliveries carried out by restaurant chains and independents) and the majority involve fast food. Approximately 65% of these deliveries are for dinner. Growth potential in the breakfast and lunch markets has been identified. The young are major users of these services, with 18-24 year olds estimated to account for 15% of all orders (NPD, 2017).

Approximately 80% of British adults order takeaway/home delivery as some point over the course of the year. Approximately 55% of Britons only order a restaurant or takeaway delivery every 2-3 months or less frequently. However, approximately 10% of people order at least once per week, 15% of people 2-3 times per month and 20% of people once per month (Mintel, 2017c).

The current and forecast growth in the takeaway and restaurant home-delivered meal market are based on many consumers wanting to save meal planning, cooking and shopping time for more important or enjoyable activities, while also enjoying food from their favourite restaurants. Over time, it is likely that this desire for convenience will result in ever-greater levels of home delivery of groceries, prepared ingredients/recipes and ready-to-eat meals, which will erode the dominance of traditional store-based grocery retailers (Mignot, 2015).

Assuming an average order value of £20 (based on a Just Eat average order of £18 and a Deliveroo average order of £25-30 – see below), it is possible to estimate that the takeaway and restaurant meal delivery market provided 180 million deliveries in the UK in 2016. Delivery charges range from free at some pizza chains and other restaurants to £2.50 for many deliveries by the main platform providers. Given that the main platform providers are estimated to account for 80% of all orders, an assumed delivery charge of £2 suggests a total annual delivery expenditure by consumers of approximately £350 million in 2016.

The marketplace for takeaway and other home-delivered meals is exceptionally competitive. Just Eat is the largest platform provider in the UK. It has grown rapidly over recent years, with annual sales increasing from approximately £10 million in 2009 to £157 million in 2014 to £248 million in 2015, to £375 million in 2016 (an increase of 52% on 2015) (BMI Research, 2016; Martin, 2016; Just Eat, 2017a).

In 2015 Just Eat's order numbers increased by 57% on the previous year to 96 million, with a total food spend of £1.7 billion. Its orders grew by a further 31% in 2016 with a total food spend of £2.5 billion (Just Eat, 2017a; Mintel, 2017c). Given that there were 136.4 million orders in 2016 (up 42% on the previous year), the average order value is approximately £18 (Just Eat, 2017a). Just Eat achieved an EBIDTA (operating profit before interest, taxation, depreciation, amortisation and non-recurring items) of £115.3 million in 2016, which is equivalent to £0.85 per order. After taxes, interest, depreciation and non-recurring items, the operating profit per order was equivalent to £0.53 per order (Just Eat, 2017). In 2017 Just Eat's processed a total food spend of £3.3 billion, with orders up by 26% compared with 2016 (giving an average order value of approximately £19), revenues increased by 45% to £546m, and EBIDTA increased 45% to £163.5 million. However operating losses were £72.5 million (Just Eat, 2018). Just Eat did not originally provide its own delivery services, instead it took orders and payments and then passed orders to restaurants for preparation and delivery. However, it began to use established same-day carriers, such as CitySprint, to carry out some deliveries on behalf of it and its restaurant partners. In 2018 Just Eat announced plans to launch its own delivery fleet investing £50 million in this network (Monaghan, 2018).

Deliveroo launched its meal home delivery service in the UK 2013. It operates in 81 cities globally, working with 15,000 restaurants that would not otherwise offer takeaway deliveries including Pizza Express, Prezzo and Gourmet Burger Kitchen. Deliveroo's daily orders have grown tenfold since January 2015 (Tugby, 2016). Deliveroo tends to currently focus on more expensive restaurants and uses its own couriers (self-employed and mostly bicycle-based) to make the meal deliveries to consumers. The company grew by 605 in 2016, and currently has 15,000 delivery couriers, with 10,000 prospective couriers applying each week (Warne, 2017a; Ainsworth, 2017). Deliveroo has also started to introduce stand-alone kitchens, known as RooBoxes and Deliveroo Editions kitchens. It provides these kitchens to companies who then provide Deliveroo with a percentage of the kitchens' revenue or enter into a lease agreement (Mintel, 2017c; Santariano, 2018). Some commentators have argued that there is little, if any, profitability in being a platform provider and this explains Deliveroo's move into RooBoxes and Deliveroo Editions kitchens, which they hope can prove more profitable. The company initially stated that these kitchens were intended to help popular restaurants cope with orders they couldn't cope with in their existing busy kitchens. However, it now also says that these kitchens help restaurants to gain new customers in locations where there are a lack of quality eating options nearby, thereby helping restaurants to expand into locations where they would not traditionally consider opening a branch. This kitchen concept is intended to have lower costs than high street restaurants and takeaways in terms of real estate and staff costs which are the major cost items for the traditional restaurant business (Satariano, 2018). Deliveroo generated revenue of £129 million in 2016 (up over 600% on the previous year). After expenses it made an operating loss of £141 million. In its accounts the company identified new competitors entering the market and increased activity from existing competitors as a principal risk (Deliveroo, 2017). In 2017 sales increased by 116% to £277m, but operating losses also increased by 43% to £185m. The company said this increase in losses was due to a new central London head office and investing in more Editions pop-up kitchens (Chapman, 2018a). It was reported in 2015 that in the UK, Deliveroo has average order values of £25-£30, which is higher than Just Eat, which primarily targets the takeaway market (Fedor, 2016). Deliveroo had generated about \$1 billion of venture capital in its five-year life by the end of 2017 (Satariano, 2018).

Uber (Uber Eats) and Amazon Restaurants commenced services in the UK meal home delivery market in 2016 and, as with Deliveroo, both have their own delivery services (Auchard, 2016). Amazon Restaurants commenced its delivery service with 100 restaurants in specific London postcodes in September 2016. The service is currently only available to Amazon Prime customers, which costs £7.99 per month or £79 per year. Customers order their meals via an Amazon app and receive free delivery within 60 minutes on orders of £15 or above and are not charged any mark-ups on the restaurants' normal prices. Restaurants using this Amazon service include the Italian chain restaurant Strada, specialist ethnic chain restaurants, and a Michelin-starred Indian restaurant (Farrell, 2016).

Uber Eats was launched in London in June 2016 providing a guaranteed 30-minute delivery time, with no minimum order size or delivery fees charged to the customer (with the restaurant paying a commission on the total price charged). This compared with some competitors who charge the customer delivery fees, and some that require minimum order sizes (Auchard, 2016). However, Uber Eats has since introduced delivery charges (Dreier, 2016). Uber Eats now operates delivery services in approximately 40 British cities. In September 2018 it was reported that Uber was in talks to buy Deliveroo for at least £1.5bn in order to increase its scale in the meal delivery market (Butler, 2018a).

In addition to these online platform providers the three leading takeaway pizza providers (each of which organises its own delivery service) also have a substantial turnover and number of outlets. Domino's Pizza has approximately 1000 outlets, and Pizza Hut and Papa Johns both have approximately 400 outlets from which they make deliveries in the UK. The entire takeaway pizza and Italian sector has an estimated value of £2.3 billion in 2017. Approximately 80% of users are between 18-27 years old and often in full-time education (Mintel, 2017d). Domino's Pizza, which operates its own takeaway and home delivery pizza restaurants together with its own in-house motorcycle-based delivery services, has also experienced major sales growth in the UK, with a 21% increase in its quarterly sales in Autumn 2015 (Ruddick, 2015).

Food providers in the so-called 'Quick-service restaurant' (QSR) sector such as McDonald's, Burger King, and Kentucky Fried Chicken are also beginning to get involved in delivery services, usually in conjunction with the online platform providers. The QSR sector is estimated to have an annual turnover in the UK of approximately £5.0 billion (Institute of Grocery Distribution, 2016). MacDonalDs started a last-mile delivery trial in 2017, using Uber Eats to make the deliveries. Deliveries are available up to 1.5 miles from participating stores between 07:00-02:00 for a delivery fee of £2.50 (Rodionova, 2017). Some third-party providers already offer established fast-food deliveries from major chains in the UK including One Delivery which was launched in 2013 and Just-FastFood (Mintel, 2016).

Some traditional non-food same-day carriers and other start-up entrants to this delivery marketplace have also become involved in making takeaway meal deliveries on behalf of the major platform providers. These include CitySprint, Quiq, and, prior to its demise, Jinn.

Food-to-go specialists such as Pret a Manger, Greggs, and other sandwich chains have yet to become involved in home delivery. This sub-sector is estimated have an annual turnover in the UK of approximately £4.6 billion (Institute of Grocery Distribution, 2016).

Some niche providers are also entering the home-delivered market. A niche third-party platform called Supper, offering meals from top-end restaurants including those that have Michelin stars, was launched in September 2015. Meanwhile 'Feast' was launched in London in 2015 offering night-time food delivery services between 23:00-05:00 (Mintel, 2016).

Whilst individual restaurants and restaurant chains have been expanding their home delivery services in a gradual manner, most of the growth in the market has resulted from the launch

and growth of third-party service providers (such as Just Eat, Deliveroo, Uber Eats and Amazon Restaurants) that offer meal deliveries from multiple restaurants. These third-party platform providers are intermediaries between the restaurant and customer and vary in terms of the services they provide to restaurants. Some offer full offer ordering, payment and delivery services, while at the opposite end others simply provide a website or app to put the consumer in contact with the restaurant, which is then responsible for delivery and communication with the customer. Companies that do not provide their own delivery services (such as Just Eat) charge commission of around 10-15% of each order value (BMI Research, 2016). This compares with commission charges that can be even higher in the case of online meal providers that do provide their own delivery services (such as Deliveroo, Uber Eats and Amazon Restaurants).

It should be noted that, reflecting the ferocity of competition in this market and the extent to which start-up companies were able to receive funding until recently, some companies in marketplaces outside of the UK faced major struggles or went out of business in 2016. In America, SpoonRocket went out of business in March 2016, selling some of its assets to a Brazilian company. Square Inc. has been trying to sell its Caviar food delivery arm, and Munchery, which both cooks and delivers food, was said to be struggling to raise new funds. DoorDash and Postmates (which also delivers non-food goods) managed to raise new funding but found this far more difficult than previously. In addition, several food delivery companies have merged or closed in India in 2016 (Newcomer, 2016).

Some mergers and acquisitions have already taken place in the UK online meal restaurant industry. For example, in August 2016 Just Eat and Takeaway agreed to trade assets, with Takeaway exiting the British market which Just Eat is dominant in, and in exchange Just Eat gave Takeaway, its Benelux business portfolio (Auchard, 2016). In addition, Just Eat purchased Hungry House in December 2016 for £200 million plus another potential £40 million depending on meeting performance targets. As this latter deal involves the largest online meal platform provider in the UK market purchasing the second largest this deal required approval from the Competition and Markets Authority (Ambrose, 2016).

Some market analysts have expressed scepticism about the extent to which companies that do not provide their own delivery services (including Just Eat) can continue to expand at such rapid rates, believing instead that the future lies in companies that provide an entire service including delivery. In January 2016, Just Eat was reported as having no plans to create their own delivery operations, instead opting to simply offer ordering and payments platforms, with the restaurants having to make the deliveries to consumers. David Buttress, the Chief Executive of Just Eats argued that attempting to provide delivery services was a model that was not “scalable”. He said that “Just Eat would need 100,000 drivers for a couple of hours on a Saturday night,”...“The operative words are a couple of hours. You don’t need them after that, because this business is so peaky” (Ahmed, 2016). In March 2016, in another interview Mr Buttress, maintained this position arguing that, “It doesn’t scale, and the economics of the (home delivery) model are fundamentally very poor”. Just Eat is the market leader in 12 of the 13 European countries it operates in and Mr Buttress argued that, “It’s taken a decade to build Just Eat in the UK”, and explained the deep working relationships it had developed with the restaurants listed on its online platform. He went on to say that, “It’s virtually impossible to shift an incumbent once they’re in an established market leadership position” (Martin, 2016). However, by July 2016 it was reported that Just Eat was considering options to include delivery services and was investigating partnerships with third-party delivery companies. It also announced that it was testing food deliveries with self-driving robots manufactured by Starship Technologies (Fedor, 2016). Just Eat has recently announced (in 2018) that it will commence its own delivery operations in the near future (Ram, 2018). In addition, Just Eat has made more than 1000 deliveries in a trial involving 10 pavement droids (robots) in the London boroughs of Greenwich and Southwark (Gerrard, 2017).

Table 5.1 shows a selection of the major third-party online platform providers in the UK, their coverage and the range of services they offer (either just ordering or ordering and delivery).

Table 5.1: Selected leading takeaway and restaurant meal delivery third-party online providers in the UK in 2017

Brand	Website	Service type	Number of UK restaurants delivered from
Just Eat	just-eat.com	Ordering platform	28,000
Hungry House	hungryhouse.co.uk	Ordering platform	10,000
Deliveroo	Deliveroo.co.uk	Ordering & delivery platform	8,000
Uber Eats	ubereats.com/	Ordering & delivery platform	2000+
Amazon Restaurants	amazon.co.uk/restaurants/	Ordering & delivery platform	200+
One Delivery	one-delivery.co.uk	Ordering & delivery platform	500+
Simply Fast Food	simplyfastfood.co.uk/	Ordering & delivery platform	Not available
<i>Takeaway.com</i>	<i>takeaway.com</i>	<i>Ordering platform</i>	<i>5,000+</i>
<i>Take Eat Easy</i>	<i>takeeateasy.co.uk</i>	<i>Ordering & delivery platform</i>	<i>140+</i>

Notes:

Those in italics are no longer in existence as at February 2018.

Just Eat purchased Hungry House in December 2016 for £200 million plus performance related bonuses – the deal required approval by the Competition and Markets Authority (Ambrose, 2016).

Takeaway exited the UK market in August 2016 trading its restaurant base with Just Eat in return for the latter's Benelux business (Price, 2016).

Take Eat Easy the Belgian start-up that began in 2013 closed down in July 2016 after achieved its one millionth delivery across the four markets it operated in (France, Belgium, Spain, and the UK) a week before it closed but was operating at a loss (Shead, 2016b).

One Delivery operates on a franchise basis for each city in which it operates.

Source: Information on company websites plus Mintel, 2017c.

Table 5.2 shows the delivery services currently provided by the main online meal platform providers in the UK.

The prices charged for these home-delivered meals ordered online are supposed to be the same as those charged to customers presenting themselves in person at takeaways and dining in restaurants. For instance, Just Eat, the online platform provider, provides its consumers with a price promise that if they order a meal from Just Eat that they subsequently find advertised by the restaurant for less elsewhere (such as in a takeaway menu or on their own website) and report this to Just Eat, they will be sent double the financial difference in the form of a Just Eat voucher (Just Eat, 2017b). However, it is unclear whether this is always the case following an investigation by a national newspaper. This investigation found three cases of restaurant chains charging 15% more for their meals ordered via Deliveroo than on their menus together with a £2.50 delivery charge. One of the restaurants involved said that it charged higher prices for its meals purchased via Deliveroo than it did in its restaurants to reflect the commission charge that it is charged by Deliveroo. Whilst this is not unlawful, it is not necessarily made transparent to the consumer (Jones, 2016).

Table 5.2: Delivery services provided by the main online meal platform providers in the UK, 2018

Online meal Provider	Operates Home delivery service?*	Delivery charge per order?	Delivery pricing membership service?	Delivery time guarantee
Just Eat	No	Set by restaurant – some offer free delivery (often with a minimum order value) while others charge up to £2.50	No	No (but an ETA* provided with order)
Hungry House	No	Set by restaurant – some offer free delivery (often with a minimum order value) while others charge up to £2.50	No	No (but an ETA* provided with order)
Deliveroo	Yes	£2.50 per order (plus some restaurants have minimum order value). Free deliveries if a Deliveroo Plus subscriber)	Yes, Deliveroo Plus (£7.99 per month) which provides free deliveries	No (but an ETA* provided with order) 32 minutes is aimed for
Uber Eats	Yes	£2.50 booking fee used to cover delivery costs	No	No (but an ETA* provided with order)
Amazon Restaurants	Yes	£1.99 delivery charge No, but minimum spend on £15 and consumer has to be Prime subscriber	Customer has to be an Amazon Prime subscriber to place order (£79 per annum or £5.99 per month)	No, but 60 minutes is aimed for

Notes:

* - if the online provider does not operate its own in-house delivery service, then it relies on the restaurants and takeaways with which the order is placed to provide these delivery services.

ETA – expected time of arrival

Source: Compiled by the authors from company websites.

6. Market Prospects in Same-Day Delivery Sectors

6.1 Current market size and future prospects for the various same-day delivery sectors

Table 6.1 summarises the review and analysis of the expenditure on delivery services in the various sectors of UK same-day delivery market carried out by the authors (discussed in **sections 2-5**). This indicates the current predominance of expenditure on B2B same-day delivery, especially parcels and documents. Some of the new same-day delivery sectors that have emerged in the last couple of years (especially non-food B2C retail deliveries and grocery deliveries) can be seen to be extremely small in both absolute and relative terms at present.

Table 6.1: Estimated current expenditure on same-day delivery services in the UK by sector

Same-day delivery sector	Expenditure on same-day delivery services (£ million)	% of total same-day expenditure (approx.)	Same-day delivery expenditure as % of total delivery expenditure in this entire sector (i.e. B2C plus B2B) (approx.)
B2B parcels and documents	1,000	65%	5-10%
B2B Healthcare/medical, technical and fieldwork	200	15%	N/A
B2C non-food same-day deliveries	10-20	0.1%	0.5%
B2C grocery same day-deliveries	10-20	0.1%	2-3%
B2C takeaway meal deliveries	350	20%	100%
TOTAL (approx.)	1,600	100%	

Notes: this estimate excludes the price of the goods purchased, and focuses only on expenditure on delivery services. Mintel estimates of £1 billion have been used for expenditure on B2B same-day parcels sector (Mintel, 2017a).

See sections 2-5 for derivation of the results presented in Table 6.1

N/A – not available.

Source: calculated by authors using data available in other sources and using assumptions.

The total expenditure on same-day delivery services in the UK is estimated to be approximately £1.6 billion, with all B2B same-day services accounting for approximately 80% of current expenditure and all B2C same-day services accounting for approximately 20% of current expenditure on delivery services. The B2B parcels and documents sector is estimated to represent approximately 65% of all expenditure in the UK on same-day services, followed by healthcare/medical and fieldwork/technical services which are estimated to represent 15% of all expenditure on same-day services. Takeaway meals are currently the largest component of B2C same-day deliveries, estimated to represent approximately 10% of total expenditure on all same-day services. Meanwhile B2C non-food and B2C grocery same-day services currently represent a very small part of all expenditure on same-day services in the UK.

Issues concerning the future size of the market in each of these same-day delivery sectors over the next five years derived from the literature review and the authors' own knowledge are summarised in **Table 6.2**.

Table 6.2: Issues likely to affect future market size of same-day delivery sectors over next five years

Same-day delivery sector	Issues facing the sector
B2B parcels and documents	<ul style="list-style-type: none"> Continuing digitisation and electronic transmission of documents and products
B2B healthcare and medical	<ul style="list-style-type: none"> Ageing population leading to growing demand for medical services Continued development of new tests and treatments Public funding shortfalls for healthcare Increase in remote/electronic and non-invasive medical testing and treatment
B2B technical and fieldwork	<ul style="list-style-type: none"> Continued outsourcing of maintenance services More remote maintenance and repair work that does not require physical vehicle trips
B2C non-food deliveries	<ul style="list-style-type: none"> Continued increase in online shopping Preparedness to pay for same-day delivery preference Convenience of delivery response/timing offered Lack of local distribution infrastructure among many retailers for widespread, cost-effective same-day deliveries
B2C grocery deliveries	<ul style="list-style-type: none"> Continued increase in online shopping Range of products offered for same-day options Convenience of delivery response/timing offered Preparedness to pay for same-day delivery preference
B2C takeaway meal deliveries	<ul style="list-style-type: none"> Lack of time/interest in meal preparation at home Increasing preference for delivered meals at home (rather than eating out) due to convenience and lower price

Several other points are worth mentioning in addition to the points raised in Table 6.2. In the case of B2C food and non-food retailing, retailers with physical stores can use these as local depots for same-day deliveries. By contrast pure-play online-only retailers have no such local physical infrastructure for same-day fulfilment. The latter therefore either need to acquire local fulfilment centres (which is prohibitively expensive other than for the largest online retailers such as Amazon) or to partner with carriers that can provide these services.

However, neither traditional same-day carriers nor disruptor start-ups have existing networks of local depots within urban population centres in the UK. This is due to the fact that traditional same-day carriers have focused on B2B point-to-point operations that do not flow through a logistics facility, but instead are transported direct from shipper's to receiver's address. Meanwhile, disruptor carriers do not have the resources to obtain such a logistics network. Acquiring such a network of suitably located depots from which to operate same-day B2C deliveries would be extremely expensive given urban land values and property rental costs in the UK (Piecyk and Allen, 2017).

Next-day and economy parcel carriers currently not involved in same-day deliveries are liable to enter the marketplace if growth in B2C parcel volumes materialise and the service offer is not too inflexible or rapid. They would be well placed to do so compared with existing same-day carriers given their existing networks of urban depots. However, such a development would potentially lead to overcapacity and a downward pressure on prices that could be charged to retailers for such delivery services.

Rates that retailers are prepared to pay next-day and economy parcels carriers for B2C deliveries are far lower than for B2B shipments. This is due to the fact that retailers are keen to acquire market share and turnover in the short-term and currently show less concern for profitability. Also, many consumers are unwilling to meet the full cost of same-day last-mile B2C retail deliveries despite being keen on the service. As a result many retailers subsidise same-day (and slower) delivery costs to gain sales and market share (see **section 3.4**). These issues have resulted in product prices and any explicit delivery charges failing to keep up with the cost of the delivery service offered. As well as causing profitability problems for retailers it has also caused profitability difficulties for many next-day and economy parcel carriers (as well as for grocery retailers making their own last-mile deliveries) providing these B2C services (Allen et al, 2017). Many same-day carriers are viewing B2C retail deliveries as an important new market opportunity, especially given long-term declines in the same-day B2B parcels and documents sector. However, it is likely that many retail customers will seek low-cost services as only a small proportion of their consumers are likely to be willing to pay charges that fully cover the cost of same-day delivery. Achieving the correct B2C same-day service proposition will be important for carriers if such work is to prove profitable. One important factor in the cost of providing such services will be the time flexibility of these deliveries. If they are too time-constrained (i.e. providing immediate delivery responses or time-slots that are too narrow) this will reduce carriers' opportunities to consolidate these deliveries, thereby reducing costs. However, consumers are liable to favour immediacy and definite, narrow delivery arrival times. This will pose a major challenge to carriers offering these same-day services in developing a viable business model.

It is unlikely that many carriers can succeed financially in each of these emerging B2C same-day sub-sectors, as sizable order volumes will be required to generate sufficient turnover in order to maintain a viable courier network and to achieve efficiencies in transport operations. Therefore, consolidation in the number of carriers in any given B2C sub-sector is likely over time. Many recent start-up on-demand disruptor carriers will struggle to survive unless they can establish scale in at least one same-day delivery sub-sector.

Retailers with a network of physical stores will face cost challenges in offering both online and physical services if footfall at physical stores continues to diminish. Similarly, casual dining chains and other restaurants are likely to find it challenging to maintain their high street presence in the face of rising demand for takeaway meals, together with increasing staff costs and business rates. They will struggle to compete with low-cost kitchens located off the high street in the takeaway delivery market. Such pressures among restaurateurs are reflected in the recent announcement of site closures among chains including Jamie's Italian, Byron, Strada, and Prezzo, a 20% increase in restaurant insolvencies in 2017 and a report that indicated one third of the top restaurant chains in the UK are currently loss-making (Butler, 2018b; Davies, 2018).

Forecasts suggest that expenditure by customers in the next-day and same-day parcels, grocery and meal delivery sectors will continue to increase in the coming years. These are shown together with the expectations of the authors of this report in **Table 6.3**).

Table 6.3: Current and estimated market size of same-day delivery services in the UK by sector (including the price of grocery and meal purchases unless otherwise stated)

Same-day delivery sector	Current expenditure /sector size	Forecast change in market size to 2021	Authors expectations of change in market size to 2021
All B2B and B2C non-food parcels and documents (all services including same-day)	£10.1 billion (Mintel, 2017a)	30% total growth over 5 years to 2021 (Mintel, 2017a)	High growth
B2B same-day parcels and documents	£1 billion (Mintel, 2017a) £2.9 billion (Apex, 2017)	30% growth over 5 years to 2021 (Apex, 2017)	Low growth – stable
B2B same-day healthcare/medical, technical and fieldwork	£200 million (our estimate) £540 million (Apex, 2017)	25% growth over 5 years to 2021 (Apex, 2017)	Medium growth
All online B2C retail shopping (food and non-food)	£45 billion (Global Data, 2017)	7.4% annual growth to 2021 (Global Data, 2017)	High growth
Non-food B2C same-day deliveries (delivery expenditure only)	£10-20 million (our estimate) £50 million (Apex, 2017)	1000% growth over 5 years to 2021 (Apex, 2017)	High growth
Online grocery shopping (all services including same-day)	£9.9 billion (Mintel, 2017a) £10.4 billion (Global Data, 2017)	9-12% annual growth to 2021 (Mintel, 2017a) 8% annual growth rate (Global Data, 2017)	High growth
Takeaway meals delivered to home/work	£3.6 billion (NPD, 2017)	10-15% annual growth (Hirschberg et al., 2016; NPD, 2017)	High growth

Note:

Estimates of current market size and forecasts of online grocery and takeaway meal include the price of grocery and meal purchases as well as expenditure of the delivery service

Authors own estimates:

- high growth: 5-10% per annum
- low growth: 1-5% per annum
- low contraction: reduction of 1-5%

Sources: as listed in table.

6.2 Current and future same-day sector involvement by category of carrier

Sections 3-5 discussed the various categories of provider of same-day delivery services in the non-food, grocery and takeaway meal sectors in the UK. These can be summarised in the categories shown in **Table 6.4**, which also indicates whether their delivery services are provided to other companies (third-party) or used to deliver their own products (in-house). In addition to the categories of same-day carrier shown, there are also next-day and economy parcel carriers who do not currently offer same-day services but who have the infrastructure and capabilities to do so should they wish in future.

Table 6.4: Categories of same-day carriers currently operating in the UK

Category of same day carrier	Third-party or in-house delivery services	Examples of carriers of this type
Traditional same-day carrier	Third-party	CitySprint, Rico Logistics, Addison Lee, Royal Mail
Disruptor retailer / carrier	In-house	Amazon, Amazon Fresh
Disruptor carrier	Third-party	Quiqup, Stuart
Disruptor platform provider/carrier	Third-party	Deliveroo, Uber Eats, Efety, Home Run
Crowdshipper	Third-party	Nimber
Grocery retailer / carrier	In-house	Tesco, Sainsbury
Takeaway meal retailer / carrier	In-house	Dominos Pizza, Pizza Hut, Papa Johns
Next-day and economy parcel carriers (not currently providing same-day deliveries but could do so)	Third-party	DHL, DPD, TNT, Yodel, Hermes

Table 6.5 indicates the same-day delivery sectors that each of these categories of carriers currently operate in.

Table 6.5: Sectors of same-day delivery that different categories of carriers currently operate in in the UK

Category of same day carrier	Same-day sector				
	B2B Parcels and documents	B2B Healthcare/ medical, technical and fieldwork	B2C Non-food same-day deliveries	B2C Grocery same day-deliveries	B2C Takeaway meal deliveries
Traditional same-day carrier	✓✓	✓✓	✓	x	✓
Disruptor retailer / carrier	x	x	✓✓	✓	✓
Disruptor carrier	x	x	✓	✓	✓
Disruptor platform provider/carrier	x	x	x	x	✓✓
Crowdshipper	✓	x	x	x	x
Grocery retailer / carrier	x	x	x	✓✓	x
Takeaway meal retailer / carrier	x	x	x	x	✓✓
Next-day and economy parcel carriers	x	x	x	x	x

Notes:

✓✓ - Major involvement

✓ - some involvement

x – no involvement

Source: Based on authors' own analysis.

Table 6.5 indicates the degree of specialisation that currently exists in the same-day delivery sector, with most categories of carrier having a strong involvement in only one or two of the same-day sectors. Only the two disruptor categories of carrier presently have current involvement in three of the five same-day sectors.

It has been reported that major carriers in the UK B2B non-food same-day delivery market have typically achieved operating profit margins of 5-7% in recent years (Apex Insight, 2017). This is borne out by the analysis of operating profits for some of the leading same-day carriers shown in **Table 3.1**, which indicates operating profits of up to 11% in recent years. This compares favourably with the average operating profit margins of the UK's top-10 store-based (i.e. multi-channel) non-food retailers which more than halved since 2011, from 6% in 2011 to 2.5% in 2015 (OC&C Strategy Consultants, 2016). It also compares well with operating profits of 1-4% in 2015 among major UK grocery retailers (Fung Global Retail & Technology, 2016). It is also a superior performance to next-day and economy parcel carriers which have typically struggled in recent years due to overcapacity and online retailers demanding lower per parcel rates for B2C deliveries, with one major carrier, Citylink, ceasing to trade in 2014 (Allen et al., 2016). Whether same-day carriers can maintain such high operating profit margins in future as the proportion of B2B work declines and B2C increases remains to be seen.

Table 6.6 shows the same-day delivery sectors that each of these categories of carriers are likely to operate in in the next 10 years based on the authors' research and analysis.

Table 6.6: Sectors of same-day delivery that different categories of carriers are likely to operate in in the UK in the next 10 years

Categories of same day carrier	Same-day sector				
	B2B Parcels and documents	B2B Healthcare/ medical, technical and fieldwork	B2C Non-food same-day deliveries	B2C Grocery same day-deliveries	B2C Takeaway meal deliveries
Traditional same-day carrier	✓✓	✓✓	✓✓	x	✓
Disruptor retailer / carrier	✓	✓	✓✓	✓✓	x
Disruptor carrier	✓	✓	✓	✓	✓
Disruptor platform provider/carrier	✓	x	x	x	✓✓
Crowdshipper	✓	x	x	x	x
Grocery retailer / carrier	x	x	x	✓✓	x
Takeaway meal retailer / carrier	x	x	x	x	✓✓
Next-day and economy parcel carriers	✓✓	✓	✓✓	x	x

Notes:

✓✓ - Major involvement

✓ - some involvement

x – no involvement

Source: Based on authors' own analysis.

Table 6.6 indicates the extent to which several categories of carrier are likely to diversify their services across more same-day sectors, together the likely entry to the sector by some next-day/economy parcel carriers. This is to be expected given the growth estimates for service demand in same-day sectors (see **Table 6.3**) together with the low margins they currently face in their existing operating sectors. This suggests a more crowded marketplace in terms of service suppliers, which would be likely to lead to overcapacity. In such a scenario there would be likely to be some individual carriers that would be unable to survive.

It has proved difficult for retailers and their last-mile carriers to charge B2C customers more for next-day and economy delivery services. In terms of these retailers' and platform providers' costs, there remains a need to commit to large investments in online technology developments. This is required in a wide range of services to enhance customers' online shopping experiences by providing last-mile delivery service choices in checkouts as appropriate; developing stock checking facilities, improving the trackability and traceability of products in the supply chain; as well as in enhancing communication systems between retailers and carriers, carriers and their couriers, and between all of the former parties and final customers. The labour costs involved in last-mile delivery have therefore been viewed increasingly by retailers and carriers as an area in which cost controls can be exercised. This has led to worker engagement models that provide the carrier with flexibility over the couriers that they use.

In the long-standing B2B parcel and document same-day delivery sector a sizeable majority of couriers have always been engaged on a self-employed basis. This has helped carriers to only have to pay couriers for their time when jobs were available, and thereby to cope with peaks in demand in a cost-effective manner. For the courier, it has been argued that this business model provides flexibility to work the hours that suit them and to work for several different organisations at the same. However, some carriers require couriers to commit to working shifts in advance and to be available for lay-long durations, and this thereby reduces flexibility from the couriers' perspective.

Section 7 considers courier pay in various same-day sectors. **Section 8** provides a review of recent cases in which couriers have challenged their worker status and provides an overview of policy thinking in relation to the topic of worker status.

7. Rates of Courier Pay in Same-Day Delivery Sectors

The majority of couriers delivering same-day parcels and meals are self-employed, while van drivers delivering groceries for leading grocery retailers are more likely to be employed. Payment rates for self-employment vary between carriers / platform providers to reflect time spent, distance travelled, and time of day. Some couriers are paid on a per delivery basis, others on a per hour worked basis, and others on a hybrid of these. Courier turnover tends to be high. A 2007 study into the use of bicycle and motorbike/moped couriers in the non-food and meal delivery sectors found that approximately two-thirds of meal delivery companies reported that their riders only stayed with them for up to one year. Retention rates in the non-food sub-sector were better, with approximately 50% of companies reporting that their couriers stayed with them for up to two years (Synovate, 2007).

7.1 Rates of courier pay in the parcel and document same-day delivery sector

Research suggests that in 2017/8 cycle and moped couriers paid on a per delivery basis were typically paid £3-£5 per delivery, while couriers paid on an hourly rate received approximately £8-10 per hour (Price, 2017). At this time the minimum hourly wage in the UK was £7.20 for those aged over 25 and £6.95 for those aged 21-24 (these rose to £7.50 and £7.05 respectively in April 2017), and the (voluntary) London and national living wage were £9.75 per hour and £8.45 per hour (which are now £10.20 and £8.75 respectively). Information gathered from cycle and moped couriers provide details of rates paid by some of the leading courier companies in London in 2017 – in most cases the companies refused to comment on these rates (Price, 2017) (see **Table 7.1**). However, it is important to note that commission and expenses can be deducted from these rates to cover costs associated with vehicle hire, uniforms, and other equipment. At first glance, meal delivery pay rates seem more attractive than parcel/document rates – but it is important to remember that meal deliveries include waiting time while the meal is prepared prior to the delivery.

Table 7.1: Rates paid to cycle and moped couriers delivering parcels in London (as reported by couriers in March 2017)

Company	Delivery type	Rate of pay
CitySprint	Parcels & documents	Average of £3.50 per delivery
eCourier	Parcels & documents	£3.15 per delivery plus 10p maintenance per mile per weekly attendance allowance
Absolutely	Parcels & documents	Minimum £3 per delivery, average £3.25 per delivery
Excel	Parcels & documents	£2.75-3.00 per delivery
Gophr	Parcels & documents	£3.80-4.80 per delivery or £9-10 per hour
Quiqup	Parcels & documents	£8 per hour
Stuart	Parcels & documents	£9.50-10.50 per hour

Source: Price, 2017.

7.2 Rates of courier pay in the takeaway meal same-day delivery sector

Table 7.2 shows the current rates of courier pay in the takeaway meal same-day delivery sector.

Table 7.2: Rates paid to cycle and moped couriers delivering meals in London (current)

Company	Delivery type	Rate of pay
Deliveroo*	Meal delivery	Couriers paid by zone they work in. 70% of zones pay £7 per hour plus £1 per delivery. Other 30% of zones pay on a per delivery basis of £3.75-4.25
Uber Eats**	Meal delivery	£5.33 per delivery during off-peak hours. £14-22 per hour during peak hours as long as at least 1.5 deliveries are made per hour and 85% of weekly deliveries are successful (from which a service fee of 20% for mopeds and 25% for bicycles is deducted).
Jinn***	Mostly meal delivery	£8-17 per hour (depending on day/time), or £7 per delivery
Dominos	Employed	£6.09-6.62 per hour
Pizza Hut	Employed	Moped £7.50-8.50 per hour / own car up to £10 per hour

Note: * Deliveroo set up a trial in June 2017 in which it changed the payment model from £7 per hour plus £1 per delivery, to £3.75-4.00 per delivery. When appearing before the UK House of Commons Business, Energy and Industrial Strategy Committee in October 2017, the Managing Director of Deliveroo UK and Ireland, Dan Warne, stated that 50% of Deliveroo riders are students, and 66% of riders work less than 15 hours per week, and that rider turnover rates are very high. He stated that the current Deliveroo average wage per hour was £9.50, with surge payments at busy times (Warne, 2017a). By July 2018, it was reported that nearly all riders were paid per delivery rather than per hour plus a delivery fee, and that over the previous 12 months, 87% of all orders had been delivered by a rider paid per delivery (Field and Forsey, 2018).

** Uber Eats pay rates include a pick up fee, a per mile fee and a drop off fee, together with 'boosts', which act as a multiplier and range from 0 to 2. These boosts vary by time of day, day of week and pickup location (Your Consumer Guide, 2017).

*** Jinn ceased trading in October 2017. Prior to its closure, in January 2017, the company changed its payment method from paying couriers £8 an hour plus £1.50 per delivery, to paying them £8-17 per hour if they make at least one delivery an hour or £7 per delivery with no hourly fee (Cook, 2017; Price and Shead, 2017).

Source: company websites, online job websites including Glassdoor and Indeed, and other sources listed above including Ainsworth, 2017; Price, 2017.

Research has shown that earnings among Deliveroo riders vary significantly, providing a good income for some, while not for others. A survey of 179 Deliveroo riders, of varying degrees of experience, based in towns and cities across Britain has shown that some Deliveroo riders only earn £2-3 an hour, while others sometimes earn £20 an hour. The average earnings reported in the survey of Deliveroo riders included hourly amounts of £5, £6, £6.83, £7, £8, £8.50, £9, £10, and £12. In general, average rates of pay tended to be either a little above, below or at the level of the National Living Wage. By July 2018 the vast majority of Deliveroo riders were paid per delivery, rather than on an hourly basis (whereas previously some riders were guaranteed hourly pay rates that were topped up based on the number of meals they

delivered per hour). It was reported that over the previous 12 months, 87% of completed orders had been delivered by a rider paid per delivery (Field and Forsey, 2018).

7.3 Rates of courier pay in the grocery same-day delivery sector

Table 7.3 shows current rates of courier pay in the takeaway meal same-day delivery sector. These have been obtained from sources that include grocery companies own websites and job advert / review websites.

Table 7.3: Rates paid to van drivers and cycle and moped couriers delivering groceries (current)

Company	Delivery type	Rate of pay
Tesco	Van	£8-10 per hour (average of £9 per hour).
Sainsbury	Van	£8.16 per hour (Sainsbury add £9.35 per hour in March 2018 in London which includes £0.50 driving premium per hour)
Ocado	Van	£7-10 per hour (average of £9 per hour).
Asda	Van	£8.50 per hour plus a competitive benefits package, including annual bonus and colleague discount.(£8.50-9.55 per hour in London March 2018)
Efety	Moped (bike and insurance provided)	£8.50-9.00 per hour
Home Run	Provide own car	Fixed £8 per Hour + £1.5 per drop + tips (on a self-employed basis)
Sainsbury Chop Chop	Bicycle and equipment provided by Sainsbury	£9 per hour

Source: company websites, and online job websites including Glassdoor and Indeed.

7.4 Changes in courier pay rates over time

Due to reductions in the demand for premium, same-day non-food courier services together with an increase in the supply of couriers, it has been reported that wage rates have fallen since the heyday of the 1980s. In America, for example, \$100 was considered a reasonable day's earnings in New York in 2002, but this same wage had also been available in the 1980s (Kidder, 2009).

Research in the USA has reported that couriers working on a self-employed basis receive approximately 40-60 per cent of the price paid by a customer for a job. In the 2000s this equated, on average, to approximately \$3-5 per delivery, but could be considerably higher if, for instance, tight time guarantees were required and is delivery was late in the evening (Kidder, 2009). It is estimated that real wages halved between the 1980s and the 2000s in the USA (Raab, 2004; Kidder, 2009) and a similar situation has prevailed in the UK.

A UK study found that in 2004, cycle couriers earned an average of £45 per day in Cardiff, and £65 per day in London (equivalent to £325 for a five-day week) (Fincham, 2007). In 2013 a BBC News article suggested that cycle couriers earned between £200–£600 per week (Curtis, 2013). A former cycle courier turned controller challenged these figures arguing that they reflected the remuneration range in the early 1990s rather than the current rates of pay. He reported that in the early 1990s it was rare for cycle couriers at a major carrier (Security

Despatch) to earn more than £500 per week, with his single best day earnings standing at £125 in 1993. He argued that, in 2013, he thought the average weekly earnings among cycle couriers in London was £250 per week (roughly equivalent to the minimum wage before taking equipment costs into account) and that the earnings range was approximately £50 – £500 per week (with few earning £500, and many novices earning around £50 for their first couple of weeks before quitting (Chidley, 2013).

Several other couriers have discussed changes in pay rates over time and suggest that these have diminished over time. A motorcycle courier reports in his memoirs that he was paid a minimum of £1.50 per job that began and ended in W1 in the West End central London in 1978. By 1979 he was earning £250 or more per week for a fifty hour week. Running costs accounted for approximately one quarter to one third of his earnings, but this compared with the £20 per week he had been earning two years earlier at Sainsburys. By mid-1980, with the in deep economic recession, he was able to earn the national average weekly wage of £125 in two or three days of motorcycle couriership (Scott, 2016).

One cycle courier memoir recounts its author experiences in 2010 during which he earned £2.50 per job in central London (and £3.75 for an urgent job on which the courier does not stop to pick up other jobs). He got paid waiting time after 10 minutes at a rate of approximately minimum wage - £1 for 10 minutes. A job that involved making a collection, taking it to a destination and then having to return to the origin earned £3.50. The company he couriers for also provided a 10 per cent weekly attendance bonus for those working all day (09:00-18:00) for the entire five-day week. Having to travel outside his central London catchment area earned an additional £1.25 per job on top of the £2.50. He states that the ideal situation was never to cross central London from west to east for a single £2.50 job, but instead to pick up at least two further jobs on the way across the city so as to earn £5 or £7.50 for this journey. On rare occasions he had as many as five jobs on his person at any one time and in such instances felt very well paid. Achieving sufficient jobs was a matter of politics – in terms of the relationship between a courier and their controller. He began by earning approximately £250 per week but this increased a little after several weeks as he got to know the controller, with him earning £300 per week on occasions. He goes on to say that on enquiring to companies about expected pay rates before applying for work, couriers are told maximum weekly rates as if they are average rates. On agreeing to start working for a company you are warned that your rates will be low for the first few weeks as you learn the job, with the implication that rates will increase as you become more experienced. However, he says that although improving a little as you become more efficient, rates remain low because there are not enough jobs for all couriers to earn more (Sayarer, 2016). He goes on to state that the industry is based on lies from carriers and their controllers to couriers about what they are likely to earn and how much work there is and will be, as well as from couriers to controllers in terms of saying they were ready for work in the morning when they hadn't even left home, or sometimes hadn't even got out of bed. However even in 2010 when he was couriers GPS tracking technology was already beginning to undermine the ability for couriers to mislead controllers about their whereabouts (Sayarer, 2016).

Another courier writing on courier pay rates in 2014 compared with five years earlier states that “most London courier companies have hung on, progressively lowering their rates, desperately undercutting each other to survive. And, this being a notoriously unfair industry, the costs are usually passed on to the courier. Where riders had previously made a bare minimum of £2.75 per delivery, now they made £2.25. Extra deductions begin to appear on payslips – uniform hire; bag hire; a weekly £2 insurance charge” (Chappell, 2014). She proceeds to tell us that in the early 1990s, couriers have reported to her riding for 12 hours a day with virtually unlimited work and earning £500 a week or more. She also provides an example of a courier in Sydney Australia earning up to AU\$1,500 a week in 1992. He quit cycle couriers but returned in 2000 to discover his average earning potential was AU\$600 per week (Chappell, 2014). It has been reported that in Germany, same-day courier

companies retains approximately 25-40% of the price charged and the rest is given to the (typically) self-employed courier. Some couriers receive bonuses including fuel surpluses for van and car drivers, for their experience, and out-of-hours jobs (Gruber et al., 2014).

By comparison with couriers, fleet controllers in same-day parcel companies are employed and according to online employment websites currently earn in the region of £20,000-30,000 in the UK. Again, anecdotal reports suggest controllers pay was higher than this in the 1990s and the first decade of this century.

8. Employment Status of Same-Day Couriers and Related Policy Thinking

Many same-day parcel carriers have, for a long time, made use of self-employed drivers (so-called 'independent contractors'). Even in the 1970s the majority of same-day non-food parcel carriers operating in London were using self-employed couriers. A few same-day parcel carriers and typesetters and printers requiring in-house same day couriers provided the opportunity of employed status (Scott, 2016). Research was carried out in 2007 for Transport for London into the use of bicycle and motorbike/moped couriers in the non-food and meal delivery sectors (i.e. the research was carried out before the emergence of start-up carriers and platform providers in the non-food and meal same-day delivery sectors, and the offer of same-day grocery deliveries) (Synovate, 2007). This interview work showed that in the non-food same-day sub-sector 80% of responding carriers made use of self-employed couriers, while only 29% made use of contracted couriers. Meanwhile, in the meal delivery sub-sector 50% of responding companies made use of self-employed couriers, while 60% made use of contracted couriers (this situation has changed in the intervening decade with the rise of platform providers including Deliveroo and Uber Eats). In both of these sub-sectors fewer than 10% of companies made use of both freelance and contracted couriers. In terms of the working hours of these couriers, 87% of carriers in the non-food same-day sub-sector reported using full-time couriers, while 40% used part-time couriers. In the meal-delivery sub-sector, 72% of companies made use of full-time couriers, and 75% made-use of part-time couriers (Synovate, 2007).

An industry survey showed that 80% of express parcel carriers (same-day and next-day operators) have mixed employment status amongst their couriers/drivers. Of those parcel carriers surveyed all (i.e. 100%) have self-employed couriers/drivers and 76% PAYE fleets. In addition, 68% of fleets also use part-time/lifestyle couriers/drivers, but only 36% use agency couriers/drivers. Carriers in the same-day sector were found to be more likely to offer self-employment rather than employed status to couriers/drivers. Of self-employed couriers/drivers, 68% use their own vehicle (Institute of Couriers, 2017). In meetings with managers and owners of parcel carriers, the Institute of Couriers found that their view was that "the most competent and motivated drivers ask for self-employment rather than PAYE" (Institute of Couriers, 2017). There is limited value to the sector in the employment status concept of 'worker'. A report with the backing of managers and owners of parcel companies responsible for approximately 50,000 couriers, states that "(dependent) worker status is still not clear to the sector and remains in the whole, a view of the gig economy which is not where the traditional express sector lies. It would be near impossible to calculate holiday like entitlements for a self-employed courier who may be absent or chosen to turn down a job from circuit, and who may be active on another LSP circuit at the same time" (Institute of Couriers, 2017).

The companies offering self-employed status to couriers/drivers argue that this approach helps to match the demand for services with the supply of workers. It also means that the companies are not responsible for paying minimum wages or national insurance on behalf of the couriers, the couriers are not entitled to holiday pay, sick pay, or maternity/paternity leave, and the company can choose not to use couriers as it wishes. The only securities offered by law to these self-employed couriers was in the form of basic health and safety rights and a right not to be discriminated against. With the rise of the so-called 'gig-economy' with the emergence of internet-based platform providers of taxi services and meal delivery, this self-employed method of hiring drivers has been growing rapidly for same-day services. By contrast major grocery retailers with physical stores requiring drivers for same-day deliveries tend to offer employed posts.

Whilst these methods of remuneration (i.e. self-employed couriers who are called 'independent contractors') suit some people who like to work for just a few hours when it suits them and to have flexibility in their working arrangement, others are less happy and would prefer to have 'worker' or 'employee' status. One cycle courier who supports the Independent Workers of Great Britain (a small union formed in the UK in 2012 to support those working in the so-called 'gig-economy') in discussing her views on the unfairness of the terms under which 'gig' workers have to operate says, "Workers around the world are being hit with these conditions, alongside no guaranteed hours, earning less than minimum wage and not getting a pension or paid holiday leave. You might have to deliver 40 takeaways per month just to cover your insurance. Or be forced to work multiple jobs because you can't survive on one without guaranteed hours or pay. I know couriers desperately trying to juggle two or three apps at a time, as they try to feed their kids or pay rent. This situation is unsustainable, un-just and urgent. But what options are left? Carry on being exploited? Wake up in a trap in five years' time? No, we have to fight it now. And we have to fight it because we are workers, not entrepreneurs!" (Dewhurst, 2017).

Many working as couriers/deliverers in the online shopping market (and as courier for same-day parcel companies) argue they cannot refuse work or set their own hours, can be asked to wear uniforms and identification, and need company permission to take holidays and that therefore they should be reclassified as 'dependent workers' (Chakraborty, 2016; Ainsworth, 2018; Field and Forsey, 2016). This is not equivalent to full employee status, but provides workers with additional rights to the self-employed including the right to the National Living Wage (NLW) or National Minimum Wage (NMW), protection against unlawful deduction from wages, minimum levels of paid holiday and rest breaks, protection against discrimination, and the right not to be treated less favourably if they work part-time (House of Commons Work and Pensions and Business, Energy and Industrial Strategy Committees, 2017).

Self-employed couriers/drivers are typically only paid when they are actively carrying out a task, whereas employed couriers are paid regardless of whether they are working or not (Kidder, 2009). The issue of whether these couriers are employees or self-employed therefore has important bearing on UK tax payments (including national insurance and income tax in the UK), and also on courier's legal rights in terms of holiday pay, sick pay and other annual leave entitlement. In addition, couriers are typically responsible for providing bicycles/vehicles, vehicle maintenance and repair. Some carriers request couriers to hire communications equipment, carrying equipment and uniforms from them, the charges for which are deducted from pay. In some organisations (same-day and next-day carriers), couriers who are unable to work due to illness or holiday are encouraged or required to provide alternative labour cover until they return.

The employment status of couriers (as well as next-day parcel delivery drivers) has been receiving much political scrutiny in the UK recently, along with other sectors that also make use of self-employed, especially manual, workers. This issue has also received attention in the USA with government agencies including the IRS and Social Security Administration taking an interest at various time (Kidder, 2009). The same situation has also been noted in France (Dablanc et al., 2017).

Some couriers have been staged industrial action. During September 2018 Ubereats couriers Groups of UberEats couriers have been carrying out strikes over pay and requesting a minimum £5 per delivery fee (in contrast to the pay structure recently put in place by the company which set the minimum per delivery fee for couriers in London, Manchester and Birmingham at £3.50 (Lomas, 2018). This led to traffic congestion outside the company's UK headquarters in Aldgate, London as motorcyclists estimated at more than 100 strong blocked the road (Siddique, 2018). Most recently, the IWW (Industrial Workers of the World union) called a strike among meal delivery couriers on 4th October 2018 in several British cities including London, Glasgow, Cardiff, Bristol, Newcastle and Plymouth. This was timed to

coincide with a strike among some McDonalds, Wetherspoons, and TGI workers, who were also striking over pay conditions (IWW, 2018).

Case studies of courier engagement at Deliveroo and Amazon Flex are provided in **sections 8.1 and 8.2**, the material for which has been made available through UK Government committee inquiries into current working arrangements.

8.1 Case Study: Deliveroo's self-employed courier arrangements

Deliveroo's contract with its couriers/riders requires that the courier provides a suitable Android or iPhone smartphone on which to operate the Deliveroo app and their own moped or bicycle. The vehicle needs to be clean, in a good state of repair, and roadworthy, and a moped needs to have a current MOT certificate, road tax and helmet. Previously all couriers also had to pay a deposit of £150 for an equipment pack containing a waterproof jacket, waterproof trousers, phone mount, thermal bag, battery pack, and branded stickers. This deposit was returned when a courier stops working for Deliveroo if the equipment is in a good state of repair. However, since October 2017 Deliveroo has started charging couriers for bags and jackets. Couriers also need to supply a box for the transportation of meals. Deliveroo is permitted to terminate the agreement with couriers "at any time and for any reason on giving not less than one week's notice in writing" (Deliveroo, 2017; Tims, 2017).

Couriers have to indemnify Deliveroo against any claim or demand made against Deliveroo in respect of any income tax, value added tax, any other tax or national insurance or social security contributions due on fees payable (Deliveroo, 2017).

Couriers using mopeds/motorbikes have to obtain third party vehicle insurance and business insurance at their own cost. They can either purchase the group insurance policy put in place with a provider by Deliveroo, or obtain equivalent cover from another insurance provider. Those opting to use the policy that Deliveroo has put in place to top up an existing personal insurance pay approximately £0.65 per hour (capped at £5 per day or £25 per week). Bicycle riders are under no legal obligation to obtain insurance (Deliveroo, 2017; Warne, 2017b).

Deliveroo has divided up its geographical and temporal territories into two 'zones', some of which are 'booking zones' (which riders can book working shifts in advance), and the others of which are 'free zones' (for which riders can log in whenever they want to be available for work). Deliveroo determines the maximum number of riders it requires in any geography at any given time. In July 2018, 45% of the time that riders were logged into Deliveroo and available for work, they had chosen to book a working shift through a booking zone (this data is similar for earlier months). Deliveroo says that it added 'booking zones' based on the feedback by riders, some of whom said that they wanted greater certainty over their earnings by being able to plan when they work. These booking zones for the coming week are made available at 11:00 every Monday to riders who Deliveroo views as having performed best in recent weeks – giving these selected riders the first pick of the week's shifts. These booking zones are made available again at 15:00 and 17:00 for all other riders to try booking shifts that are still available for the rest of that week (Field and Forsey, 2018).

In addition to the agreed rates of pay with Deliveroo (either on a per hour or per delivery basis), couriers are permitted to any tips or gratuities paid to them by customers. Motorbike/moped drivers are entitled to a fuel allowance which is based on: (i) Deliveroo's estimate of the distance driven based on GPS co-ordinates (based on a straight line distance multiplied by 1.5); (ii) an assumed 18km/litre fuel economy standard; (iii) an assumed price per litre of petrol depending on local market considerations (in February 2017 a price of £1.50 per litre of petrol was assumed, whereas the market price was £1.17). Therefore, this formula moped riders receive a fee which more than covers fuel costs (Deliveroo, 2017; Warne, 2017b).

In March 2017 Deliveroo reported that over 50% of its riders/couriers worked 0-10 hours per week, 24% worked 10-20 hours per week, and less than 20% worked more than 20 hours per week. In addition, only 25% of couriers worked for Deliveroo for more than 6 months (Warne, 2017c). Internal surveys at Deliveroo show that 85% of couriers have another job and 60% are under the age of 25 (Warne, 2017d).

A survey by Deliveroo of 900 of its riders carried out in June 2017 showed that 90% of riders said that working with the company did not represent their main source of income. Deliveroo also reported during 2017/18 that 72% of riders delivering at least one order in a particular week have worked fewer than 15 hours per week; 19% have worked between 15 and 29 hours per week; 5% have worked between 30 and 39 hours per week; and 4% have worked more than 40 hours per week (Field and Forsey, 2018).

Deliveroo has estimated that if its riders/couriers were reclassified as employees, this would cost the company approximately £3 million annually in employer NI contributions (Warne, 2017e).

8.2 Case Study: Amazon Flex's self-employed courier arrangements

Amazon Flex couriers are self-employed. They are expected to deliver a set number of parcels in delivery blocks of one to four hours. They earn £12-15 per one hour block (excluding tips). Amazon assumes a 'realistic number of parcels within each block, taking into account traffic congestion and the need to drive safely.' Amazon states that it 'set the fees at a rate to ensure that drivers achieve at least the national living wage after costs' (Smith, 2017a).

Amazon Flex couriers are required to provide their own car, van, or scooter and an Android mobile phone. The courier is responsible for vehicle costs, vehicle insurance, vehicle maintenance, petrol, tax, National Insurance and road tax. Amazon has organised with third party insurers to offer drivers the option of a "pay as you go" insurance for around £1-2 per hourly block worked (Smith, 2017a).

Amazon states that 'parcels are pre-bagged in rounds ready for the drivers to collect, so for each delivery block, we plan for 15 minutes to load the bags and 15 minutes for the driver to return them at a delivery station if needed. On average, it takes around 13 minutes for a driver to load their vehicle and in most cases drivers make all deliveries and then do not need an additional 15 minutes to return to the delivery station' (Smith, 2017a).

In the period 29 January to 4 March 2017, 70% of Amazon Flex couriers worked 1-10 hours per week, 18% worked 11-20 hours per week, and 11.8% worked 30 or more hours per week (Smith, 2017b).

8.3 Review of legal challenges brought by couriers against their self-employed status

Existing employment law provides little detail of the differences in the three categories of work that currently exist in the UK, namely i) employee, ii) limb (b) worker (also referred to as dependent contractor), and iii) self-employment (also referred to as independent contractor). This limited detail in the statutory definitions of employment status are supplemented by a body of case law on which courts base their judgments when making rulings about employment status. In reaching rulings about whether a person is self-employed or a worker, employment tribunals take into several factors including (House of Commons Work and Pensions and Business, Energy and Industrial Strategy Committees, 2017; Pyper, 2017):

- whether there is a requirement for personal service, or whether the individual is able to appoint a substitute to carry out work on their behalf;

- the level of control by an employer over workers in determining matters such as how, when and where work is carried out;
- evidence or lack thereof of mutuality: an obligation for the employer to provide work (or pay if there is none), or for the worker to accept it if offered; and
- whether the individual's work is carried on as a business undertaking. This might include the extent to which the individual is responsible for their businesses' success or failure, or whether they have the power to negotiate and set rates of pay.

This section reviews challenges that workers in the same- and next-day delivery sectors have brought against their employment status, some of which have resulted in rulings by Employment Tribunals, the Central Arbitration Committee and the Supreme Court.

An Employment Appeal Tribunal case was brought in 2007 by Ms James against a parcel carrier Redcats (Brands) Ltd in which Ms James argued she was not being paid a minimum wage. In order to deal with this case it was necessary to determine whether she was a worker or if she was self-employed as Redcats claimed, and therefore not protected by employment legislation. Ms James delivered parcels on behalf of Redcats using her own car; Redcats provided delivery deadlines and instructions on how the deliveries should be carried out. At appeal Judge Elias ruled in favour of Ms James deciding that even if a person carries out small working shifts without a written contract, there was an employment relationship (Employment Appeal Tribunal, 2007).

Efforts by couriers deemed to be self-employed by the parcels companies giving them work led to protests and legal action that commenced in 2015. This action was been supported by the Independent Workers Union of Great Britain (IWGB) which was founded in 2012. The IWGB had initially requested CitySprint to increase their pay rates in London to the London Living Wage. However CitySprint refused. This led to the IWGB helping to organise protests, contacting CitySprint clients to explain the situation, a social media campaign, and mainstream press coverage. In December 2015, as a result of this action, CitySprint announced its first pay increase in over 15 years, which was equivalent to a 20% increase as well as removing equipment hire fees.

Following this success with CitySprint, IWGB turned its attention to another courier, eCourier. This featured a high profile living wage campaign against eCourier. A large protest was also planned, but prior to this eCourier entered negotiations with the IWGB, leading to a 28% pay increase for eCourier cycle riders, together with the ending of uniform fees, the altering of an unpopular bonus scheme, and a 10 pence per mile compensation for vehicle maintenance costs (IWGB, 2016b).

Absolutely

The IWGB then turned its focus to G Thompson, a courier/logistics organisation with thirteen company brands the best-known of which is Mach1 (now known as Absolutely). Mach1 welcomed negotiations with the IWGB as it did not want to face a campaign against it, and had happened at CitySprint. This again led to increased pay for deliverers, the removal of former equipment rental fees, and an agreement to provide or subsidise the cost of clothing necessary to the role (IWGB, 2016c).

In 2016 legal action was commenced against four traditional same-day parcel carriers (CitySprint, Excel, Addison Lee and eCourier) by one or more of their couriers, which was supported by trade unions. Each of these actions resulted in employment tribunal hearing at which self-employed 'independent contractors' brought the case to be recognised as

'dependent workers', which would lead to automatic entitlements including minimum wage legislation and holiday pay.

CitySprint

The judge presiding in the CitySprint employment tribunal ruled in early January 2017 in favour of the courier, Maggie Dewhurst, agreeing with her that she was a dependent worker for the company and not a self-employed contractor. The judge ruled that CitySprint had therefore unlawfully failed to pay Ms Dewhurst for two days' holiday. CitySprint, stated that it was disappointed with the ruling but that it only applied to a single individual. Ms Dewhurst's lawyers said they expected thousands of couriers across London to make similar claims for back-pay (O'Connor, 2017). The judge, Joanna Wade, noted that the title of the contract, "Confirmation of Tender to Supply Courier Services to CitySprint" arouses the suspicion that the contract may have been generated by (an) army of lawyers...". The judge noted that in relation to whether on not the courier was independent and therefore self-employed, that, "Ms Dewhurst was also proud of her professionalism but did describe one incident when she was feeling unwell at the end of the day and asked the controller if she could go home. She was told that he could not find somebody else for a job and so she could not go". The judge also noted that "The respondent did not provide the evidence to rebut this...". The judge also noted that couriers were not responsible for invoicing customers, and that they payment they received from CitySprint, "was a payslip in all but name", and that "This is a long way from an arrangement whereby a contractor, such as a window cleaner, writes and then delivers their bill from which deductions are only made, generally by agreement, if, for example, they have broken a window".

The judge concluded that although CitySprint argued that "Self-employed van drivers, motorcycle riders and cycle couriers all make their services available to CitySprint, on relatively the same terms" this did not reflect the reality of the relationship in which the couriers "work for" the company. They quoted from a previous case in 2011 involving car valeters (Autoclenz Limited v Belcher & Others [2011] IRLR 820) where it had been suggested that the valeters were "in business on their own account" based on the contracts they had signed. The judge in the Autoclenz case had rejected this argument in stating that, "It matters not how many times an employer proclaims that he is engaging a man as a self-employed contractor; if he then imposes requirements on that man which are the obligations of an employee and the employee goes along with them, the true nature of the contractual relationship is that of employer and employee. I can see that the argument of the employee is rather less attractive where, for many years, he accepts that he is a self-employed contractor and benefits from the rather more favourable taxation arrangements, which are available to people running their own businesses. However, it seems to me that, even where the arrangement has been allowed to continue for many years without question on either side, once the Courts are asked to determine the question of status, they must do so on the basis of the true legal position, regardless of what the parties had been content to accept over the years. In short I do not think that an employee should be stopped from contending that he is an employee merely because he has been content to accept self-employed status for some years".

In November 2017 CitySprint decided to drop its appeal against the employment tribunal ruling that Maggie Dewhurst was entitled to worker status. However, it has been accused by the IWGB of changing the wording of its contracts without changing the nature of the work, and getting all couriers to sign them. This has resulted in Maggie Dewhurst receiving approximately £200 in holiday back pay, but her not being granted rights as a worker, including paying for any subsequent holiday pay (Chapman, 2017). A spokesperson for CitySprint said that it would await the Government response to the Taylor Review, which it hoped, "would bring much needed clarity and guidance in this important area for both organisations and individuals" (quoted in Chapman, 2017). CitySprint argued it was an individual appeal that did not apply to the other independent contractors. An employment lawyer stated that applying

the ruling of an employment tribunal to a single employee could be a risky decision given that the abolition of tribunal fees early in 2017 had increased the chances of further cases being brought by other couriers, and that in any subsequent cases the tribunal would consider whether there had been any operational changes in the nature of the work rather than whether there had been a change in the contract (Butler, 2017a).

Excel

Judge Wade was responsible for hearing all four courier tribunal cases: CitySprint, Excel, eCourier, and Addison Lee. In March 2017 the judge ruled that Andrew Boxer a courier for Excel was a worker rather than an independent contractor as he was required to work five days a week by the Excel controller, was paid a non-negotiable rate, that the contract he had signed “did not reflect the reality of the situation” and that he had signed it because he had no choice. The company operation required the courier to work five days a week, and to carry out jobs that were allocated to him by a fleet controller. The courier was expected to remain ready between jobs, and if he wished to move location while waiting would need permission from the controller. When necessary, the courier was expected to work without breaks, and any change in working hours or time off required by the courier would require prior notice and arranging with the controller. The courier did not agree his own terms with customers and did not bear the risk of cost of damage in transit. Judge Wade concluded that although the courier did provide his own “tools of the trade”, such as a bicycle, mobile phone and protective clothing, he was not providing his services on his own account as a business undertaking, and was not entering in to any additional business contracts. The judge also noted that, “the inequality of bargaining power at this point was very notable”. Boxer was therefore deemed eligible for paid holidays and minimum pay, in addition to the basic health and safety and anti-discrimination rights of a self-employed independent contractor Excel was ordered to pay him a week’s holiday pay or £321.16 (Employment Tribunal, 2017b; Butler, 2017b; Hinchcliffe, 2017; Scott, 2017a). However a dependent worker is not entitled to the sick pay and maternity/paternity rights of an employee. Excel did not appeal against the ruling and was taken over by CitySprint in 2016.

eCourier

In May 2017, eCourier, the same-day carrier owned by Royal Mail admitted that it had wrongly classified one of its couriers as an independent, self-employed contractor rather than as a dependent worker. The company took this decision rather than going to an employment tribunal, and agreed that the courier bringing the action should have been entitled to benefits including the minimum hourly wage, holiday pay and protection against discrimination. The Independent Workers of Great Britain (IWGB) Union which had been supporting the courier in their action, had argued that the courier was not self-employed as they had to work exclusively for eCourier, the company was in charge of setting prices for the delivery work and pay rates rather than the courier, and the courier was allocated work jobs booked by the company and was told what to do by a company fleet controller (IWGB, 2017). The chief executive of eCourier stated that the company planned to carry out a review of how it should implement the same worker status “for colleagues where it reflects their actual working arrangements with us” as the vast majority of eCourier’s 350 bicycle couriers were on the same arrangements as the courier bringing the complaint (quoted in IWGB, 2017).

The Doctor’s Laboratory

In June 2017 five bike, motorbike and van couriers working for The Doctor’s Laboratory and carrying emergency blood supplies and delivering passports were granted dependent worker (rather than their previous status as self-employed) status by the company, rather than going to an employment tribunal (Butler, 2017c).

Addison Lee

In August 2017 Judge Wade ruled that Chris Gascoigne, a cycle courier at Addison Lee should also have been treated as a dependent worker with holiday pay and minimum wage rights rather than an independent contractor. The judge criticised the company's efforts "frighten off" the courier from taking his case to an employment tribunal, and noted that couriers were given Addison Lee-branded bags and T-shirts, took instructions and delivery jobs allocated by a fleet controller and used Addison Lee communication devices, with the system not offering couriers an opportunity to decline a job. The judge noted that Addison Lee recruitment material stated "we are proud of our couriers – we'd love you to be part of that", and it did not say, "We want to find couriers who are independent and work on an ad-hoc basis. If you do account work you [will] be a self-employed sub-contractor and for non-account work we will be your agent so you carry the risk." The judge ruled that, "Not only is this confusing and wordy, it is not the way the business ran, or could run, as [Addison Lee] well knew. This is why it employed 'armies' of lawyers; to do the best possible job to ensure that the claimant and his colleagues did not have ... worker status" (Employment Tribunal, 2017c; Wade, 2017). Among its various arguments, Addison Lee put forward evidence that "Gascoigne would take time away from his courier job to go on tour with his band or do gardening work for a neighbour. Added to that, the contract stated that Gascoigne should let Addison Lee know of a morning whether he would be working – he often did not, and was never penalised" (Employment Tribunal, 2017c). An Addison Lee spokesperson said: "We note the tribunal's verdict, which we will carefully review. Addison Lee is disappointed with the ruling as we have always had, and are committed to maintaining a flexible and fair relationship with cycle couriers" (Booth, 2017a).

Addison Lee appealed against this decision. The company's main point on appeal was that its couriers were under no legal obligation to work; they could decline jobs offered to them by controllers without any consequences. The Employment Appeal Tribunal took place in April 2018 with the judgement handed down in May 2018. Judge Soole and his two colleagues ruled that Judge Pearl's original decision had been correct and that Chris Gascoigne was a dependent worker and not self-employed. It ruling (as had the earlier tribunal) that the established practice and expectation of both the carrier and the courier was that both parties expected that the courier would carry out work as directed. As a result, the courier was a worker under the legal test and entitled to holiday pay (Employment Appeal Tribunal, 2018; Leckey, 2018).

Meanwhile, Andrew Boxer, the courier who won the employment tribunal case against Excel, was offered a job as a courier at Addison Lee. However, reportedly, he was subsequently refused this job by a manager at Addison Lee once it was discovered that he had taken another firm to court over workers' rights. Boxer is now receiving support from the IWGB, which is considering legal action against Addison Lee for "trade union victimisation and blacklisting" (Dearden, 2017).

In another similar case, Judge Pearl at the employment tribunal ruled in September 2017 that three minicab drivers working for Addison Lee should be employed as dependent workers rather than independent contractors, and thereby be given holiday pay and the national minimum wage. The drivers used branded vehicles that they had to hire through an associated Addison Lee organisation, and which could not be used for other commercial work. The drivers were not responsible for setting the prices charged, which were decided on by the company and not communicated to the driver, there was a required dress code for drivers, they were given a list of acceptable topics of conversations while transporting customers, and had to carry out a set amount of weekly work or be subject to a service charge. The judge deemed that the drivers were performing driving services that were allocated to them by the company's controllers, and that they had to accept these jobs unless a reasonable reason was provided as to why they could not accept it. If the reason was not considered to be acceptable by the controller, then the case would be referred to a manager (Scott, 2017b).

Judge Pearl ruled that: “We have come to the view that the claimants were workers as defined. We agree that there must be a contractual obligation by the drivers to provide services. The statutory wording is that there must be a contract ‘whereby the individual undertakes to do or perform personally any work or services’ for the other party. This was clearly the case here whenever each driver logged on. Ignoring the period between ‘log-ons’, the drivers, when they logged on, were undertaking to accept the driving jobs allocated to them. They were undertaking to perform driving services personally. No other conclusion is possible” (Employment Tribunal, 2017d).

Uber / Uber Eats

Uber Eats faced wildcat strike action from its deliverers on 28 August in protest about pay rates (IWGB, 2016e).

In July 2016 a claim was brought against Uber that its drivers are, in fact, workers. In October 2016 an employment court in the UK ruled that Uber drivers were not self-employed and should therefore be paid the national living wage. Uber appealed the ruling but lost this appeal in November 2017 (Employment Tribunal, 2017e). The company is now seeking to appeal this ruling; it tried to take the case directly to the highest court, the Supreme Court, but this was not permitted and it will now be heard in the Court of Appeal first (Reuters Staff, 2017).

Deliveroo

Couriers for meal delivery firm Deliveroo are also uniformed but engaged as ‘independent contractors’ rather than ‘dependent workers’. In August 2016 some Deliveroo deliverers went on strike at being told to sign new terms and conditions or face the sack; Deliveroo ultimately removed this threat as a result of the strike action (IWGB, 2016d). Since November 2016 the IWGB has been attempting to gain recognition via a collective bargaining agreement from Deliveroo in north London. The case was heard by the Central Arbitration Committee in November 2017. The judge ruled that Deliveroo riders in north London were not dependent workers but are instead self-employed and therefore are not eligible for holiday pay and minimum wage rights. The tribunal made this ruling based on the fact that Deliveroo couriers are permitted to ask a substitute courier to perform a job in place of them. The Independent Workers Union of Great Britain (IWGB) had bought the case in an effort to get Deliveroo to accept the collective bargaining rights of its members. Deliveroo added the “substitution clause” to its contracts eleven days prior to the tribunal hearing, as well as charges for Deliveroo bags (with couriers now permitted to purchase their own non-branded backpacks and insulated bags from elsewhere (Tims, 2017). At the hearing, cross examination by the barrister acting for the couriers identified issues associated with the inclusion of the substitute courier clause into Deliveroo contracts. These include the difficulty of ensuring that legal obligations that Deliveroo issues to its couriers concerning keeping vehicles clean, and ensuring health and safety knowledge and personal hygiene training, criminal record checks, and ensuring couriers are sufficiently old to deliver alcohol are achieved in the case of a substitute person making the delivery. A representative for Deliveroo stated that as part of their contract couriers had to ensure that any substitute is suitably trained, safely equipped and did not have a criminal record. He also conceded that Deliveroo did not provide its couriers with health and safety, food or road safety documentation which could be passed on to substitute couriers, or specific advice on selecting substitutes (Butler, 2017d). If the case bought by the IWGB had been successful, it would have been the first collective bargaining agreement in the UK's online shopping and delivery market (Labour Start, 2016).

The Independent Workers' Union of Great Britain (IWGB) representing these Deliveroo deliverers sought a High Court judicial review of the decision by the Central Arbitration Committee (CAC) that they are not workers. The IWGB argued that the CAC has incorrectly

interpreted the law (Barber, 2018). In June 2018, the IWGB was granted the right to lodge a High Court challenge to the CAC's original decision (Butler, 2018c).

Hermes

The Labour MP Frank Field has also called for a parliamentary inquiry into the working practices at next-day parcel carrier Hermes, concerning what he refers to as, "bogus self-employment" (Wood, 2016).

A group of 65 couriers brought claims against Hermes with the support of the GMB union. The couriers argued that they had to sign up to work for the organisation as vehicle delivery round holders, which involves them in taking responsibility for the delivery round and work six days a week, parcels have to be delivered within company-determined time slots, that their performance is tracked and they have to meet performance standards or face disciplinary action. In addition, Hermes dictates couriers' payment terms, generates invoices for couriers, and decides how couriers are paid. The couriers argue that, based on these terms, they were workers rather than self-employed independent contractors (Employment Tribunal, 2018; Scott, 2018).

In June 2018, the Employment Tribunal ruled that these couriers were not independent contractors, as Hermes had claimed, but are dependent workers, entitled to the National Minimum Wage, holiday pay and reclamation of unlawful deductions from their wages. This is due to the fact that the contract between Hermes and the courier contrasts with the flexibility that is expected of being an independent contractor (Employment Tribunal, 2018; Leigh Day, 2018). Frank Field, was reported as saying it was, "a mega knockback to those companies still using old means of exploiting vulnerable workers" (Siddique, 2018). A subsequent Employment Tribunal hearing will determine the financial compensation that the couriers should receive. This ruling may have implications for the other 14,500 couriers who work for Hermes under the same contract as the successful couriers (Leigh Day, 2018).

UK Express

In January 2018 the GMB Union announced that UK Express (solely delivering for Amazon) had accepted that couriers bringing an action against the company had been wrongly classified as self-employed and were in fact employees. The GMB's West Midlands Branch reported that the company had settled the claim in full rather than face an employment tribunal hearing and potential further claims. Some of these couriers were awarded substantial back pay as a result (Taylor, 2018). The GMB has another outstanding case of behalf of other couriers against DX (van Marle, 2018).

IWGB

The president of the IWGB, Jason Moyer-Lee, believes that how workers are being treated in the parcel and meal delivery sectors is going to become far more widespread, saying that "The whole economy is going to head in that direction if we're not careful". There has been a substantial rise in self-employment in the UK in recent years (in March 2016, there were 4.7 million self-employed, or 15% of the workforce). While some are genuine 'independent contractors', others are likely to have been given this self-employed status to deny them their lawful employment rights (Lynch, 2016).

Amazon Logistics

A BBC undercover investigation into one of the independent carriers that provides delivery services to Amazon Logistics' operations found that their independent contractors (i.e. drivers) received a fixed rate of £110 per route per day, which typically involved more than 11 hours

work per day. These driver-contractors were charged for vehicle rental, insurance, and administration costs imposed by the carrier. These contractors did not receive holiday or sick pay, and some reported that when taking into account the hours they worked delivering parcels, earned below the minimum wage. A professor of labour law who was presented with the information said that in her opinion the drivers contracted by the independent carrier should not be classed as self-employed, as they do not determine their own routes, days of work or rest periods, and should instead be considered to be workers or agency workers, and receiving the national minimum wage (BBC, 2016a). The GMB has announced legal action against three Amazon delivery carriers on the same principles as the Hermes case (see above – Siddique, 2018).

Pimlico Plumbers

Another case of interest is in the plumbing / tradesperson sector. In February 2018, the UK Supreme Court began hearing an appeal brought by Pimlico Plumbers and its Chief Executive Charlie Mullins against a previous ruling that Gary Smith, one of its plumbers from 2005 to 2011 was self-employed as the company argues. Smith suffered a heart attack in January 2011 and when he had recovered sought to reduce his work from five days per week to three. Pimlico Plumbers refused Smith's request and took back his branded van that he hired from the company. Smith claimed that he was a worker and was unfairly dismissed in May 2011, which the company contested. In February 2017, the Court of Appeal ruled that Smith was a dependent worker as he was required to work specified hours per week and to use a Pimlico Plumbers van while doing so. Mullins has argued there is "no comparison" between a skilled tradesperson, such as a plumber, and a bike courier or minicab driver, on close to the minimum wage (Chapman, 2018b).

In June 2018 the Supreme Court ruled that, despite being VAT-registered and paying self-employed tax, Gary Smith was entitled to dependent worker status, and is thereby entitled to holiday and sick pay. Charlie Mullins, Chief Executive of Pimlico Plumbers was reported to have said in reaction to the ruling that he was, "disgusted by the approach taken to this case by the highest court in the United Kingdom". However, lawyers pointed out that this Pimlico Plumbers ruling may not have a bearing on cases in the parcel delivery sector as all cases have to be argued on their specific facts and circumstances. The substitutability of jobs to another person is likely to remain an important factor in future rulings. However, the ruling could encourage other currently 'self-employed' contractors to challenge their legal status. It could also encourage the government, which is currently consulting on its proposals on this topic, to draw up legislation that could either support or overturn such rulings. Matthew Taylor, author of the Taylor Review presented to government in 2017, said that this Supreme Court ruling together with the government's proposals to reduce the tax incentives for companies to employ freelancers, would put pressure on companies' budgets for freelance staff, and that, "this is generally a good thing, especially if it leads to more people who are employees in all-but-name securing proper workplace rights," he said. (BBC, 2018; Supreme Court, 2018).

Summary

Table 8.1 provides a summary of actions taken by same-day carriers in the face of courier challenges as well as the outcomes of employment tribunal cases involving couriers working in the same-day delivery sector in the UK.

Table 8.1: Same-day courier employment challenges

Company	Same-day sector	Date of decision	Employment Tribunal / Central Arbitration Committee / Supreme Court or company decision?	Outcome
Redcat	B2B parcels & documents	February 2007	Employment Tribunal Appeal	In favour of courier: determined that the person was a worker
CitySprint	Medical	Jan 2017	Employment Tribunal	In favour of courier: status changed from self-employed to dependent worker
Excel	B2B parcels & documents	March 2017	Employment Tribunal	In favour of courier: status changed from self-employed to dependent worker
eCourier	B2B parcels & documents	May 2017	Company decision	In favour of courier: status changed from self-employed to dependent worker
The Doctor's Laboratory	Medical and documents	June 2017	Company decision	In favour of couriers: status changed from self-employed to dependent worker
Addison Lee	B2B parcels & documents	August 2017 & May 2018 (appeal)	Employment Tribunal Appeal	In favour of courier: status changed from self-employed to dependent worker
Addison Lee	Minicab drivers	September 2017	Employment Tribunal	In favour of drivers: status changed from self-employed to dependent worker
Uber	Minicab drivers	July 2016 & November 2017	Employment Tribunal	In favour of driver: status changed from self-employed to dependent worker
Deliveroo	Meal deliveries	November 2017 on	Central Arbitration Committee	In favour of company: status remained as self-employed (but High Court appeal granted in June 2018)
Hermes	B2C parcels (next-day)	June 2018	Employment Tribunal	In favour of couriers: status changed from self-employed to dependent worker
Pimlico Plumbers	Plumber	Jun 2018	Supreme Court Appeal	In favour of plumber: status changed from self-employed to dependent worker

Source: compiled by the authors from sources listed in the preceding text.

Therefore, several recent employment tribunal cases, have resulted in couriers successfully challenging same-day carriers that argued they were self-employed (i.e. CitySprint, Excel, and Addison Lee). As a result they were given dependent contractor status. As a result these workers gained several important employment rights. However, these rulings only apply to the named workers bringing these cases and their companies; these rulings do not result in any automatic consequences for other companies with similar business models.

As mentioned at the start of this section recent Employment Tribunal, Central Arbitration Court and Supreme Court rulings have all (with the exception of the Deliveroo case which is to be appealed in the High Court) rulings and judgements have found in favour of the courier and awarded them with dependent contractor status (i.e. limb (b) worker).

Those judges making these rulings and judgements have identified several issues of as primary importance in reaching their decisions: i) the lack of substitutability of the courier (and therefore the requirement by the carrier for their personal service, and whether or not the courier is free to pursue other work); ii) the level of control that the carrier has over the courier and how, when and where the work is carried out (including the wearing of uniforms and use of branded vehicles); iii) the evidence of mutuality (the obligation concerning the offer and acceptance of work); iv) and the extent to which the courier operates as a business undertaking (with powers to set prices, negotiate pay rates and is responsible for the success or failure of the business). Other factors cited by judges in their rulings include: whether training was provided to couriers; whether codes of staff conduct existed; and whether indemnity clauses exist in contracts with couriers. Judges in these cases have tended to examine the actual working practices of the couriers required by the carriers, rather than the description of these working practices in written contracts and other documents.

Therefore, evidence from recent cases (as well as company responses to cases they have decided to settle with going to Employment Tribunal) show that that the judiciary has in all but one case sided with the view of the courier that they are a dependent contractor and not a self-employment independent contractor.

8.4 UK Policy thinking on self-employment

A government-commissioned independent review of the UK labour market considered the changing nature of working in the country, including the status of those working in the gig economy, those on zero-hours contracts, agency workers, and those who are self-employed and limb (b) workers. Among its suggestions and recommendations were that (Taylor Review, 2017):

- Platform based working offers welcome opportunities for genuine two-way flexibility and can provide opportunities for those who may not be able to work in more conventional ways. These should be protected while ensuring fairness for those who work through these platforms and those who compete with them.
- The Government should retain the current three-tier approach to employment status as it remains relevant in the modern labour market, but rename as 'dependent contractors' rather than 'limb (b) workers' - the category of people who are eligible for worker rights but who are not employees (Limb (b) refers to the part of section 230(3) of the Employment Rights Act 1996 which describes this group of people). But it should be made clearer about how to distinguish workers from those who are legitimately self-employed.
- 'Dependent contractors' are the group most likely to suffer from unfair one-sided flexibility and therefore we need to provide additional protections for this group and stronger incentives for firms to treat them fairly.

- The same basic principles should apply to all forms of employment in the British economy – there should be a fair balance of rights and responsibilities, everyone should have a baseline of protection and there should be routes to enable progression at work.
- The National Living Wage is a powerful tool to raise the financial base line of low paid workers. It needs to be accompanied by sectoral strategies engaging employers, employees and stakeholders to ensure that people – particularly in low paid sectors – are not stuck at the living wage minimum or facing insecurity but can progress in their current and future work.

The UK Government has responded to the Taylor Review by saying that it “agrees that it should be easier for individuals and businesses to determine whether someone is an employee, a worker, or self-employed, and is committed to improving clarity and certainty in this area. This will include consideration of legislative options”. However to ensure that any reforms achieve their aim and do not have unintended consequences, the government “will therefore consult to explore the best way to improve clarity for those on the boundary between employment and self-employment, including options for legislative reform” (HM Government, 2018).

The Government also intends to consult on how best to ensure that legislation improves transparency for agency workers in terms of how and how much they will be paid when taking up assignments. It also is “committing to provide a right to request a more predictable contract for all workers, including those on zero hours contracts and agency workers. It also intends to consult to seek evidence “on where low-paid workers struggle to access sick pay and holiday pay to help target enforcement efforts” (HM Government, 2018).

Following the Taylor Review, Deliveroo began offering income protection and public liability insurance to its couriers. Deliveroo cyclists, moped riders and car drivers can protect their income in case they cannot work due to illness or injury for £8.02 per month (£1.85 per week), and Deliveroo cyclists can also obtain £2 million of public liability insurance in case they cause injury or death to someone while at work for £2.82 per month (£0.65 per week) (Deliveroo, 2018b). In May 2018, Deliveroo announced it would introduce a new free accident insurance scheme for its couriers which provides up to £7,500 cover for medical expenses and 75% of gross pay as replacement income for up to 30 days of inactivity in case of injury at work (Makortoff, 2017; Roberg, 2018; Tassinari, 2018).

Uber has responded to the Taylor Review and the government’s response to it by stating that it will establish a feedback programme called UberEngage to make it easier for drivers to raise issues, ideas and provide feedback to the company on changes and decisions. It will also set up advisory groups in every British city it operates in, which will comprise up to five local drivers, who will meet with senior Uber staff each month (Haslett, 2018). In January 2018, Uber Eats launched a free personal insurance scheme for self-employed couriers working for it in nine European markets. The scheme includes personal accident insurance during a delivery trip, a cash benefit for severe sickness or injury that leads to hospitalisation up to a maximum of 15 days, and third party liability cover up to a maximum of €1 million. This Uber Eats scheme does not, however, provide insurance for sickness or injury that does not result in at least three days of hospitalisation (Fioretti, 2017; Lomas, 2017).

The House of Commons Work and Pensions and Business, Energy and Industrial Strategy Committees (2017) has gone further than the Taylor Review and recommended that the UK Government:

- legislate to implement a worker by default model....This would apply to companies who have a self-employed workforce above a certain size defined in secondary legislation” (House of Commons Work and Pensions and Business, Energy and Industrial Strategy Committees, 2017).
- work with the Low Pay Commission to pilot, for workers who work non-contracted hours, a pay premium on the National Minimum Wage and National Living Wage. The Low Pay Commission should be responsible for identifying suitable companies to be included in this pilot, based on workforce size and turnover.
- creates an obligation on employment tribunals to consider the increased use of higher, punitive fines and costs orders if an employer has already lost a similar case. We further recommend that the Government takes steps to enable greater use of class actions in disputes over wages, status and working time.
- extends the duty of employers to provide a clearly written statement of employment conditions to cover workers, as well as employees, (and) that this right apply from day one of a new job, with the statement to be provided within seven days.
- amends the Agency Worker Regulations 2010 to remove the opt-out for equal pay. We further recommend that the Employment Agency Standards Inspectorate be given the powers and resources it needs to enforce the remainder of those regulations.

The UK Government will respond in due course to the recommendations of the House of Commons Work and Pensions and Business, Energy and Industrial Strategy Committees. Given the recent decisions reached by Employment Tribunal cases concerning the same- and next-day delivery sectors which have typically been in favour of couriers, together with the recommendations of the Taylor Report, and current sentiment and arguments made by politicians, there would appear to be a strong likelihood that new employment legislation could be introduced that will result in the vast majority of self-employed couriers being recategorised as dependent contractors, and thereby receiving the employment benefits accorded to workers with that status.

PART II. SAME-DAY DELIVERY OPERATIONS

9. History of Same-Day Deliveries

As described previously (see **section 2.2**) the same-day delivery market has been undergoing major changes in recent years as a result of changes in the economy, the development of new technology and the rise of online retailing. At the same time as these economic and technological changes that have affected the marketplace, the means by which same-day deliveries are operated has also been undergoing substantial change.

Prior to the First World War and the advent of faster, motorised vehicles, same-day delivery services were mostly restricted to short distances. The earliest same-day services were mostly intra-urban movements within towns and cities that took place on-foot or by horse. From medieval times street porters in the City of London had made B2B deliveries on-foot from food markets to locations in the surrounding area, and from ships in the Port of London to nearby warehouses on a same-day basis (Stern, 1960).

Pedlars, hawkers and chapmen were peripatetic traders who supplied cheap for retail and wholesale. They often sold goods via door-to-door selling to those living in rural and urban areas as well as at markets and fairs from early times until the end of the 19th century. They typically travelled on foot with backpacks or boxes, while a few used horses or donkeys to assist them to transport their wares. In general these traders carried products including textiles (especially linens), haberdashery and ready-made clothing accessories (such as stockings, gloves, caps, hoods, capes, handkerchiefs and neckcloths). Other items carried by some included books, foodstuffs, cooking ware, medicines and gifts. The products offered by these sellers ranged from coarse to fine quality, and cheap to dear. Some carried a very broad range of goods while others specialised in particular types of item. Their sales either took place on-street or by door-to-door visits. Some of the more successful chapmen were less itinerant than others with market stalls or occasionally even shops.

Inter-urban freight transport services, which existed in England from as early as the 15th century were not traditionally offered on a same-day basis due to the speed of transport possible (using horse transportation). Direct scheduled carrier services to and from London had existed as early as the 15th century, and by the late 17th century there were at least 345 services per week. However, these services usually operated once per week throughout the year with overnight stabling of horses and journey breaks. These services also generated many provincial and local services (Barker and Gerhold, 1993; Chartres and Turnbull, 1983).

Analysis of trade directories and newspapers of the time has shown that by the middle of the 18th century relatively well-developed networks of inter-provincial or regional carrier services had emerged. These networks of different carriers linked with each other either through simple overlap or by explicit interchange arrangements between carriers (Turnbull, 1977). However, the distances involved and speed of transport meant that the vast majority of these services also involved overnight stops at coaching inns.

Local (or village) carriers offered goods transport services from at least the late-18th century that linked market towns with their surrounding villages and hinterlands (Everitt, 1973, 1976; Greening 1971). Usually these services offered relatively low capacity in terms of the quantity of goods that could be handled (often by packhorse or cart). Village carriers transported local produce to market, as well as obtaining shopping for locals from the town. After the advent of the railways they also carried goods and parcels from railways to their final destination in the countryside (Everitt, 1976). These carriers tended to set out early in the morning and return home at night; a 16-17 hour working day was not uncommon. The frequency with which these

services operated was dependent on demand and the frequency with which markets were held. Most local carriers worked regular routes at least once per week, but often 2-3 times weekly. These routes typically called at 3 or 4 villages before reaching the town. The majority of these routes served by carriers about 15-20 miles but exceptional cases of 30-40 miles have been found in records (Everitt, 1976). Therefore, although these services were not typically provided on a daily basis, on the days that they did operate they usually did so on a same-day basis due to the relatively short distances involved. It has been estimated that there were about 20-25,000 local carriers nationally in 1880, and that these numbers had approximately doubled between 1800 and 1880 (Everitt, 1976). Many of these local carriers offered passenger as well as freight transport services. It is among these small, local family-owned carriers that same-day parcel services over longer distances emerged with the advent of motorbikes and other motorised vehicle types in the early 20th century.

Prior to the introduction of regular postal services, carriers often had to wait one or two days at their destination for a return load. Some overcame this difficulty by using running footmen (also known as footposts) who could make deliveries on foot, especially letters. The carrier or his customer would send a letter in advance of their departure with orders for goods by footpost so that once the carrier arrived in the town/city they could make their delivery and then go immediately to collect the return load. It is claimed that running footmen had much prestige in the 16th and 17th century based on their speed compared with horses over relatively long distances. For instance, the running footmen supplied to Thomas Kirk of Dundee in 1677 would “undertake to run down the best horse you can buy in 7 or 8 days”. Sir William Petty in his plan to improve the speed of the postal service to 5mph thought it may be better performed by men exercised in it, by reason that men can go where horses cannot. Unless relays of horses could be arranged, the quickest means of communication over long distance was therefore believed to be running footmen (Crofts, 1967). Running footmen emerged as a class of servant in western Europe in the 15th century (Sears, 2001). They were often in service to aristocrats, towns and Corporations to carry their official correspondence. The running footmen of Bristol regularly travelled between Bristol and London with letters. Bartholomew Moore made regular trips from Leicester to London and back - if his claims are true he covered 204 miles per week, and unless he travelled on Sunday, kept up an average of 34 miles per day, about twice the rate of an ordinary carrier (Crofts, 1967). However, running footmen only ever existed in small numbers working for the rich and elite.

In 1511, Henry VIII appointed a number of standing posts who were paid wages by the king – this was the start of the royal post but only operated along one main route from Berwick to Dover. A post was regarded as a Messenger of the Chamber on permanent riding duty. He was required to carry the royal packets and letters over his stage (usually 20 miles) at any time of the day or night (Crofts, 1967). During the 16th century, in order to give posts a sufficient income, they were also permitted to carry private letters. This resulted in posts being responsible for two things: the “Packet” (mail conveyed for the monarch) and “Bye letters” (other private mail). A packet had to be taken forward to the next post within 15 minutes of its arrival, while “bye letters” had to wait to be forwarded until an official “Packet” was running. Posts carried a bag over their arm with the mail and a horn. The horn was originally used by the post at the town’s end on arrival to warn the next post to saddle his horse and be ready to depart within 15 minutes of hearing the horn. But it seldom worked this smoothly. Over time the post was instructed to blow his horn on approaching any town, continuously when he met people on the road to warn them to “give way unto the post”, and even to blow it four times per mile on a clear road. Posts were expected to travel at 7 miles per hour in summer and 5 miles per hour in winter (Hemmeon, 1912).

In the 1600s payments to posts fell so far into arrears that they became increasingly dependent on their income from the bye letter (private) business. Therefore under Charles I a national monopoly is created for postal services in order to generate revenue. Up until the

introduction of the national monopoly postal service in 1635 private post was carried by posts, carriers and footposts.

Six main post roads were established in England and Scotland with the first-ever 'post office' in Bishopsgate Street in London. These post roads ran between London, Dover, Plymouth, Edinburgh, Bristol and Yarmouth. Letters were transported day and night, and therefore could travel approximately 120 miles in a 24-hour day (Starmans, 2018).

Initially postal services ran once per week, but over time this improved and postal services began to run more than once per week. This allowed people in business to receive far faster information and feedback from suppliers and customers than had previously been possible. Although the frequency of goods delivery remained the same, orders, information and other business paperwork began to move much more rapidly. This allowed people to set up businesses further from London and yet still deal with businesses there. For instance, shopkeepers could receive price lists and place orders far more quickly and frequently as a result of post improvements. Coaches and horses for mail transport were initially trialled and introduced from 1784 onwards. These coaches were initially introduced between London and Bristol, but by the end of 1785 they were being used on twenty inter-city routes from London (Austen, 1981). This expansion in inter-city routes continued up to 1810, while provincial and cross-country services continued to expand up to 1835. These mail coaches carried both mail and passengers and were run on behalf of the Royal Mail by coach operators. They proved popular with well-to-do passengers as they were faster than stagecoach services, carried fewer passengers, had more inside seating and were accompanied by an armed guard. However, they only accounted for approximately 5-10% of all passenger coach services on London and other provincial routes. By the mid-1830s there were 261 mail coaches in use, compared with approximately 3,000 stagecoaches (Austen, 1981). Postal carts were also operated that only carried mail. However from the 1820s onwards passenger traffic was being lost to coastal steamers, and not long after this railways were competing with coaches for mail transport. This resulted in a decline in long-distance postal traffic by road during the rest of the 19th century as rail gained ascendancy. However, this trend was reversed during the latter part of the 20th century with road once again becoming dominant for long-distance mail transport.

From the early 20th century butchers, bakers, grocers and milkmen provided home deliveries within their local catchment. However all these deliveries were based on pre-arranged or regular orders. Ad hoc same-day orders and deliveries were only possible from door-to-door salesmen. Door-to-door selling acquired a poor reputation during the 20th century due to its associations with pressurised selling and criminality, and declined rapidly as household motorisation and public transport services increased and retailing became a leisure activity for the masses with more choice and lower prices available in-store. This led to the demise of home deliveries by milkmen and other local food retailers.

The advent of the bicycle led to its use for delivering small items on a same-day basis from the late 19th century. Examples include bike couriers conveying messages on behalf of the Paris Stock Exchange in the 1870s, and bicycle telegraph boys in large American cities in the 1890s (Herlihy, 2004). However, it was motorbikes rather than bicycles that became the vehicle of choice in same-day urban deliveries from the 1920s. During World War One the British Army enlisted motorcycle despatch riders, whose job was to act as a messenger delivering urgent orders and messages to advanced military units at a time when other methods of communication were extremely limited and prone to interception. Some of these military despatch riders wrote accounts of their service (for example see Watson, 1915). Motorcycle courier services commenced in central London after the end of World War One as some of these Army despatch riders purchased surplus motorcycles from the military. From the 1950s on the use of motorcycle couriers for same-day involved scheduled pick-ups and drop-offs between printers and advertising agencies. Apparently, the use of same-day ad hoc motorcycle couriers began to escalate substantially in UK cities, and those in other European

and American cities, as a result of rising city centre traffic levels, with motorbikes able to complete faster journeys at lower cost than taxis and minicabs (Scott, 2016).

The 1971 Royal Mail strike provided a further growth in demand for the B2B same-day parcels sector in the UK. The advent of two-way radios during the 1970s that could be fitted in vans, cars and on motorbikes helped to improve efficiency and service in the same-day sector, with direct contact at any time between couriers and their office-based fleet controllers. This made work allocation, and alterations to jobs far easier to accommodate and led to far less need for couriers to locate public phone boxes or return to their office bases to obtain more work (Scott, 2016).

During the 1980s growing traffic congestion in central London coupled with growing demand for B2B same-day parcel and document deliveries resulted in growing demand for motorcycle and bicycle couriers. Bicycle couriers could carry out their jobs even faster than motorcycle riders in busy locations due to their ability to weave in and out of traffic, as well as easily transgressing road traffic laws (such as the illicit use of pavements and travelling in the wrong direction along one-way streets). Over recent decades, some family-owned taxi and parcel carrier businesses decided to specialise in the provision of parcel services, while others continued to offer both.

The last five years has seen the emergence of entirely new and rapidly growing sectors in the same-day delivery market including groceries, takeaway meals, and non-food retail deliveries (while at the same time the demand for B2B parcel and document deliveries has been falling). These opportunities have been met by a range of organisations including traditional grocery retailers, online food and non-food retailers, platform providers offering meals from a vast array of restaurants. In addition, there numerous 'start-up' delivery companies have emerged in the last couple of years who provide work to couriers use bicycles, mopeds, motorbikes, cars and vans to deliveries goods and food on a same-day basis primarily in cities on an ad hoc, per job basis. Traditional same-day parcel carriers are having to adapt their traditional B2B services in order to compete in this dynamic and rapidly-evolving marketplace.

10. Operating Patterns in Same-Day Delivery Sectors

The key factor that distinguishes the same-day courier market from other freight transport services is the short lead-time between the placement of an order and its delivery (either purchasing a product such as groceries or a takeaway meal, or the request for the collection and delivery of an item). This ad-hoc, on-demand nature of same-day delivery services make it operationally challenging. At its most extreme, customers can request urgent collection and delivery of an item (Kidder, 2009). Due to the rapid response required in order to fulfil these same-day deliveries, it is more challenging to achieve operational efficiency and high levels of vehicle carrying capacity utilisation in same-day freight operations than in other less time-sensitive forms of freight transport.

Beyond this similarity between same-day deliveries due to their immediacy, there are important differences between same-day operations in different sectors based on factors including:

- The perishability of the product (e.g. a hot meal can only be transported over a relatively short-distance if it is to arrive with the customer in prime condition)
- The time-sensitivity of the product (e.g. an organ for transplant will be required as soon as feasibly possible)
- The price that the customer will bear for same-day delivery services (e.g. a business customer may be willing to pay far more for a contract-critical document transfer than a retail consumer will pay for delivery of a an item of clothing)
- The complexity and length of the supply chain for a product / sector (some same-day deliveries only involve a single origin and destination for a given product such as a parcel moved from one office to another, or a pizza moved from a restaurant to a customer's home, whereas retail deliveries may involve products moving between two business locations before delivery to the consumer)
- The scale and repeatability of the demand for a given same-day service (with operators paying more attention to achieving operational efficiency in sectors /segments with high levels of product throughput and repeatability)
- The typical size and weight of product/s requiring delivery

These above factors have an important bearing on the operational features of same-day deliveries in different sectors in terms of:

- The types of vehicle used
- The operational attributes of the deliveries (i.e. whether point-to-point deliveries, multi-drop deliveries or a mix of the two)
- The geographical distances over which services are offered
- The static logistics infrastructure required (i.e. whether or not depots/warehouses are required, and, if so, the number required and their size, location and facilities)
- The model of courier employment adopted

In terms of the geographical coverage of same-day services, non-food B2B deliveries take place over national and international distances, while non-food B2C, takeaway meal and grocery deliveries are far more localised.

Non-food B2B and takeaway meal deliveries are usually operated on a point-to-point basis with a single item carried on each trip, whereas grocery and non-food B2C deliveries are more likely to involve multi-drop operations with several customer's products carried at once.

Three main vehicle types are commonly used to provide same-day delivery services: vans, motorbikes and bicycles. Cars and heavier goods vehicles are also used to a lesser degree. Recently, electrically-assisted cargo-cycles (bicycles, tricycles and quadricycles), which can carry far greater loads than motorbikes and bicycles, are being introduced into these services. Non-food deliveries will utilise all these vehicles types, takeaway meal deliveries make greatest use of bicycles and mopeds, while the majority of grocery deliveries use vans.

Same-day couriers (and taxi drivers) have traditionally often been self-employed due to the nature of the work. The owner of the taxi or courier company was unwilling to offer employment to these drivers and couriers given the uncertain and sporadic nature of the work; and some of these drivers and couriers had other jobs in addition to driving. The expansion of the same-day sector to include takeaway meal delivery has made use of this self-employment model for couriers. However, in grocery same-day deliveries direct employment models are used for drivers/couriers by some of the major store-based grocers (see **section 4** for further details).

In this report all those working in physically carrying out same-day deliveries have been referred to as 'couriers' for ease of terminology. However, in reality various terms are used for these tasks in various same-day sub-sectors. **Table 10.1** shows these range of terms.

Table 10.1: Terminology used to describe those carrying out same-day deliveries by sub-sector

Same-day sector	Terms used to describe those carrying out delivery service
Parcel, document and medical deliveries	Bicycle: courier, messenger Motorbike: courier, despatch rider Van: courier, driver, delivery driver
Technical and fieldwork services (parts delivery and sometimes installation)	Courier, delivery driver, technician, fieldworker
Grocery deliveries	Bicycle: Personal shopper, delivery partner, rider Moped: Personal shopper, delivery partner, delivery driver Van: Driver, delivery driver
Takeaway meal deliveries	Bike: rider, delivery cyclist Moped: rider Car: driver

The following sections (**10.1-10.3**) provide insight into the operational characteristics of non-food, grocery and takeaway meal same-day deliveries. **Table 10.2** provides a summary comparison of the operational features of the various sectors of same-day delivery.

10.1 Non-food: parcels (B2B and B2C) and medical deliveries

10.1.1 Collection and delivery activities and job allocation to couriers

The main differentiation in non-food same-day service level is whether collection is instantaneous (say within 15 minutes) or at an unspecified time. Few parcel carriers offer guaranteed delivery times for same-day services. Whereas, In US cities, time-guaranteed same-day parcel delivery services are more common (Kidder, 2009). Time guarantees are more common for time-critical healthcare items.

Same-day parcel deliveries (B2B and B2C) take place using a range of vehicle types: bicycles, motorbikes, electrically-assisted cargo bikes, cars and vans. These deliveries are typically made during the working day (between about 09:00 and 19:00) on Monday to Friday. The rise of B2C same-day deliveries is likely to increase the extent of weekend activity. Bicycles are usually limited to central and inner urban areas, whereas the other vehicle types can cover a larger geographical area given their speed advantages on faster roads. Bike and cargo bikes have speed advantages over motorbikes and vans in central and inner urban locations that suffer from traffic congestion.

While parcel B2B and B2C deliveries could take place between virtually any two locations, medical work will usually involve movements between hospitals, surgeries and laboratories.

Same-day parcel couriers usually work all day (i.e. 10-12 hours per day) and most work five days per week – but there is scope to work fewer than five days per week. Most have self-employed or dependent worker status, with few employees in the sector. A 2007 study found that, on average, couriers in London worked for 9 hours per day (Synovate, 2007). The number of same-day deliveries made by a courier depends on several factors including: (i) the distance between each collection and delivery, (ii) the extent to which the courier is allocated overlapping jobs that allow them to carry more than a single delivery at a time, (iii) the level of demand from customers, (iv) the number of couriers being used at any one time by the carrier, and (v) and the controller's relationship with, and views on the efficiency of, the courier.

A cyclist typically achieves 15-35 urban delivery jobs and covers 50-100 miles per working day in London (Employment Tribunal, 2017a; Employment Tribunal, 2017c; Pender, 2007; Sparkes, 2009; Day, 2015b; Wood, 2016; Morgan, 2011; Butler and Osborne, 2017). For couriers using other vehicle types, journey speeds in busy urban areas are likely to be slower and hence fewer delivery jobs per day. However, vans and cargo bikes offer larger and heavier carrying capacities so are better suited to transporting multiple items and several deliveries at once (whereas cyclists are limited to only carrying multiple items in the case of documents and very small packages). Vans, motorbikes and cars are best suited to deliveries that involve long-distance journeys with a collection or delivery location remote from the urban area, given their speed. A 2007 study of companies operating in London showed an average mileage of 120 miles per courier shift for motorcycle couriers, with an average shift duration of 9 hours (Synovate, 2007).

The majority of same-day non-food carriers are relatively small organisations that operate on a regional or local/city basis. Employee numbers are usually low (including management, administrative staff and controller). But the number of couriers – who are typically not employed – are usually far greater than the number of employed staff (Gruber et al., 2014; Maes and Vanelislander, 2012; Synovate, 2007; Transport for London, 2007).

As previously discussed (see **section 7**), couriers are usually self-employed and paid on a per job (i.e. delivery) basis that takes account of distance travelled. Cycle couriers in London typically earn between £2-10 per job (with an average of £3.25-3.50 per job), whereas motorbike and van drivers earn a higher rate to reflect fuel and vehicle costs. Couriers (and

their carrier companies) usually also receive waiting time payments if collections or deliveries are delayed by more than the period of time specified in the contract (Employment Tribunal, 2017a; Employment Tribunal, 2017c; Day, 2015b; Wood, 2016).

Accounts by couriers indicate that the amount of money they earn per week in London has fallen over time. One cycle courier who reported earning £400-500 per week in 2011, said that he earned £1000 ten years earlier (Sparkes, 2009). However, in 2015 another cycle courier reported that on a good day he could earn approximately £100 (i.e. £500 per week) (Day, 2015b).

The carrier company typically acts as a broker, taking orders from customers, dealing with charging and billing of customers, and taking responsibility for the goods transported. These companies enter into contractual agreements with either ad-hoc or regular customers to collect and deliver goods. The prices charged are based on the distance over which the goods will be conveyed, the type of vehicle required, the size and weight of the goods, and the speed of collection/delivery requested. Other factors that can be included in pricing include waiting time (to make collections or deliveries), out-of-hours work, and unusual or especially large/heavy goods. Customer bookings are made by phone and online – but phone remains the dominant means of placing orders. The courier company passes the actual collection and delivery work to couriers who are typically self-employed.

Fleet controllers employed by these courier companies then allocate these collection and delivery jobs to couriers. Couriers either roam the city performing jobs or waiting for their next job to be allocated to them by a controller. A controller may be responsible for as many as 50 couriers. Controllers are therefore in regular contact with their couriers. Until the 1980s cycle couriers typically used telephone boxes on the street to call their controllers to receive new job allocations. The communication technology subsequently progressed two-way radios, pagers, and eventually mobile phones (see **section 12** for further discussion of technology).

The controller has to retain a mental map of where each courier currently is, the job/s they are working on and their direction of travel to decide who best to allocate each job to. The controller also has to allocate these jobs in such a manner that each courier is able to earn a worthwhile income and/or has an equitable workload. In order to earn a sufficient income, couriers are preferably dealing with more than one order at a time, so are earning income from multiple customers at the same time as they travel around the city. Ideally, an experienced courier may be carrying approximately 4-6 orders at any given time, which is often referred to as a 'run' (Fincham, 2006a). However, many jobs involve a single point-to-point journey of a single item. The greater the number of couriers overseen by a controller, the more organised and skilful the controller needs to be in visualising, planning and distributing the jobs between couriers as they arise. The controller will typically seek to allocate couriers to particular locations as much as possible (Fincham, 2006a).

At smaller courier companies, the same person may take orders from customers and then allocate these to couriers, whereas in large companies such as CitySprint there will be a separate team of order takers and fleet controllers. The controller requires a detailed knowledge of the street layout, vehicle routeings, location of buildings and the entry points for couriers; therefore invariably controllers are former couriers.

Jobs are allocated to couriers by office-based controllers on a real-time basis. This can result in some waiting between jobs for couriers. The frequency and duration of waiting times for the next job to be allocated vary. These typically range from about 10-60 minutes – longer gaps often occur around the middle of the day when customers are taking lunch-breaks). The courier is expected to remain wherever they are, on standby for their next job from the controller (Employment Tribunal, 2017a).

Once a courier has been allocated a job by a controller, they are responsible for collecting the item from the customer, transporting it to its destination as quickly as possible (along with the other goods they are carrying for other customers), finding the building the item is destined for, delivering the item to its intended recipient, and obtaining a Proof of Delivery (PoD) (typically a signature) to prove delivery was successfully made and the associated time and date at which this took place (in case of subsequent disputes with customers). If the courier has any queries about a job they are working on – such as they can't find the building, can't gain access to it etc. they will contact the controller for advice. Experienced couriers will rarely contact controllers for such assistance, but less experienced couriers will make greater use of a controller's knowledge.

Being a controller or courier is a pressurised job. For controllers this stems from having to retain and compute vast quantities of information and make rapid decisions as new work arises. For couriers the pressure is based on having to quickly decide on the best routes to take for their jobs and then make rapid journeys across often congested urban environments, taking into account all the hazards and traffic risks that exist. Bicycle and motorcycle couriers are likely to suffer serious physical injury if a collision takes place in the course of their work. Couriers driving vans are less liable to serious physical if involved in a collision, but have the added complexity of finding a permissible parking space – and are usually personally liable for any fines that arise from illegal parking.

Couriers typically provide their own vehicles, with the exception of cargo cycles (and some vans) which are leased to couriers by carrier companies. Although it has been little studied, what evidence does exist suggests that urban bicycle couriers suffer a very high rate of occupational injury (Dennerlein and Meeker, 2002). The same may also be true of cargo cycle and motorbike couriers. In his memoirs of motorcycle couriering in London for a decade from the late 1970s, Chris Scott recounts numerous collisions he was involved in and which he witnessed involved other motorcycle couriers (Scott, 2016).

Cycle and motorcycle couriering can provide paid work to those seeking part-time and irregular working structures (and there is usually a degree of flexibility about when the courier chooses to work), and those who choose to have several part-time jobs at one time. It also attracts its fair share of idealists and middle-class bohemians who are attracted by the supposed freedom and excitement that the work offers – in terms of both choosing working hours, the adrenaline release of the job and its inherent risks, and the independence involved in spending most of the working day alone and making one's own decisions about routes to take, how to behave without a formal line-manager overseeing and rebuking couriers, and how much time to take off between jobs (Kidder, 2009). It also offers the opportunity to socialise between jobs with other couriers in much the same way that some taxi drivers engage in.

The turnover of couriers (i.e. those leaving a company or the entire industry) is very high. This is due to the complexity, pressure and risks associated with the work, combined with its relatively low income rates. One New York courier company reported that half of new, inexperienced couriers leave within two months (Kidder, 2009). In addition, few bicycle and motorbike couriers remain in the industry for more than 5-10 years due to its hazards.

The gender profile of couriers and controllers is extremely male-dominated (as is the entire freight industry), with few women employees. In US cities women comprise only 5-20 percent of cycle couriers (Kidder, 2009). In a study in the UK involving 154 cycle couriers, only one in six cycle couriers in Cardiff was a woman, and in London one in four (Fincham, 2007). As a result of this gender imbalance, coupled with the pressurised and dangerous nature of the work, the behaviour of some of those working in the industry is extremely macho, and testosterone fuelled (Kidder, 2009).

This UK study found that over a third of the couriers surveyed were educated to degree level or above, their average age was 28, and cycle couriership was not considered by any of the respondents as 'a job for life', with the average working life of a cycle courier being approximately three years. However, even among many former cycle couriers, they continue to identify positively and strongly with the courier identity (Fincham, 2007, 2008). Another study of carriers operating in London in 2007 found that for nearly three quarters of responding companies, the majority of riders they deploy were aged between 26 and 35 (Synovate, 2007).

Factors determining the existence and size of the same-day courier market within any given urban area include population, the density of people and businesses, the prevalent economic sectors, and the prevailing traffic conditions. The number of carrier companies providing services in a city, is related to city size and demand levels. For instance, in 2004, Cardiff, a city of 300,000 inhabitants that covers an area of 54 square miles, had only one cycle courier operator, which provided work to 5 cycle couriers. These couriers covered greater daily mileages than cycle couriers in many other urban areas due to the relatively low density of businesses in the city and the number of commercial customers in suburban locations. By contrast, at the same time in London a city ten times as large as Cardiff, had multiple cycle courier companies. However these only served central London with many working exclusively in the 'City' or 'Square Mile', which although geographically small, supported approximately 300,000 employees, with no couriers operating in the suburbs. It is estimated that at this time, London supported 600-1000 cycle couriers (International Federation of Bicycle Messenger Associations, 2004). In 2007 there were estimated to be 6100 non-food motorbike/moped couriers and 585 non-food courier cyclists in London (Synovate, 2007). Cycle couriers in London had far lower daily mileages than those in Cardiff (Fincham, 2007). New York was estimated to support approximately 2000 cycle couriers in 2003, while seven other US cities supported between 100-400 cycle couriers - San Francisco (375), Washington, DC (350), Chicago (300), Philadelphia (200), Boston (150), Seattle (125), and Los Angeles (100) (Kidder, 2004). It has been estimated that Germany as a whole supports approximately 5,000 cycle couriers and 20,000 van couriers (Gruber et al., 2014).

10.1.2 Logistics considerations in B2C same-day deliveries

Retailers' existing fulfilment processes are usually designed for next-day rather than same-day delivery. To fulfil an order, the retailer need to carry out several processes, each of which takes time. These include: picking the item, packing it, despatching it, transporting it and delivering it. Given that online retailers often hold their stock at distribution centre located outside the urban area, these facilities are often situated too far from most customers' chosen delivery location in an urban area to facilitate on-time and cost-effective same-day delivery. Retailers with bricks-and-mortar shops in urban areas are better suited to same-day delivery as they can pick orders at these retail locations for delivery to customers on a same-day basis. However, for instant same-day deliveries, in which deliveries are made within one or two hours from the time at which the order is placed, this is only possible for retailers with a sufficient network of local depots or shops at which stock is held and from which local deliveries can be made.

Offering same-day and faster deliveries represents a major challenge for retailers seeking to both in terms of the operational efficiency required and the logistics infrastructure needed, and hence the costs per order handled. Retailers therefore need to decide the speed of delivery it is possible for them to offer to their customers. This decision involves balancing costs and service levels offered, as the faster the service level the higher the costs. But in striving to retain turnover and market force, many retailers are contemplating or have already begun offering same-day and faster deliveries. This can have significant implications for costs and profitability.

However, to provide same-day delivery requires retailers to address many complicated fulfilment issues which include IT systems, replenishment strategies, inventory management strategies, picking and packing systems, and transportation systems. They also need to decide whether it is best to invest in and perform fulfilment in-house or to outsource fulfilment services to a third-party specialist.

A key consideration for retailers offering same-day delivery is the cut-off order time it is possible to offer. This will depend on the speed at which processes can be carried out and the location from which products are despatched. This will vary between retailers. Designing the operations required at a distribution centre, local depot or shop with a same-day or even two-hour order-to-delivery response time, are very different to one providing next-day deliveries. There is a trade-off here, as later ordering cut-off times generate greater number of orders, but come at the price of needing faster and more expensive fulfilment services, and distributions centres that are located closer to market.

Simply trying to speed up each individual activity in the fulfilment process can result in sub-optimisation within the entire fulfilment process. For instance, a retailer may place fast-moving products in a high-velocity picking location in their distribution centre, but if a high proportion of orders include a fast-moving item having these products in a dedicated location can lead to inefficiencies and delays in manual picking systems. Therefore holistic system solutions are required to achieve faster order-to-delivery fulfilment times. In addition, a high degree of automation is also likely to be necessary within the distribution centre in sortation, packing, labelling and quality control (Fortna, not dated).

The faster the order-to-delivery response time offered by the retailer, the less the opportunity for consolidating despatched items together on transport vehicles, which in turn increases transport costs per item handled. However, the slower the fulfilment process in the distribution centre or shop, the less time that it leaves for transportation and delivery.

Land values have been rising rapidly in UK cities in recent years, as the demand for housing and office space increases. The freight transport and logistics industry has relatively low profit margins which has resulted in difficulties for parcel carriers and other logistics service providers to obtain affordable distribution centres and depots in urban areas. This is leading to parcel carriers relocating their local delivery depots ever further from the urban centre (Cidell, 2010; Hesse, 2008; Dablanc and Rakotonarivo, 2010). Often referred to as 'logistics sprawl' (Dablanc et al., 2014), this has the effect of increasing delivery distance, and the operating costs of central urban parcel collections and deliveries.

Logistics sprawl makes the achievement of large-scale B2C same-day delivery even more challenging as longer journey distances typically increase journey time. Reductions in road capacity provision for private motorised vehicles as the space allocated to bus and cycle lanes is leading to worsening road traffic conditions for goods vehicles and increasing journey time unreliability. As well as adding to delivery costs, these factors also lead to greater difficulties in meeting same-day delivery time windows, especially when order-to-delivery times of several hours or less have been offered by retailers.

The fulfilment of same-day (and next-day) orders by online retailers is having important consequences for the demand for physical stockholding and warehousing requirements in the supply chain. Whereas warehouse portfolios had vacancy rates of 20-30% in 2008, these portfolios are now at record levels. Online retailers will pay a premium for relatively small, well-located and well-equipped sites that allow them to gain an advantage over their competitors' fulfilment times, particularly in terms of sites located in or near urban conurbations from which they can make deliveries to consumers. Whereas such prime smaller warehousing facilities in areas such as Enfield in north London were achieving prices of £8.50 per square foot four

years ago, these sites are now achieving prices of £11 per square foot now (Addleshaw Goddard, 2017).

It has been recognised that there is not currently sufficient availability in UK cities for the urban distribution centres logistics required for last-mile fulfilment (Williams, 2018). Research by Prologis and Aberdeen Asset Management has shown that three times as much warehousing space is required for online fulfilment compared with retail store-based fulfilment. In addition, this research also indicates that for every €1bn spent online, an additional 775,000 square feet of warehousing space is required. According to estimates by Colliers, in order to meet the needs of an expanding online shopping and ecommerce market, the UK and Ireland market will require 18 million square feet of logistics space to be built annually (which far exceeds current projections by Savills of what is being built over the next 12 months which is approximately 3.5 million square feet) (Addleshaw Goddard, 2017).

There is therefore a need for far greater quantities of suitable, viable land to be developed for these online shopping and ecommerce requirements. Obtaining suitable land in urban areas for an ever-increasing number of 'fulfilment centres' to serve the growing online shopping market and its same-day delivery offer is likely to become of great importance to the successful expansion of this sector and the maintenance of reliable and ever-faster home deliveries, as offered by online retailers and demanded by their customers. However, locating and acquiring suitable land for such purposes is likely to become increasingly difficult due to the high level of demand for suitably priced land and its resultant high and ever-increasing price. For instance, Network Rail is currently seeking to sell the majority of its commercial property portfolio (5,500 of its 7,500 properties with an estimated value of £1.5 billion). The sale includes all of its 4400 railway arches, more than half of which are located in London (Network Rail, 2018; Bourke, 2018). Traditionally, railway arches have been suitable, low-cost premises for warehousing, logistics and other industrial activities with low profit margins. However tenants of these arches have complained about substantial rent rises under Network Rail and are concerned about continuing rent increases under new ownership (Bourke, 2018; Kollwe, 2018).

Amazon is one of the few online retailers with sufficient financial resources to acquire a network of urban fulfilment centres from which it can perform B2C deliveries on a same-day basis to the majority of the British population (Williams, 2018). It has recently been reported that Amazon is keen to purchase Homebase stores in urban areas to use as delivery fulfilment centres, which would help it to expand its one-hour delivery service (Curry and Woods, 2018). Most of Amazon's warehousing capacity, which grew by 4 million square feet in 2017, is located in out-of-town locations, but it requires urban fulfilment centres for rapid delivery services in dense, busy, highly populated, built-up areas (Szajna-Hopgood, 2018). Forty-two of Homebase 241 stores have been earmarked for closure as part as its compulsory voluntary arrangement (CVA). Several of these are in London including Merton, New Southgate and Wimbledon (Clark, 2018).

Amazon has also put in place a locker bank infrastructure to which same-day deliveries can be made for customer collection. Other retailers can make use of other locker banks networks as well collection points in convenience stores (such as those operated by Collectplus, Pass My Parcel, Doodle, and Parcelly) to deliver same-day deliveries in the urban area, and thereby remove the need to make these same-day deliveries directly to the customer (as the customer can then pick-up their deliveries at a time that suits them. Using locker banks and collection points can help reduce failed deliveries to residential addresses but has additional cost implications for consumers (Allen et al., 2017).

10.2 Grocery deliveries

Same-day grocery deliveries can be divided into two varieties: (i) those that are fulfilled later in the day on the same day that the customer places the order and (ii) those that are delivered as soon as possible after the order is placed, ideally within one to two hours of order placement. The first category accounts for a greater proportion of same-day grocery deliveries than the latter and generally permits a wider customer catchment area.

Store-based same-day grocery retailers also offer Click & Collect services to their consumers in which they consumer collects their ready-picked groceries from their local store (obviously online-only retailers cannot offer this service).

Grocery home deliveries take place over a longer period of the day than most non-food parcel deliveries. Typically delivery slots are offered to consumers commence from 06:00-07:00 and continue until 22:00-23:00. In addition, unlike many non-food parcel deliveries, grocery home deliveries are operated seven days per week.

10.2.1 Orders fulfilled in a time-slot later in the day on the same day that the customer places the order

These deliveries have the following typical attributes:

- they are usually made in vans (i.e. goods vehicles with gross weights of up to 3.5 tonnes), often refrigerated, that are despatched with deliveries for multiple customers
- they take placed in pre-booked time slots selected by consumers (thereby avoiding the first time delivery failure rates associated with non-food parcel deliveries)
- they are associated with far lower product return rates than many categories of non-food orders (thereby making the reverse logistics less important and complicated)
- they can be despatched from either local stores or fulfilment centres to customers' addresses.
- they are not limited in terms of the maximum number of items that can be ordered, and a full product range is offered
- they can involve large quantities of goods and therefore can require the driver to make several trips between the vehicle and the consumer's home.
- they can involve the driver taking the goods into the consumer's home.

Same-day grocery delivery operations major grocery retailers typically involve multi-drop van operations that either start from a supermarket or a fulfilment centre. The van will typically carry several deliveries at the same time that will be delivered according to time slots booked by customers. Grocery delivery drivers (same-day and next-day) working more store based grocery companies (such as Tesco, Sainsburys, and Asda) are typically employees and are provided with vans by the company. In these employment situations, if there is insufficient delivery work for drivers they are expected to assist in the store or fulfilment centre as part of their shift. The vans are used continuously from morning to night for deliveries.

This work involves more heavy lifting than other same-day delivery sectors given the size and weight of orders, both in terms of loading the van and then making deliveries to customers' homes. Drivers typically work part-time or full-time shifts (of anything from 4-5 hours up to 8-

10 hours). The working day commences from 07:00 and continued until 00:00. Drivers often find their start and end times vary from day-to-day and week-to-week which can take time to get used to. The working hours are therefore usually more unpredictable than for parcel couriers/ In addition, grocery drivers are usually expected to work at weekends as this is when demand is greatest.

Van drivers are issued with their multi-drop workloads by an automated allocation system that makes use of assumptions concerning vehicle speed and time taken to make a delivery at the delivery point. Vehicles are usually equipped with navigation equipment. The rate at which deliveries are made by drivers is highly dependent on: (i) the stem mileage from the store/fulfilment centre to the delivery points, (ii) the inter-drop distance between deliveries, and (iii) road traffic conditions. Once a vehicle has arrived in its delivery area from the store/centre, 3-4 deliveries per hour would typically be achieved assuming inter-drop addresses are closely grouped together. Vans used typically have approximately a one-tonne payload and can carry up to a maximum of about 30 grocery orders.

10.2.2 Orders fulfilled immediately upon order placement (usually with 1-2 hours)

These deliveries have the following typical attributes:

- they are usually made on bicycles or mopeds and each journey typically involves the delivery of a single customer's order
- the courier usually travels to, or is based at, a retail shop where they carry out order-picking, payment (in the case of third-party providers), and then travel directly to the customer's address to make the delivery (and experience very low first time delivery failure rates as the customer is expecting the delivery)
- they are associated with far lower product return rates than many categories of non-food orders (thereby making the reverse logistics less important and complicated).
- they are usually limited in terms of the maximum number of items that can be ordered, and a full product range is not offered
- they involve the courier making a single trip between the vehicle and the consumer's home given the small number of lightweight items involved.
- they do not usually involve the courier taking the goods into the consumer's home; instead the goods are handed over at the door.

Sainsburys offers a same-day delivery service in which customers receive their orders within 60 minutes. This service is called "Chop Chop" and is available to customers in travel zones 1 and 2 in London (living within a 3 km radius of one of its stores). This service is aimed at customers requiring small order sizes quickly (up to 25 items from a specific product range). The company has found that baby products, weekend brunch ingredients, and evening meal items are among the most commonly ordered products. Goods are delivered by couriers on bicycle or moped within one hour if orders were placed during store opening hours (Sainsburys, 2017; 2018).

Efety, a start-up company providing grocery deliveries within 60 minutes of ordering (where traffic permits) at any time day or night makes deliveries from its warehouses using mopeds. The service is available in selected London postcodes. The company provides mopeds, insurance and all necessary equipment but the couriers are not employees, and are paid on an hourly basis (Efety, 2018).

Meanwhile, Home Run is a start-up grocery delivery business that allows customers to request purchases from a selection of four retailers (Waitrose, Whole Foods Market, Marks & Spencer and Tesco). A personal shopper then makes these purchases on behalf of the customer and delivers within as little as one hour where possible. Cars and mopeds are used to make these deliveries. At present the service is available in southwest and west London. Couriers provide their own vehicles and are paid on an hourly basis (Home Run, 2018b).

10.3 Takeaway meal deliveries

Meal delivery differs from parcel courier work in several respects: the duration of shifts worked are typically shorter, the age of those doing the work is usually lower, and there is little scope to carry more than one delivery at a time (this only usually happens in the case of two orders from the same restaurant at the same time with similar delivery addresses). Also, the allocation of jobs to couriers is far more automated than in the case of same-day parcel delivery and therefore far less dependent on relationships with controllers. Any monetary tips from customers can be retained by the courier, but in practice these are quite rare, and typically add no more than a few percent to the total earnings (Anon, 2017).

While parcel and medical work can involve waiting time at the collection and delivery point, meal delivery will typically only involve waiting at the restaurant rather than the delivery location.

Meal deliveries made by both restaurant staff and couriers contracted to work by the online platform providers (such as Deliveroo and Uber Eats) share several key operational features:

- these vehicles are despatched from the restaurant to the consumer's home with only one order typically carried by the deliverer; these are therefore point-to-point single drop delivery operations rather than the multi-drop vehicle operations associated with most grocery and some parcel same-day deliveries
- the journey distances from the restaurant to the consumer's home are usually relatively low (i.e. less than 2-3 miles) in order to achieve a rapid delivery response and keep down the costs of delivery (with restaurants placing maximum catchment distances on their delivery area),
- by the nature of the service and the demand for meals, these are same-day deliveries, usually taking place within 15-45 minutes of orders being placed
- given the nature of meal deliveries, couriers only rarely experience the problem of delivery failure (i.e. when the consumer is not at home to receive the delivery)
- similarly these deliveries are not associated with the problem of product returns that exist in non-food parcel delivery sector
- restaurants, takeaways and platform providers have to decide whether or not to charge an explicit price for these home delivery services (some do, some offer free delivery over a certain order value and some offer free delivery)
- many takeaways, restaurants, and platform providers only offer home delivery on orders over a certain minimum spend

One bicycle meal delivery courier reports that in a five-hour shift that they will typically travel about 25-35 miles and make 8-12 deliveries, and earn about £40-£45 (Cycling Plus and

Ainsley, 2016). Another reports a typical delivery rate of 3 per hour, while a third typically achieves 2-3 deliveries per hour (Khaleeli, 2016, Anon, 2017). A financial analyst involved in the meal delivery sector reports that even on a busy Saturday night it is difficult for a courier/deliverer to receive more than two deliveries per hour (Fedor, 2016), while another industry insider reports that a maximum of 3-4 deliveries per hour is possible (Martin, 2016). A typical delivery shift involves travel distances of up to 3 miles per delivery from restaurant to customer, and 2-3 deliveries per hour, with earnings of £4-5 per delivery. Average distance lengths of meal deliveries are shorter than parcel/medical deliveries given that the meal provider is usually aiming for a time duration of little more than 30 minutes from order to delivery. A 2007 study of meal delivery riders using moped and motorbikes found that, on average, they travelled 23 miles per shift (with a average shift duration of 5 hours) (Synovate, 2007).

As with parcel delivery, the rate of deliveries per hour will depend on the distance between restaurant and delivery point, the level of demand from customers, and the number of couriers being used at any one time by the carrier. The majority of restaurant couriers are self-employed but some companies offer employment such as certain pizza delivery companies.

Many of Deliveroo's cyclist deliverers/couriers carry out a three-hour shift at lunchtime and another three-hour shift in the evening, because those are the busiest times for the company. Most food delivered by Deliveroo is from restaurants and takeaways, but also includes street vans. Orders sizes can vary considerably (Fedor, 2016; Khaleeli, 2016). Deliveroo typically makes its deliveries to consumers within approximately 30 minutes of the order being placed (32 minutes is quoted on the Deliveroo website (Deliveroo, 2017).

There are peaks in demand for a couple of hours at lunchtime and for several hours in the evening on weekdays. Demand tends to build from lunchtime onwards at weekends (Anon, 2017). Orders spike on weekends. A customer survey across 16 countries showed that 74% of all orders are placed on online platforms on Friday-Sunday (Hirschberg et al., 2016).

This same survey across 16 countries showed that 60% of respondents cite speed of delivery as the most important factor in their customer satisfaction. The optimal customer waiting time from order to receiving their meal is no more than 60 minutes. Approximately 80% of deliveries are placed from and made to customer's home, with workplace only accounting for 16% of orders (Hirschberg et al., 2016).

Bicycles and mopeds are the most commonly used vehicle types, with some motorbikes, and a small proportion of car use. Vehicles are typically provided by the courier, but some pizza chains provide mopeds. Meal couriers are provided with an app-based navigation system to assist them in travelling between restaurant and customer.

Although meal delivery services often commence in the morning or at lunchtime and continue throughout the day (for instance Deliveroo offers its services from 12:00 to 23:00 daily; by comparison Uber Eats is available from 07:00 to midnight daily – Deliveroo, 2017; Uber Eats, 2017), the greatest periods of meal delivery activity takes place during lunchtime and the evening. Weekend delivery activity is usually greater than that on weekdays. For independent takeaways and restaurants operating their own ordering and delivery systems, the meal delivery can take longer than for other competitors, as the deliverer/driver is sometimes responsible for collecting payment on delivery. However, In August 2018 it was announced that both Deliveroo and Uber Eats would be providing a 24-hour seven day per week service in London in the near future (Edmonds, 2018). **Table 5.2** shows the delivery charges and delivery time guarantees (if any) of the main online meal platform providers.

Meal delivery couriers working for platform providers are typically self-employed with no sick pay or holiday pay, responsible for their own vehicle insurance, but with seemingly little

flexibility concerning swapping shifts with colleagues and generally working the same shifts each week, which are booked in advance (Khaleeli, 2016). Some of those working directly for individual restaurants and restaurant chains are employees (See **section 8** for further discussion of working conditions and rights).

A study of companies deploying meal couriers in London in 2007 found that for nearly three quarters of responding companies, the majority of riders they deployed were aged between 21 and 30. On average riders were deployed for shifts of approximately 4-6 hours (which corresponded to the peak evening delivery hours (Synovate, 2007).

Table 10.1 compares the similarities and differences in markets, operating patterns and vehicle activities in the various same-day delivery sectors.

Table 10.1: Market, service arrangements and operations in same-day delivery systems by sector and provider

Sector	Non-food			Grocery retail	Takeaways and home-delivered meals
Products delivered	B2B parcels and packages	B2B other (healthcare/medical, field technicians)	B2C parcels and packages	Grocery shopping	Ready to eat hot meals
Estimated expenditure on same-day deliveries*	£1-3 billion	£200-500 million	£10-20 million	£10-20 million	£350 million
Estimated number of orders delivered in UK per year*	100 million	N/A	0.5 million	1-3 million	180 million
Direction of market	Low growth-stable	Medium growth	Forecast to grow rapidly	Growing at 15% per annum	Growing at 10-15% per annum
Markets served	B2B	B2B	B2C	Predominantly B2C	Predominantly B2C
Geographical areas currently served	National	National	Depends on retailer – but excludes rural areas and islands	Coverage depends on retailer – Tesco serves 90% of postcodes; many other retailers far more limited	Limited to selected urban areas
Explicit same-day delivery charge?	Yes	Varies – but often not	Yes	Yes (sometimes requires minimum order size)	Varies (sometimes requires minimum order size)
Membership available for free same-day delivery?	No	No	Some retailers	Some retailers	Some retailers
Change in pricing model in last 12 months?	No	No	No	Minimum order size for free delivery increased. Membership fees.	Some retailers using membership fees
Are costs of delivery service currently fully covered by price charged?	Yes	Yes	Unlikely (the retailer may subsidise the cost rather than the carrier)	Unlikely	Uncertain

Table 10.1: Market, service arrangements and operations in same-day delivery systems by sector and provider (cont.)

Sector	Non-food			Grocery retail	Takeaways and home-delivered meals
Products delivered	B2B parcels and packages	B2B other (healthcare/medical, field technicians)	B2C parcels and packages	Grocery shopping	Ready to eat hot meals
Receivers to which deliveries are made	Businesses	Businesses	Residential and businesses	Predominantly residential	Mostly residential but also businesses
Organisation selling service to customers	Third-party carrier / on-demand start-up provider	Third-party carrier	Online retailer	Mostly online grocery retailers (one case of carrier)	Platform provider on behalf of restaurant / restaurant directly
Organisation carrying out delivery operations	Mostly couriers who are self-employed / dependent workers	Mostly couriers who are self-employed / dependent workers	Mostly couriers who are self-employed / dependent workers for third party carrier / on-demand start-up provider	Mostly drivers employed by grocery retailer (plus some cases of self-employed couriers for grocer/carrier)	Self-employed couriers working for platform provider / restaurant (some cases of courier employed by restaurant)
Job title of person making delivery	Courier / messenger	Courier / messenger / technician / fieldworker	Courier / messenger / delivery driver	Delivery driver / rider	Rider / driver
Typical employment status	Mostly self-employed (some dependent workers)	Mostly self-employed (some dependent workers)	Mostly self-employed (some dependent workers)	Mostly employees (some self-employed)	Mostly self-employed (some employees)
Daytime variation in product volumes	Most deliveries during working day on weekdays	Most activity during working day on weekdays	Deliveries made afternoon and evening inc. weekends	Deliveries made afternoon and evening inc. weekends	Most demand at evenings & weekends
Seasonality in product volumes	Moderate – reduces during holidays	Moderate – reduces during holidays	High – Christmas peak	Moderate – Christmas peak	Moderate – peak during holidays
Busiest time of delivery operations	Daytime	Daytime	Evenings	Evenings and Fri - Sun	Evenings and weekends
Deliveries out of hours (before 07:00 or after 18:00)	Limited off-peak services	Limited off-peak services (except medical)	Yes	Yes, after 18:00	Yes, after 18:00
No. of delivery days per week	Usually five (limited on Sunday)	Usually five or six (limited on Sunday) (except medical)	Usually seven	Seven	Seven
Weekend work	Some, but limited	Some, but limited	Yes	Yes	Yes

Table 10.1: Market, service arrangements and operations in same-day delivery systems by sector and provider (cont.)

Sector	Non-food			Grocery retail	Takeaways and home-delivered meals
Products delivered	B2B parcels and packages	B2B other (healthcare/medical, field technicians)	B2C parcels and packages	Grocery shopping	Ready to eat hot meals
Locations from which delivery vehicles are despatched	Point-to-point: driver does not return to depot between each delivery and collection	Logistics depots or point-to-point	Logistics depots or shops	Shops (supermarkets) and fulfilment centres	Shops (restaurants and takeaways)
Same-day service coverage	Nationwide	Nationwide	Often only available to customers in major urban areas of UK, and in some cases only London	Some major grocers with stores nationwide offer services to all but the most remote locations. Other providers and services offering one-hour response times: only currently available in selected parts of inner/central London	Often only available to customers in major urban areas of UK (as selected by provider)
Price of service	Prices considerably more expensive than standard next-day or economy parcel services. Based on journey distance, so can be very expensive for long journeys.	Prices considerably more expensive than standard next-day or economy services. Based on journey distance, so can be very expensive for long journeys.	End customers often not charged full costs of operation in retailers/carriers efforts to win business (delivery price charged rarely over £10). But costs considerably higher than standard next-day or slower services.	Ranges from free to approx. £10 depending on provider and service offer. End customers often not charged full costs of operation in retailers efforts to win business	Only same-day service available for takeaway meals so no valid comparisons within sector. Unclear if price charged covers cost of service.
How jobs are typically allocated	By human fleet controller	By human fleet controller	By human fleet controller	By computer allocation tool	Mostly by computer allocation tool
What happens when no deliveries available	Courier waits on-call at same location for next job	Couriers wait on-call at same location for next job	Couriers wait on-call at same location for next job	Employees help with store / fulfilment centre tasks	Courier waits on-call for next job

Table 10.1: Market, service arrangements and operations in same-day delivery systems by sector and provider (cont.)

Sector	Non-food			Grocery retail	Takeaways and home-delivered meals
Products delivered	B2B parcels and packages	B2B other (healthcare/medical, field technicians)	B2C parcels and packages	Grocery shopping	Ready to eat hot meals
Type of delivery operation	Point-to-point (some collections en route depending on urgency of delivery)	Point-to-point	Mix of point-to-point and multi-drop rounds	Multi-drop rounds for vans. Point to point for other operations using bikes and mopeds.	Point-to-point
More than one delivery carried at a time?	Only if there is sufficient work – but usually from different shipping locations.	Only if there is sufficient work – but usually from different shipping locations.	Multi-drop from shop/depot: yes. Otherwise only if there is sufficient work – but from different shipping locations.	Vans operations: yes. Bike/moped operations: no.	Rarely.
Typical lead-time from order to delivery (i.e. responsiveness of delivery)	Same-day (as soon as possible for urgent items)	Same-day (as soon as possible for urgent items)	Same-day day (some within 1-2 hours)	Same-day (some within 1-2 hours)	Usually within 15-60 minutes
Bookable delivery times available?	Depending on urgency	Depending on urgency	Often not. But some carriers allow consumer selection of delivery day or time (often for an additional charge). And some carriers send message to consumer either one hour or the day before delivery	Yes, 1- or 2-hour delivery slots	No, but usually within 15-60 mins of order
Type of vehicle/s commonly used for home delivery	Bicycles, mopeds, motorbikes, cars, vans	Mostly vans (some bikes, motorbikes and cars)	Mostly vans (some motorbikes, bikes and cars)	Mostly vans (with some mopeds and bicycles depending on operation)	Bicycles, mopeds and some cars
Who usually provides vehicle?	Courier	Courier	Courier	Grocery retailer	Courier (some large pizza chains provide mopeds)
Number of people in vehicle	One	One	One	One	One

Table 10.1: Market, service arrangements and operations in same-day delivery systems by sector and provider (cont.)

Sector	Non-food			Grocery retail	Takeaways and home-delivered meals
Products delivered	B2B parcels and packages	B2B other (healthcare/medical, field technicians)	B2C parcels and packages	Grocery shopping	Ready to eat hot meals
Where vehicles are stored	Logistics depots and residential addresses (on- and off-street)	Logistics depots and residential addresses (on- and off-street)	Logistics depots and residential addresses (on- and off-street)	Shop car parks and fulfilment centres	Shop car parks and residential addresses (on- and off-street)
Typical number of orders delivered per vehicle round	1-3	1	1-6	10-15	1
Average size of delivery	Often one package / parcel	Often one parcel / package	Often one package / parcel	Several bags full if standard same-day service Bag if from instant same-day service	Single bag/box
Typical time taken per delivery (i.e. unloading time at delivery point)	Approx. 2 minutes (except in multi-storey buildings or busy areas with little parking)	Approx. 2 minutes (except in multi-storey buildings or busy areas with little parking)	Approx. 2 minutes (except in multi-storey buildings or busy areas with little parking)	Less than 10 minutes (2 mins if instant same-day service)	Approx. 2 minutes (except in multi-storey buildings)
Typical time taken per collection (i.e. waiting/loading time)	Approx. 5 minutes but sometimes longer when shipper not ready	Approx. 5 minutes but sometimes longer when shipper not ready	Approx. 5 minutes but sometimes longer when shipper not ready	All deliveries loaded at store/depot (but picking time is considerable: 10 mins plus per order)	2-15 minutes depending on readiness of meal at restaurant
Are collections also made on delivery rounds?	Quite often – depending on urgency of delivery	No	No, not usually	No (with exception of carrier bag recycling)	No
Incidence of first-time delivery failure	Very low	Very low	Very low	Very low	Very low
Product return rates	Very low	Very low	High	Low	Very low
Is Click & Collect at store possible (for items purchased from physical retailers)?	N/A	N/A	Yes, by some retailers	Yes, by some retailers	Usually only if ordered direct from restaurant

Table 10.1: Market, service arrangements and operations in same-day delivery systems by sector and provider (cont.)

Sector	Non-food			Grocery retail	Takeaways and home-delivered meals
Products delivered	B2B parcels and packages	B2B other (healthcare/medical, field technicians)	B2C parcels and packages	Grocery shopping	Ready to eat hot meals
Are collection points and/or locker banks ever used?	Not usually	Yes, sometimes for delivering parts to engineers	Yes, by some retailers	Rarely	No
Change in delivery speed and service over last two years	Unchanged	Unchanged	Longer delivery day	Longer delivery day. Click & Collect service improvements	Longer delivery day

Notes:

* - see sections 2-6 and Table 6.1 for further details of the estimated expenditure on and order volumes for same-day delivery services in each sector.

Source: based on the authors' own judgement using available information.

11. Vehicle Types Used in Same-Day Deliveries

In the previous section the various types of vehicles used in different sectors of the same-day delivery market were referred to. These vehicles include vans, motorbikes, mopeds, bicycles, cargo bikes, and cars. Rigid goods vehicles over 3.5 tonnes are also used in a small number of retail B2C operations involving larger, heavier goods. Many of these vehicle types are used in various same-day delivery sub-sectors. Vehicle choice depends on several factors including:

- Geographical area in which goods are being transported (bicycles, motorbikes/mopeds and cargo bikes have faster speeds are faster than vans and cars in congested central and inner urban areas)
- The topography of the area to be served (bicycles and cargo bikes are more difficult to operate in hilly urban areas)
- The distance over which goods have to be transported (bikes and cargo bikes are not suited to long urban journeys that extend to the outer urban area, or outside the urban area altogether due to their lower speeds in such locations and the range limitations due to human-powered capabilities / battery life).
- The size/weight of the item/s to be transported (given the differing carrying capacities of various vehicle types)
- Existing traffic regulations in the area in which the items need to be transported (for instance urban transport regulations such as the Congestion Charging Zone, Toxicity charge and proposed Ultra-Low Emissions Zone in London can affect vehicle selection due to differential pricing by vehicle type – with bicycles and electric cargo cycles often exempt from charges)
- Who is responsible for providing the vehicle – when the courier is self-employed and responsible for providing the vehicle the carrier company has less control over vehicle selection

Table 11.1 shows the attributes of each vehicle type used for same-day delivery.

The vehicle types predominantly used in the different sectors of the same-day delivery market are as follows:

- Grocery shopping: Vans (temperature-controlled) for multi-drop operations. Mopeds and bicycles used for single load rapid response (within 60 minutes) deliveries by grocery retailers, and by at least one carrier providing a pick from shop and delivery service. One London based start-up retailer is using cars.
- B2B parcels and packages: Bicycles, cargo cycles, mopeds, motorbikes, cars, vans.
- B2C parcels and packages: Mostly vans (some motorbikes, cargo cycles, bikes and cars).
- Other non-food (e.g. healthcare, field technicians): Mostly vans (some bikes, motorbikes and cars).
- Takeaways and home-delivered meals: Mostly bicycles, mopeds and motorbikes, some cars.

Table 11.1: Attributes of the vehicle types used for same-day delivery

Vehicle type	Carrying capacity (m ³)	Carrying capacity (kg)	Type of products best suited to	Range limit – one-way distance per journey (miles)	Daily distance limits
Human on foot	Up to 2 m ³ (using wheeled bag)	15-25 kg	Documents & packages	0.5 miles	5-10 miles
Cycle with shoulder bag or insulated food box	Non-food using bag: 0.01-0.02 m ³ Meal delivery using box: 0.01 m ³	1-3 kg (with bag) 1-3 kg (with food box)	Flat artwork, envelope, small bags and packets and takeaway meals	2-5 miles	50-100 miles
Two-wheeled standard cycle with baskets fitted to front and rear	0.03-0.05 m ³	20-40 kg	As per cycle	2-5 miles	50-100 miles
Two-wheeled specialist cargo cycle (inc. with baskets fitted to front and rear)	0.2-0.8 m ³	50-125 kg	All non-food plus limited ambient groceries	2-5 miles	50-100 miles
Cycle with cargo trailer	0.2-2.1 m ³	50-150 kg	As per above	2-5 miles	50-100 miles
Three-wheeled cargo cycle	0.2-1.5 m ³	50-300 kg	As per above	2-5 miles	50-100 miles
Electric cargo cycle	0.25 m ³	Up to 250 kg	As per above	15-20 miles	50-100 miles
Moped	0.1 m ³	5-8 kg	Small non-food plus takeaway meals and limited ambient groceries	50 miles	100 miles in working day
Motorbike	0.1 m ³	5-8 kg	One A4 box, A3 flat items, a lever arch file or a standard laptop case	Unlimited with refuel	500 miles
Car	1-2 m ³	400-700 kg	All non-food	Unlimited with refuel	500 miles
Car-derived van	2-4 m ³	400-700 kg	All non-food	Unlimited with refuel	500 miles
Medium van	6 m ³	750 kg	All non-food plus groceries if temperature controlled	Unlimited with refuel	500 miles
Large van	5-10 m ³ plus	1000-1750 kg	All non-food plus groceries if temperature controlled	Unlimited with refuel	500 miles

Source: compiled by the authors from a review of a wide range of sources.

See **section 13** for further discussion of bicycle and cargo cycle use for urban freight transport together with case studies of such operations.

Table 11.2 shows typical average daytime speeds in central London by vehicle type, as well as maximum permissible speeds in urban areas and on major roads. This helps to reiterate the usefulness of bicycles, cargo bikes, mopeds and motorbikes but also why the first three are not suited to long journeys in outer urban locations and outside the urban area. There is a generally held view among same-day carriers that bicycles can outpace even motorcycles and mopeds in busy central urban areas over distances of up to a couple of miles (Ferrinho, 2018).

Table 11.2: Comparison of same-day vehicle speeds on different road types

	Typical day time speed in central London / other major urban area	Maximum speed permissible in urban area	Maximum speed permissible on non-urban major road
Manual bicycle / cargo cycle	10-15 mph	Technically unlimited	Technically unlimited but limited by human capability to approx.30-50 mph (and not allowed on motorways)*
Electrically-assisted cargo cycle	10-15 mph	15.5 mph	15.5 mph (and not allowed on motorways)**
Moped	10-15 mph	30 mph	31 mph (and not allowed on motorways)
Motorbike	10-15 mph	30 mph	70 mph
Car	8 mph	30 mph	70 mph
Van	8 mph	30 mph	70 mph

Notes: * In the UK vehicle speed limits only apply to motor vehicles. However, cyclists can be prosecuted for cycling too fast under the charge of 'riding furiously'. Cyclists can also be prosecuted for riding dangerously or carelessly (Kimpton, 2014).

** Under UK Electrically-Assisted Pedal Cycle (EAPC) regulations of 2015 the allowed motor power is up to 250 W, and the assisted speed is up to 15.5 mph.

EAPC cargo bikes can be used in the UK without a motor vehicle licence (TfL, 2017).

Sources: Transport for London, 2017; Transport for London, 2018a; Nocerino et al., 2016; various online cycling discussion groups.

Table 11.3 shows the typical purchase cost range for same-day delivery vehicles as well as their CO₂ emissions per vehicle km. The purchase cost has an important bearing on hire and leasing costs, but there are few such opportunities for bicycles and cargo bikes in comparison with other vehicle types. In addition, while there are sizeable second-hand markets for vans, motorbikes and mopeds. However, given the small number of cargo cycles in use, there is no effective second-hand market for them.

The largest components of cargo bike (electrically-assisted and manual) operating costs are tyres, brakes, chains and saddles. Cracked frames and loss of wheel spokes are also common among users. Total annual maintenance costs of an electrically assisted cargo cycle are reported to be approximately £120-160 per year. By comparison, these costs for a typical van are estimated to be up to £500 per year (TfL, 2017). In addition, vans also have higher purchase/leasing cost, higher fuel costs, insurance costs, vehicle excise duty, and road tax costs.

Some delivery companies are making use of electric vans and other alternative fuel sources. For instance, CitySprint has recently purchased its first hydrogen-powered van powered by a battery and hydrogen fuel cell and with a range of 200 miles to operate alongside its existing electric vans (CitySprint, 2018a). This is in addition to CitySprint's growing fleet of approximately 25 electrically-assisted cargo cycles with carrying capacities of 50-100 kg. The company has set itself the target of a 100% low emission delivery fleet in central London by 2019 to reduce its environmental impact as well as to meet the requirements of the forthcoming Ultra Low Emission Zone (CitySprint, 2018b). Deliveroo is trialling a scheme in north London to subsidise the costs of quieter, electric bikes for its couriers (Volpe, 2018).

Table 11.3: Comparison of purchase costs and CO₂ emissions of same-day delivery vehicles

Vehicle type	Approx. purchase cost (£)	CO ₂ per km at point of use
Manual bicycle	£100-£2,000	0 ^a
Cargo cycle	£2-2,500	0 ^a
Electrically-assisted cargo cycle	£2-4,500	0 ^a
Moped	£1-5,000	82 g / km ^b
Motorbike	£5-15,000	82-133 g / km ^c
Car	£10-15,000	118 g km ^d
Small van	£10-15,000	148 g / km ^e
Medium van	£15-20,000	233 g /km ^e
Large van	£15-25,000	274 g /km ^e

Notes:

a – although manual and electrically assisted cycles are shown as having zero CO₂ emissions, research has shown that there are CO₂ emissions associated with the extra food and drink consumption that a cyclist requires compared to a motorbike, car or van driver. These have been calculated to be approximately 16 g CO_{2e} / km for a cyclist and 6 g CO_{2e} for an electrically assisted bike user (European Cyclist's Federation, 2017). Also, research has shown that, like for other transport vehicles, there are CO₂ emissions associated with the manufacture and production of bicycles and cargo bikes. Although lower than for other, larger heavier vehicles this has been calculated to be approximately 5 g CO_{2e} / km for a bicycle or assisted cycle with a life of 8 years that travels 2400 km per year (compared to 42 g CO_{2e} / km for a car) (European Cyclist's Federation, 2017). While CO₂ free at the point of use, the electricity used by assisted cargo cycles is not necessarily generated from renewable sources.

b - CO₂ emissions from government reporting standards for companies based on small motorcycles new and old (DBEIS and DEFRA, 2017).

c – CO₂ emissions from government reporting standards for companies based on all motorcycles (small, medium and large) new and old (DBEIS and DEFRA, 2017).

d - fleet average for all new cars sold in the EU in 2016 (European Commission, 2018c).

e - CO₂ emissions from government reporting standards for companies based on all motorcycles (small, medium and large) new and old (DBEIS and DEFRA, 2017). CO₂ emissions data for new vans have lower values: 90-220 g CO₂/km small vans, 100-220 g CO₂/km for medium vans, and 155-265 g CO₂/km for large vans (Vehicle Certification Agency, 2018). In 2016, the average van sold in the EU emitted 163.7 g CO₂/km (European Commission, 2018d).

Source: as quoted above for CO₂ emissions sources. Vehicle purchase costs acquired from a range of online reference material.

12. Communications and Information Technology Developments in Same-Day Delivery Services

12.1 Parcel carriers and fleet controllers

The parcel carrier company typically acts as a broker, taking orders from customers, dealing with charging and billing of customers, and taking responsibility for the goods transported. These companies enter into contractual agreements with either ad-hoc or regular customers to collect and deliver goods. Customer bookings are made by phone and online – but phone remains the dominant means of placing orders.

Fleet controllers employed by these courier companies then allocate these collection and delivery jobs to couriers who are typically self-employed. Couriers either travel around the urban area performing jobs or wait for their next job to be allocated to them by a controller. Controllers are therefore in regular contact with their couriers. A controller may be responsible for as many as 50 couriers.

In the early days of same-day deliveries controllers used face-to-face communications with couriers to issue them jobs (with couriers having to keep coming back to base after each delivery). Later couriers used telephone boxes on the street to call their controllers to receive new job allocations or used telephones at clients' premises if available. Crystal set radios became available in the 1970s. These provided the first mobile radio communications for couriers, but it was bulky filling the entire motorcycle top box and leaving only panniers for documents and packages (Institute of Couriers, 2017). From the late 1970s / early 1980s the communication technology subsequently progressed to two-way radios (or pagers for those companies not wanting to afford expensive radio systems with couriers then still having to locate a telephone box to call their controller), and eventually to mobile phones (Scott, 2016). Today parcel couriers typically have both a two-way radio and a mobile phone to communicate with controllers, having both overcomes the difficulties of signal reception in street locations and inside buildings where this can be problematic.

“The Express business model evolved due to communications technology. Long before mobile phones, internet or the Gig economy. Crystal set radios such as the Pye Westminster in the seventies provided the first sensible mobile radio communications for couriers. Such a device would fill the whole top box of a motorcycle courier but panniers were still available for the packages and this brought communication between jobs, no more stopping for a red box landline phone or asking clients for use of their phone when a pager went off. Digital radio brought reliability to communications and included band 3 networks, this provided a step towards present mobile communications and an evolving business model for express delivery to meet ‘consumer expectations’ of today” (Institute of Couriers, 2017).

An analogy of the fleet controller as a chess player and the couriers as chess pieces has been used to explain the nature of the controller's role and their relationship with the couriers. The controller and courier will speak by radio or phone at the start of the courier's shift in the morning. During this conversation, the controller will tell the courier which part of the urban area they will be covering on that day and the courier will make their way to that location. During the day it may be necessary for the controller to speak about a particular job, forthcoming jobs, and waiting areas between jobs so that the controller knows where the courier is when planning incoming work. They will also typically speak again at the end of the shift to make sure it is convenient for the courier to stop working. In their conversations with controllers, couriers use call signs and agreed nick names to identify themselves (Employment Tribunal, 2017a).

The human fleet controller has to retain a mental map of: i) where each courier currently is, ii) the job/s they are working on, and iii) their direction of travel in order to decide who best to allocate each job to. The controller also has to allocate these jobs in such a manner that each courier is able to earn a worthwhile income and/or has an equitable workload. In order to earn a sufficient income, couriers are preferably dealing with more than one order at a time, so are earning income from multiple customers at the same time as they travel around the city. Ideally, an experienced courier may be carrying approximately 4-6 orders at any given time, which is often referred to as a 'run' (Fincham, 2006a). However, many jobs involve a single point-to-point journey of a single item.

At smaller courier companies, the same person may take orders from customers and then allocate these to couriers, whereas in large companies such as CitySprint there will be a separate team of order takers and fleet controllers. The controller requires a detailed knowledge of the street layout, vehicle routeings, location of buildings and the entry points for couriers; therefore invariably controllers are former couriers.

The larger the team of parcel couriers overseen by a controller, the more capable the controller needs to be in visualising, planning and distributing the jobs between couriers as they arise (Fincham, 2006a). At any given time, the controller needs to be aware of the last known location of their couriers, what job/s these couriers are currently working on, their direction of travel, their estimated location even when travelling, and the time at which they are likely to complete their current job. This will assist controllers in the task of allocating jobs to couriers as they arise and deciding whether it is feasible for a courier already on a job to collect other items during their journey. The controller will usually allocate specific couriers to particular urban locations to reduce the time taken to collect new jobs that are placed by customers and provide good geographical coverage. In a modern controllers' office they will typically nowadays also have a computer and screens that show current courier locations (from GPS tracking of the couriers), which jobs are currently allocated to which couriers, and new jobs to be allocated. Today the controller's decisions about which courier to allocate a job to, and the details and timings related to this job are saved on computer and are used to calculate pay courier rates. However, prior to the introduction of computer systems capable of offering this, controllers would use pen and paper to record such details. These paper records would, in the past, then be referred to if a dispute arose with the customer or the courier.

Once a courier has been allocated a job by a controller, they are responsible for collecting the item from the customer, transporting it to its destination as quickly as possible (along with the other goods they are carrying for other customers), finding the building the item is destined for, delivering the item to its intended recipient, and obtaining a Proof of Delivery (PoD) (typically an electronic signature nowadays) to prove delivery was successfully made and the associated time and date at which this took place (in case of subsequent disputes with customers). Couriers will usually have another handheld device provided by the carrier company called a Personal Digital Assistant (PDA) which lists the details of each job to be done, and which is used to gain electronic signatures from consignees and consignorers. A modern PDA will often also provide a navigation or routing service to the courier.

If the courier has any queries about a job they are working on – such as they cannot find the building, cannot gain access to it etc. they will contact the controller for advice. Experienced couriers will rarely contact controllers for such assistance, but less experienced couriers will make greater use of a controller's knowledge. Controllers are usually former couriers, who gained years of experience making collections and deliveries prior to taking on their current role and therefore have detailed knowledge of the job facing the courier, street layouts, routings, and even the location and entry point to buildings to be served.

Being a controller is an extremely pressurised job. For controllers this is derived from having to retain and compute vast quantities of information and make rapid decisions as new work

arises. To be a successful controller requires an exceptional set of visualisation, mental mapping and recall skills, together with an excellent memory of work allocation.

One London-based same-day carrier, eCourier, commissioned a team of computer scientists to develop an automated controller in order to replace this human role with a computer-based one. The company wanted to implement a computer-based system that could make the same decisions that human controllers currently do – in terms of allocating jobs as they arise to couriers, and removing the need for human controllers to be in contact with each other when jobs overlap their territories. It was felt by the company that there was much scope to improve the efficiency of the job allocation, remove the human errors that occur when such a parcel courier system is operated on a large scale, and reduce the number of human controllers required. Such a computer-based system may help a same-day parcel carrier to increase market share, given that using human controllers can be argued to be a limit to growth, due to the informational complexity of the allocation problem. The computing team developed a new set of algorithms using real-time courier location GPS information and vehicle type data, together with other data variables to allocate each job to the most appropriate courier on the basis of road traffic conditions (given that the nearest courier may not be the fastest to despatch depending on the traffic situation), current fleet status, and individual courier efficiency (Attanasio, 2007). eCourier has been using this computer controller (called LARRY) in place of human controllers for the last decade for its operations (which are wholly within London). However, human controllers oversee the results and solutions produced by LARRY before issuing them to couriers. The founder of eCourier stated in 2009 that the introduction of Larry had enabled the company to reduce office staff costs by 35% and achieve 25% increased productivity (Commercial Motor, 2009). Addison Lee also implemented an automated controller for courier and passenger transport approximately 15 years ago, which it has been estimated by the technology provider, has reduced unnecessary mileage by 20% (Cook, 2015; Haulmont, n.d.).

Other same-day parcel carriers in London have typically continued to use human controllers who have the additional support of computers for recording and visualising job allocation and for have visibility of couriers on the road network. However, the larger carriers are investigating the scope for automating these controller processes. Meanwhile, other start-up entrants to this market have now also began to implement new computer-based solutions to the allocation problem.

Other IT solution providers are now engaging with the complexity of scheduling and routeing same-day deliveries, especially those with pre-arranged time slots. For instance Quintiq is developing solutions that aim to optimise all resources including vehicles, drivers and depots by allocating delivery time slots dynamically based on forecast orders (Quintiq, 2018).

Other traditional same-day delivery companies are now focusing greater efforts on computing technology. For instance, CitySprint the largest same-day carrier in the UK, set up LastMileLink Technologies in 2015 to drive computer-based technology innovation within CitySprint but also for other customers. LastMileLink is developing new products and enhancing the delivery platform infrastructure and service offer by its parent company. This is being achieved through the developing a cloud platform that will, 'help carriers streamline their processes and manage their fleet more efficiently, enable retailers to integrate time-slot deliveries into their checkout environment, and increasing courier productivity and retention by improving their mobile applications and reducing costs' (CitySprint, 2017).

Other technology improvements in the same-day delivery sector last ten to twenty years include:

- Enhanced faster and more reliable communications systems between controllers and couriers (as described above)

- The gathering of electronic proof of delivery (using barcode scanning of parcels and documents together with electronic signatures and photographs) to provide rapid evidence of delivery success to customers
- GPS tracking of items and couriers (both to enhance carrier efficiency as well as in some cases such as eCourier to allow customers to track the progress of their shipments)
- Vehicle routing tools that assist less experienced couriers (rather than paper-based maps) to select appropriate vehicle routes
- Computer-based tools are also available to assist couriers in finding the entry point to buildings (which may not be the registered building address). However, such tools require the provision/capture of this geographical coordinate data as a comprehensive publicly-available data set containing this information does not currently exist.
- IT system developments in the last three to five years that have fundamentally altered the way in which products that are then delivered on a same-day basis are ordered, managed and allocated to couriers. The IT platforms, as used by on-demand, start-up providers such as Deliveroo, Uber Eats, Quip and Stuart allow customers to use their smartphones or computers to search product offerings, place orders, make payments, manage inventory, allocate the delivery job to a courier, provide the courier with vehicle routing guidance to the collection location and then the delivery location in order to make rapid deliveries of non-food products and meals, and monitor the performance and workload of couriers. These IT platforms make use of advanced algorithms and analytics (Lee et al., 2016). These IT platforms have enabled B2B and, especially, B2C product sales and same-day (and next-day) deliveries to become more user-friendly, easier to manage especially at scale, and more efficient. These IT developments have influenced both the supply and demand of these services and change in this field is likely to remain rapid in the coming years, leading to increasing blurring in the divisions between the various sectors of the same-day market.

12.2 Grocery, takeaway meal and non-food retail same-day delivery

All of these sectors of the same-day delivery market have only emerged in recent years and therefore did not exist prior to the uptake of computer-based innovation described above in relation to parcel carriers. They have all therefore utilised the technologies described above since their inception.

The main difference between these sectors and the B2B parcels sector is that they involve online selling a product (grocery, meals, non-food retail items) direct to the customer (which is typically a private individual) to which delivery services are added. By comparison, in the parcels sector it is the delivery service that is being sold primarily to a business customer, and in the vast majority of cases orders are still placed by telephone. It has therefore been necessary for these sectors to design and implement attractive, user-friendly online ordering platforms that are integrated with inventory systems, payment systems, and communicate with the customer and suppliers. In the case of grocery and non-food retailing, some of these ordering systems need to provide delivery-booking systems that allow customers to select time slots based on vehicle/driver availability, and in these situations are integrated with vehicle allocation software tools.

IT system developments in the last three to five years have fundamentally altered the way in which products that are then delivered on a same-day basis are ordered, managed and allocated to couriers. These IT platforms, as developed and used by on-demand, start-up

providers such as Deliveroo, Uber Eats, Quip and Stuart allow customers to use their smartphones or computers to search product offerings, place orders, make payments, manage inventory, allocate the delivery job to a courier, provide the courier with vehicle routing guidance to the collection location and then the delivery location in order to make rapid deliveries of non-food products and meals, and monitor the performance and workload of couriers. These IT platforms make use of advanced algorithms and analytics (Lee et al., 2016). They have enabled B2B and, especially, B2C product sales and same-day (and next-day) deliveries to become more user-friendly, easier to manage especially at scale, and more efficient. These IT developments have influenced both the supply and demand of these services and change in this field is likely to remain rapid in the coming years, leading to increasing blurring in the divisions between the various sectors of the same-day market.

Deliveroo has developed a vehicle routing and scheduling algorithm called 'FRANK'. As orders are processed the algorithm checks on available couriers, and then calculates the most efficient way to dispatch the order. This decision process is based on: (i) machine-learning predictive models of when the food will be ready, (ii) how long each part of the delivery process will take and (iii) which courier is best placed to fulfil that specific order based on distance, type of location and other factors. Deliveroo estimates that together with other refinements to its technology and operations, the 'FRANK' algorithm has reduced delivery times by 20% (Deliveroo, 2018a).

Deliveroo is also introducing technology that assists its restaurant partners to: “speed up food preparation, providing chefs with preparation time information on an item-level basis to optimise preparation and cooking speed; provide chefs and managers with a real-time kitchen overview dashboard, helping them identify bottlenecks and make adjustments ensuring uninterrupted flow; and help restaurants effectively manage their purchasing operations by predicting weekly order quantities and therefore ingredient requirements. By using this technology to aid kitchen administration, chefs can enhance their focus on food-preparation, improving their output by up to 100%” (Deliveroo, 2018a). This technology is intended to improve revenue generation for restaurant partners, reduce food waste and costs, and reduce order times for customers, and enable couriers to deliver more meals to our customers (Deliveroo, 2018a).

13. Study of Same-Day Parcel Sector Operations in German Cities

A study of the leading same-day parcel couriers in eight German cities showed that 84% of all bicycle trips and 86% of all car trips involved a same-day rather than next-day delivery service (Gruber et al., 2014). The geographical coverage of car journeys in the eight cities studied was greater than bicycle journeys over the course of 2011-12. The urban areas regularly covered by car messengers was found to range from 320 km² (Bremen) to 3459 km² (Berlin) and have a mean of 1466 km². Meanwhile, the geographical area covered by bike messengers ranged from 48 km² (Leipzig) to 382 km² (Munich) with a mean of 170 km². In Munich, cycle couriers used public transportation in conjunction with their bikes or lived in suburbs where they also carried out occasional deliveries and/or collections (Gruber et al., 2014).

The vast majority of same-day jobs by both bicycle and car took place within the urban limits of each of these eight German cities (accounting for 99% of all bike journeys, and 82% of all car journeys), with the majority of these occurring within the inner- and central urban areas. In Berlin, for example 83% of the collection locations and 77% of the delivery locations were located within the inner-city, with two-thirds of these shipments occurring entirely with the inner-city (Gruber et al., 2014).

As would be expected, bicycle courier activity was more concentrated than for cars, with 85% of the bike shipments taking place wholly within the inner-city, 11% of shipments between the inner-city and outer Berlin, and 4% of shipments completely outside the inner-city. By comparison, 39% of car-based shipments took place wholly within the inner-city, 34% between the inner-city and outer Berlin, and 28% of shipments completely outside the inner-city (Gruber et al., 2014).

The average trip distance for bicycle journeys by couriers in Berlin 5.1 km (compared with 11.3 km for courier shipments made by car). Approximately 90% of all of these trips carried out by bike have a trip distance of less than 10 km (compared with 56% by car or less shipment distance). Ninety nine per cent of these bike trips and 87% of these car trips are shorter than 20 km. On average, bike couriers carry out 9.4 trips per working day compared with 6.4 by car couriers (due to the difference in trip distances). The average daily distance travelled by cycle couriers was 42 km (with a range from 1–166 km); with 90% of the daily distances between 1 and 75 km. By comparison, car couriers had an average daily distance travelled off 66 km (with a range from 1–253 km); with 90% of the daily distances between 1 and 125 km. For cycling daily distances per courier, 62% were below 50 km and 99% below 100 km. For car driving daily distances per courier, 42% were below 50 km and 78% below 100 km (Gruber et al., 2014).

Among these Berlin cycle couriers, approximately 80% of the total distance travelled is loaded (i.e. goods are being carried, while 20% is accounting for by empty running. The average free-flow speed for these bike trips is 15.9 km/h compared with 17.3 kmph for car couriers. Approximately 80% of all these bike and car trips take place during the working day and the early evening (09:00-16:00 and 18:00-20:00). Virtually all bike courier work takes place on weekdays. One quarter of the bike and car couriers worked less than 2.9 and 2.6 hours per day respectively, while another quarter worked more than 7.0 hours per day and 7.3 hours respectively. The average working day was 5.3 hours for both bike and car couriers (Gruber et al., 2014).

In terms of distance travelled by activity by both bikes and cars, 57% of the total distance travelled is accounted for by a single customer's job, 22% by couriers transporting 2 or more customer's jobs at the same time, and 21% by empty running (i.e. no customer's jobs being carried) (Gruber et al., 2014).

More than 90% of couriers in the German study were male. There was a slightly higher proportion of female cycle couriers than van couriers. Ages of couriers were widely spread ranging from 18-80, with 88% between 23-55 years. However, bike couriers were younger than car couriers with average ages of 35 and 48 respectively. Over 80% of cycle couriers had graduated at least from high school compared with only 50% among car couriers. In terms of experience, 35% of couriers had been working in the sector for more, while 13% had less than one year's experience. In terms of income, approximately half of the respondents earned net wages between €1001 and €2000 per month, while about 40% receiving incomes below €1000 net wage, and 10% above €2000 net wage. Approximately 30% of couriers surveyed had other jobs in addition to couriering (Gruber et al., 2014; Gruber and Kihm, 2016).

Of all bike and car couriers surveyed in Germany, 23% worked only 1-3 days per week, 14% worked 4 days per week, 54% worked 5 days per week, and 9% worked 6-7 day per week. In terms of hours worked per day, 27% worked up to 6 hours per day, 47% worked 6-9 hours per day, and 26% worked more than 9 hours per day (Gruber and Kihm, 2016).

Both cycle and car couriers viewed being responsible for their own time management as an extremely a very important aspect of their job (84% of couriers overall). However, 87% of bike couriers view the exercise they get from their work as of high importance, compared with only 26% of car couriers; and 65% of cycle couriers view their environmental impact as of high importance compared with only 30% of cycle couriers. Other job factors of high importance to cycle couriers included day-to-day variety in their work (69% of respondents); and contact with people / clients (65% of respondents), while only 42% of bike couriers rated income as of high importance. By contrast, job factors of high importance to car couriers included income (76% of respondents) (Gruber et al., 2014).

Vehicles in the companies surveyed were mostly owned by the couriers. Virtually all the items carried were B2B deliveries. In Berlin, customers from five sectors accounted for 84% of the total deliveries carried out: media/arts (31%), general services (18%), health (12%), business-oriented services (12%) and banking/insurance (11%). Some of the companies have long-standing key accounts with specific companies. Vehicle selection for a given job is either based on customer choice, or the suggestion of the person taking the call. In the companies studied some jobs were allocated to couriers on a 'first come, first served' basis in which the first courier to respond is allocated the job, and some jobs are allocated by controllers (Gruber et al., 2014).

14. Bicycle and Cargo Cycle Same-Day Deliveries: History and Findings of Studies

14.1 Same-day deliveries by bicycle – history and present day

The bicycle, tricycle and quadricycle have been used for freight transport ever since their invention. For example, the British Post Office purchased their first cargo tricycles in 1881 (Caunter, 1955). Such vehicles were also commonly used by retailers for the local delivery of groceries and other products to customer's homes, for the peripatetic sales of ice cream, and by tradespeople to carry the tools of their trade. They were also used (and continue to be) by the general public to carry shopping and other items (Cyclelogistics, 2011). In European and North American urban areas it was widely used by retailers for the local delivery. Meanwhile, in India lunchboxes have been transported to customers using bicycles since 1890 (Maes and Vanellander, 2012).

In the Netherlands and Denmark, unlike many other western European countries, cargo bikes continued to be used for a wide range of freight operations beyond parcel and package distribution, by companies and private individuals continuously until the present day (Cyclelogistics, 2011). However, in London it was not until the early to mid-1980s that carriers began to make use of bicycle couriers again. This was a response to the rapid growth in demand for B2B parcel delivery in central urban areas, together with the growing traffic congestion on these roads. Bicycles offered a fast alternative to travelling more quickly around these busy locations. Bicycle usage for same-day parcel deliveries also began to increase in mainland Europe during the latter part of the 1980s.

Today, bicycles are commonly used (along with other vehicle types including motorbikes, cars and vans) in the distribution of same-day parcels and packages in urban areas in many, especially northern, European countries. This work involves point-to-point collections and deliveries of small items, in which the courier collects and then delivers items as requests arise. This can involve transporting a single item at a time, but, in order to earn a reasonable income, cyclists may carry several items destined for different addresses at any one time. This contrasts with the next-day parcel sector in which van drivers typically load their vehicles with parcels and packages at a depot in the early morning and then spend the rest of the working day at making deliveries. In these next-day parcel operations the driver can distribute as many as several hundred parcels per day depending on the location of the activity and the average trip length (Allen et al., 2016). Same-day couriers are typically self-employed and are paid on a per job basis and can therefore choose to work part-time hours that suit them. By comparison next-day parcel drivers may be employed or self-employed, and typically work all day due to the time taken to perform the work they are allocated.

Research has indicated the scope for the use of cycle freight in other sectors beyond parcels and packages in European urban areas. These include: home delivery services, internal and on-site transport, service trips, and trips by private individuals. Cycles are potentially suitable for operations that involve the transportation of relatively small volumes of product with comparatively low weight. This work identified urban authorities as having a key role in the uptake of cargo cycles by companies, through the implementation of policy measures aimed at reducing the environmental impact of freight traffic (Rudolph and Gruber, 2017). Studies suggest that a sizeable market for cycle freight in European towns and cities does exist. Estimates of the potential size of this market suggest that 25-50% of city centre freight traffic could be transferred from motorised vehicles to cycles under the right conditions (Cyclelogistics, 2014; Lenz and Riehle, 2013; Schliwa et al., 2015; Wrighton and Reiter, 2016).

A 2016 survey found that commercial cycle logistics businesses were operating in at least 93 towns and cities across 17 European countries in 2016. In the UK, at least 19 companies

operated cycle logistics in 25 urban areas. Two-thirds of these companies had been established since 1999, and half of them were working with/for traditional logistics companies providing last and first mile delivery services on their behalf. A total fleet of approximately 900 bicycles, trailers, cargo bikes, cargo trikes and quads were being used by 80 of the companies responding to the survey, indicating average fleet sizes of just over ten machines. Overall, these companies were delivering 16,000 items delivered per day on average, which indicates an average of 170 items per company per day, and approximately 18 deliveries per day per bicycle/cargo cycle. Median daily distances travelled per bike / cargo bike were 30-50 km (20-30 miles). Only 17% of companies providing financial data stated they were making a profit, with 46% stating they were breaking even (with 11% of these companies receiving subsidies from local authorities) (Amsterdam University of Applied Sciences, 2016).

Another study has estimate that there were fewer than 100 load-carrying cycles in use in London in non-food operations (i.e. in the parcel and other non-food sectors) in 2017 (TfL, 2017). **Table 14.1** shows the benefits and challenges of bicycles and cargo-cycles for transporting freight compared with diesel vans.

Table 14.1: Benefits and challenges of bicycles / cargo cycles compared to diesel vans in central London

Benefits	Challenges
Reduced carbon emissions	Volume and weight carrying capacity limitations mean for more trips needed for large, heavier loads (and potential empty running to make collections/reload)
Reduced air pollutant emissions	Range (distance) capabilities and maximum speed in outer urban area and beyond
Quieter operations as no engine noise and generally no vehicle doors to shut	Security of bikes and their cargos
Speed and reliability (can use cycle lanes, have more direct routes, fewer parking restrictions - resulting in 25-50% reduction in journey time; less prone to traffic disruptions)	Lack of affordable depot space in inner/central London
Greater flexibility in timings and range of services due to speed and reliability	Handling costs in transferring goods to bicycles / cargo cycles
Lower running cost (due to lower fuel and maintenance costs, no vehicle access charges for Congestion Zone or Toxicity Charge, together with no parking penalty charge notices)	Lack of awareness and acceptance of cycle freight outside of traditional mail and document sector
Potentially lower capital costs (but depends on ratio of cargo bikes to vans in given logistics operation)	Fleet capital costs although less than for van still considerable for a small business, and, unlike vans, currently few leasing options
Courier health benefits from exercise of cycling	Lack of existing cargo cycle operators suitable carriers
Public acceptance of cycle freight is better than for vans	Lack of secure overnight parking and recharging space in inner/central London

Source: adapted from Transport for London, 2017.

The carrier Outspoken! makes next-day deliveries on behalf of TNT in the city of Cambridge in the UK in which motorised vehicle access is restricted, with several roads closed to private motorised vehicles, and loading and unloading not permitted in the city centre between 10:00 and 16:00. Outspoken! Delivers these parcels using cargo bicycles and tricycles (TfL, 2017).

A study in Rotterdam, The Netherlands has investigated the market for cargo cycles in the city, existing regulations and policies that govern their use, and opportunities for their use on specific streets and localities within the city. The research and report have taken into account seven street design issues that can help ensure that urban distribution by cargo bike can take place in a high-quality and safe way (Hoogendoorn et al., 2018).

Bicycles, tricycles and rickshaw cycles are also widely used in urban areas in Asia, Africa and South America for both passenger and freight transport. Much of this cycle-based freight work takes place on an informal basis with riders working on a for-hire basis. Goods carried range from small parcels and food items to large, heavy items including furniture, washing machines (Gallagher, 1992; Hagen et al., 2017; Replogle, 1991; Norcliffe, 2011; Tiwara, 1999). The physical effort involved in being a rickshaw rider in Indian cities has been shown to be substantial, and results in physical stress for approximately 80% of these workers, with the predominant complaints being fatigue, backache and leg cramps (Pradhan et al., 2008). It has been estimated that approximately 300,000 cycle rickshaws plying for trade in carrying goods and waste in Delhi. Survey work in Delhi indicates that the main commodity types transport by cycle rickshaw are building materials, timber, electrical appliances, and groceries. On average, the riders of these vehicles carry out 4.2 trips per day, each of which has an average trip length of 5.2 km and an average travel time of 62 minutes, at an average speed of 5 kmph. Approximately 90% of these trips have distances of less than 10 km. Empty running accounts for more than half of all these trips; the average weight of goods carried on loaded trips is 195 kg (Sandhu et al., 2014).

14.2 Research into electrically-assisted cargo cycle operations

Analysis of an operation using electrically-assisted cargo cycles in conjunction with a micro-consolidation centre in London found that that the total distance travelled and the CO₂e emissions per parcel delivered fell by 20% and 55% respectively compared to the previous operation using diesel vans (Browne et al., 2011).

A study in Milan using electric bikes indicated a 73% reduction in CO₂ emissions compared to the previous operation using diesel vans (Nocerino et al., 2016).

Electrically-assisted 2-4 wheeled cargo cycles do not emit any emissions at the point of use and are capable of transport 50-250 kg of goods, with a distance range limit of approximately 50-80 km per day on a full charge. Research efforts are taking take to attempt to develop batteries with higher energy densities (Schier et al., 2016).

The potential market for electrically-assisted cargo bikes in the same-day carrier sector is strongly linked to the views of the courier rather than the company, as these workers are usually self-employed and often their own vehicles. Research in this sector in Germany has indicated that key factors in whether couriers will switch from manual to electrically-assisted cargo cycles include demographics, their attitudes concerning their health and the environment, purchase prices, vehicle range and recharging infrastructure, and the availability of vehicle information. Approximately 90% of same-day cycle couriers view doing exercise while working as being of high importance, while 65% view the environmental footprint of their job as of high importance (Gruber et al., 2014). Research has suggested that cargo bikes have the potential to reduce car trips among private individuals in America (Riggs, 2016).

A trial is currently taking place in London, funded by Innovate UK, in which some city centre deliveries in a specified area are being made by next-day and international parcel carrier UPS using cargo cycles that pull electrically-assisted wheeled 'pay load boxes' which contain parcels. These pay load boxes are loaded with parcels each morning at a UPS depot and then loaded onto a trailer. This trailer is then transported by a conventional goods vehicle and is deposited in a city centre location, such as a car park. Cargo cycles couriers then visit the trailer to collect pay load boxes and tow these electrically-assisted pay load boxes using their cycles to deliver the parcels within the locality (UPS, 2017).

CitySprint, the largest same-day carrier in the UK, currently has a fleet of approximately 25 electrically-assisted cargo cycles with carrying capacities of 50-100 kg, which it is planning to expand, in its efforts to achieve a 100% low emission delivery fleet in central London by 2019 (CitySprint, 2018b).

14.3 Study of freight bicycles and cargo cycles in Paris

A study of courier and delivery companies using bicycles and cargo bikes to provide freight transport services in Paris in 2014 identified 15 operators, nine of whom took part in a survey. They were: Coursier.fr, La Petite Reine, Novea SAS, La Poste (the French postal service), Urban Cycle, SCS Dragonet, The Green Link, Team Distribution Logistique, and Vert Chez Vous. Eight of these operators provided delivery services and three provided both delivery and courier services (delivery services involving transport from a depot to a receiver, whereas courier services involve transport direct from a shipper to a receiver).

Seven of the nine operators used other vehicle types in addition to human-powered cycles. Freight transport services by cycle represented an average turnover of 2.2 M euros/year (69% of the firms' total revenue). On average (with the exception of La Poste) these businesses served 226 clients and employ 53 individuals, including 25 bicycle or cargo cycle drivers. Most of these firms used either human-powered bikes (with an average maximum load of 22 kg) or electric cargo-bikes (with an average load of 164 kg). The major product types being transported were mail and parcels (53%), food (13%) and other goods (31%), and 88% of the trips take within inner Paris (with 8% taking place between inner Paris and its suburbs, and 4% taking place wholly within the suburbs).

Each bicycle or cargo-bike rider carried out on average approximately seven round trips per day with each round trip comprising on average 27 deliveries and collection (8 collections and 19 deliveries). Average trip distances were 12.2 km and took approximately 2 hours to complete. Large variations were observed across the survey respondents (Koning and Conway, 2016).

14.4 Study of freight bicycles and cargo cycles in Belgium

As part of a PhD, a study of cargo cycle operators in Belgium was conducted (Maes, 2017). This identified 38 companies using cargo bikes between 2010-2017, several of which were one-person businesses. Twelve of these companies ceased trading or merged with other organisations over the period in question. Three of these companies use cargo bikes as a small part of a much larger parcel delivery operations (TNT Express, UPS and FedEx), two are not-for-profit organizations, and the others are small independent companies. Several of these companies have been operating for less than five years.

These cargo bike services are offered in six different sectors: postal and express parcels (i.e. bike use by major parcel carriers), courier services (i.e. traditional, specialist same-day services including B2B parcels and documents, medical deliveries and freshly-cut flower deliveries), own-account delivery services (i.e. small businesses with their own delivery services such as bakers, and food shops), tradespeople and other service activities (including

window cleaners, gardeners, electricians, plumbers, musicians, and street vendors), Urban Consolidation Centres (when the deliveries from these centre are made by cargo bike), and on-demand, start-up platform providers in the gig economy (such as Deliveroo, Uber Eats, Take Eat Easy and Foodoragig-economy) (Maes, 2017).

The current provision of these cargo bike services in Belgium is therefore extremely small, with the specialist bike courier firms jointly having a total of 20-50 full time equivalent (FTE) couriers, the express and postal companies having a combined total of 50 - 150 FTE couriers, and the on-demand, start-up, gig-economy platforms having 100 - 200 FTE couriers (Maes, 2017).

14.5 Study of freight bicycles and cargo cycles in Rio de Janeiro

A study in Rio de Janeiro has shown that the main sector using bicycle transportation is for last-mile B2C deliveries from shops to customers' homes. Nearly all these bikes (96%) and the services that they provide were owned and operated mainly by shopkeepers rather than by third-party logistics and courier companies. These users included restaurants, grocers, pharmacies, hardware stores, bakers, and drycleaners. These types of B2C deliveries were common in the UK and the rest of Europe in the first half of the 20th century. A total of 628 bicycles used for goods transportation were identified at 322 businesses. Of these 43% were regular bicycles, 35% were cargo bicycles and 23% were tricycles. All were human powered, and no electric cycles were identified in the study (Hagen et al, 2017).

14.6 Study of cargo cycles in the USA

A research project in the USA identified twelve carriers in the USA and Canada serving multiple customers and carrying a variety of commodities using cargo cycles (carriers using cargo cycles solely for B2B or B2C deliveries were excluded from the study). In examining the use of cargo cycles in New York City in this same study six carriers were identified that had recently employed cargo cycles; one was a start-up carrier using bicycles, cargo cycles and motor vehicles to provide courier services, one also offered passenger pedicab services, and the other four were small companies typically with less than three employees/couriers providing freight services using cargo cycles. Case studies of cargo cycle use in New York were carried out with two companies: one a bakery that delivers products to retailers in Lower Manhattan, to customers using five tricycle drivers, and another not-for-profit organisation collects excess food daily from all sectors of the local food industry (e.g. restaurants, cafes, grocers, bakeries etc.) and then distributes these goods to approximately 500 local community food programs across New York City, with 120 of these destinations in Manhattan. These collection and delivery operations were carried out using this food 19 refrigerated trucks and three freight tricycles. The bakeries cargo tricycles operated at speeds of up to 15 mph, with a median speed of 7 mph, while the food collection cycles operated at speeds of up to 8 miles per hour, with a median of 4 mph. Speed differences were accounted for by location of activity (and its prevailing traffic conditions) and the length of the cycle rounds performed (Conway et al., 2014).

14.7 Analysis and simulation of the potential for cargo cycles

Some other academic research has analysed the potential benefits of using cargo cycles. These studies have not involved studying actual cargo cycle operations but instead have involved simulation of the traffic, environmental and economic impacts of switching existing goods vehicle operations by diesel vans to cargo cycles. These studies are therefore theoretical rather than based on real-world trials.

A study in Antwerp, Belgium simulated the replacement of last-mile deliveries by diesel vans with a revised approach in which these vans delivered items to Collection Points (convenience

stores etc.) and then cargo cycles were used to make last-mile deliveries to consumers. The simulation results suggested that the carrier's operating costs would increase by 9% (due to the lower carrying capacity of a cargo bike than a van and their assumed lower travel speed) but the external costs would fall by 40% (due to the reduction in total distance travelled by diesel vans) (Arnold et al., 2018)

A simulation of the replacement of diesel vans with electrically assisted cargo cycles in Porto, Portugal indicated that cargo bikes have the potential to replace van activity when the vans are engaged in journeys with a maximum linear distance of approximately 2 kilometres. This equates to about 10% of the current goods work carried out by vans. The study found that this could be achieved without any adverse effects on overall transport network efficiency. This vehicle substitution was estimated to be capable of reducing CO₂ emission by 73% on a Well-to-Wheel basis. Higher cargo cycle penetration of 20, 30 and 100% of existing van activity for goods transport was also simulated. These penetration levels led to a worsening of simulated traffic conditions and hence more vehicle queueing and longer idling times for all vehicle types, but still produced overall fuel savings and lower CO₂ emissions in the simulation results due to the decrease of the share of conventional diesel vans (Melo and Baptista, 2017).

15. Same-Day Couriering as a Way of Life

Some same-day couriers have a passion for and interest in their work that extends beyond the practicalities of the tasks involved in carrying it out. Instead, it would appear to derive from their identification with the work and their relationships with others performing the same role. Research and writing about this courier subculture has mostly focused on the B2B non-food same-day delivery sector, presumably due to this sector having been in existence far longer than other sectors. For those who feel part of this courier 'subculture' it seems to also be strongly related to the transport mode used as well as the work itself. Several studies have been carried out into the non-food same-day cycle courier subculture, usually by those who have combined their identification with and membership of this group with their academic studies (for example see Kidder, 2004; 2005; 2009 and Fincham, 2006a; 2007, 2008). In addition, several cycle couriers in the UK and USA have written memoirs about their work and social lives in this world (see UK examples see Chappell, 2016; Day, 2015a; Sayerer, 2016; for US examples see Cully, 2002; Reilly, 2000) and web-based chatrooms exist for couriers (see for example the Moving Target forum (Moving Target Forum, 2018). The other same-day non-food sector in which such a subculture appears to exist is among motorbike couriers (or as they many refer to themselves 'despatch riders'). Although not having been subject to academic research, several motorcycle couriers have provided first-hand accounts of that subculture in the UK, including in magazines aimed at those working in the sector in pre-internet days (see for example Gurman, 2008; Scott, 2016). No research or memoirs appear to exist among same-day parcel van and car drivers, but a subculture does also appear to exist among these workers on online forums allow them to share experiences and interests (see, for example, Courier Owner Driver Forum, 2018 and Courier World Forum, 2018). However, it may be less marked than among cycle and motorbike couriers due to the vehicles used providing less opportunity to meet and socialise between jobs.

Newspaper articles and the existence of online chat forums for takeaway meal couriers that go beyond simply exchanging work tips suggest that some of the people working in this new same-day delivery operation also identify strongly with the role. For instance, some Deliveroo couriers have a Facebook group (Cycling Plus and Rob Ainsley, 2016; Roo Community - Deliveroo Riders, 2018). A subculture among grocery delivery couriers is not obvious due to the lack of research and memoirs in this emerging same-day sector, which may be related to these often being employed jobs, and offer fewer meeting opportunities during the course of the working day.

Groups of both non-food and meal delivery cycle couriers organise long-distance leisure rides. Cycle couriers generally report enjoying their work, and feel that a strong bond exists with their fellow cycle couriers (Cycling Plus and Rob Ainsley, 2016). One researcher who worked as a parcel cycle courier while carrying out his PhD on the subject reports that many of his fellow couriers described their work as "the best job ever" (Kidder, 2009). However, this is countered by a courier who wrote memoirs of his work who disputes this and instead describes it as "the best of all the worst jobs in the world". He agrees that being paid to cycle is "amazing" but that the problem is "when you're not getting paid money and not riding your bike" (Sayerer, 2016).

A Deliveroo courier based in Brighton give us both views, telling us, "Weaving through traffic. Battling pouring rain. Dodging drivers turning across you. It's great to have a job carving through the streets with no manager, but it is a dangerous one. As a courier, you're public enemy number one—hated by pedestrians, motorists and taxi drivers alike. Not that I don't enjoy it—it's great to sit back, coming down a hill with the lights of the city spread out in front of you, the roads quiet late at night. Most people would say that riding is their job satisfaction—people don't just do it for the pay. It's for the sense of freedom that you only get as a messenger; nobody knows the city quite like us. Roaming through the backstreets to kitchen

doors, and crossing estates so quietly you surprise the foxes, you get to see a side of your city that nobody else does” (McClenahan, 2017).

In his examination of the reasons for the allure of the job Kidder considers some of the negative aspects including having no paid holidays, no sick pay, receiving hundreds of dollars in traffic fines the unpleasantness of working in the rain and snow, irate behaviour and rudeness from vehicle drivers and condescending clients. Yet despite this negative list and that the job is essentially, as he describes it, “a low-end service job (rife with danger and minimal material compensation)” he found that some cycle couriers are so attached to it and feel so passionate about it that they organise local, national and international cycle courier races and hold parties all-night parties together. (Kidder, 2009). Some view the job as an opportunity to get paid to exercise (Long and Butler-Roberts, 2017).

The passion for the work among some cycle couriers appears to stem from their identification with it as much more than a job to them. Some of the couriers interviewed in academic studies view their work as also being a subculture that they strongly identify with. In the UK, couriers’ views of the constituent parts of this subculture include the sense of danger concerning the working environment, the marginal nature of the work – stemming from it being physically demanding, the marginal, typically self-employed working status, the sense of freedom that goes with the work, the focus on cycling, the clubs and pubs that couriers frequent, and the widespread use of alcohol and recreational drug use among interviewees (Fincham, 2007). This courier subculture and style also comprises riding behaviour, clothing, helmets (or lack of), types of bicycles used and language spoken (Kidder, 2005). This cycling style can involve riding dangerously, irritating and scaring pedestrians and breaking traffic laws – so as to comply with an image of being outlaws and outsiders with something of a death wish. These couriers typically choose not to wear helmets, so as to add to the sense of danger. Clothing mixes cycling apparel with modified street wear. Types of bicycles used by couriers include mountain bikes and road bikes, but the bike of choice of those involved in couriership as a subculture is the track bike with a fixed gear and lack of brakes – which adds to the skill needed and risk involved especially in busy, road conditions. A private language involving slang terms used by couriers has emerged (Kidder, 2005). In the UK and the USA this subculture also involves bike races between couriers often referred to as ‘alleycats’ in which couriers race in open traffic with few rules but which require dangerous and innovate cycling styles often using one-way streets, pavements and running red lights. These informal races eventually led to the formation of a Cycle Messenger World Championship, held annually since 1993, together with various continental championships (Fincham, 2007; Kidder, 2009). In the USA it has been estimated that approximately 15 percent of cycle couriers identify with this subculture (Kidder, 2005). A London cycle courier who wrote memoirs of his time estimates that approximately one in five cycle couriers were bohemians and enjoyed the image of being a cycle courier (Sayerer, 2016).

The work offers these couriers the opportunity to discuss their interests in bicycles and bicycle technology in the down-time while waiting between jobs. Most cycle couriers have preferred sitting and waiting locations between jobs. Meal couriers have more flexibility in this respect as they can choose to wait where they choose, and try to aim for locations that are well-located for quick access to popular restaurants. Non-food cycle couriers are often instructed to wait in the proximity of where they completed their last job so that the fleet controller knows where they are located when new jobs arise. Where possible cycle couriers will choose waiting locations with a bench and shelter, and report often being joined by other cycle couriers as well as by smokers and homeless people (Long and Butler-Roberts, 2017).

One London parcel cycle courier-cum-writer tells us of his pleasure at learning the street layouts and business addresses, which he viewed as a private map of the city, “another city exists alongside the London most people know, and cycle couriers are privy to this backstage city, with its post rooms manned by neon-tabarded security guards, its goods lifts, its secret,

parallel infrastructures” (Day, 2015a). He proceeds to explain that, for him, cycling in central London allows him to experience streets in different weathers, gain intimate knowledge of traffic signal sequencing, the buildings passed between collections and deliveries, as well as to gain an intimate knowledge of the road: its contours, its likely traffic problems, its potholes, in which “very soon, the rhythm of the street becomes internalised...Eventually you come to feel part of the city’s secret networks, at one with its hidden rivers and its dead letter drops, at one remove from its anonymous crowds of commuter” (Day 2015).

A motorcycle courier who began doing same-day deliveries in London in 1978 recounts his early reckless driving style both to make deliveries as quickly as possible but also for the pleasure it gave him. He viewed motorcycle couriership in the late 1970s and early 1980s as “attracting artful roger-dodgers from all backgrounds, footloose young guns who weren’t yet fixed on a career and were reluctant to clock on to a steady job. [Motor] Bike messengering was an occasionally exciting but ultimately dead-end job. With no ranks to rise up, once you knew the streets and a few associated tricks as well as the next guy, you were top of the crowded heap. Beyond that lay van-driving, office-bound controlling or starting your own despatch company...Most despatchers didn’t stay for more than a few months or didn’t stick at it full-time” (Scott, 2016).

Some Deliveroo meal couriers perceive themselves as popular with the general public that they pass on the streets, with other road users and pedestrians smiling at them. Some put this down to the kangaroo company image on their clothing and carrying boxes being popular (Rosehill, 2016). However, some meal delivery couriers report being shouted at, taunted and even attacked by late-night drinkers and revellers (Cycling Plus and Rob Ainsley, 2016). And a non-food courier reports that “most of the time it felt that as though all London was looking down at couriers: people bristled, their noses contorting like concertinas, their spines straightening and lips stuck out. I was shot some priceless glance, and to be honest, you don’t know a sneer until you’ve been a courier or in some similarly low-ranking job” (Sayerer, 2016).

A cycling courier reports that motorcycle couriers were among the worst road users he encountered during the time he spent doing the job, and were invariably angry, which he attributed to costly motorcycle repairs and insufficient earnings. He also explains that taxi drivers showed little respect to cycle couriers and there was no love lost between most of them (Sayerer, 2016).

Cycle couriers are subject to fines from police officers for cycling on the pavement. On reports that in 2010 he typically received such fines in central London every two months.

The daily working experience of same-day parcel couriers involves more variety and social mobility than just about any other. It involves going inside all manner of workplaces and buildings to make deliveries and to wait for and pick up collections ranging from architects practices, media companies, law firms, modelling agencies, government and council offices, to delivering summons to squatters (Chappell, 2014). As part of the work couriers find themselves inside parts of buildings not even usually seen by making staff working there including loading bays, and goods lifts. To be successful couriers require the navigational knowledge of taxi drivers (albeit often over a smaller area), as well where parcels enter and leave buildings (which is often not via the main entrance), which floor companies are located on in multi-tenanted buildings. Then between jobs they need to be acquainted with gardens and parks, benches and other convenient resting locations, warm waiting areas in winter, and public toilets.

Some places such as bike repair shops can become meeting places for couriers where they also congregate in- and outside to socialise. Fullcity, in Clerkenwell, central London has become such a location, together with its neighbouring pub. Couriers visit during the day for bike repairs and to stop briefly and chat between jobs, and then gather there in larger numbers

at the end of the day to socialise with their courier community (Blaze, not dated; Gophr, 2017). Specific pubs are often also used as cycle courier meeting places such as The Foundry and the Duke of York in London prior to their shutting down (Chappell, 2016).

The radio contact between parcel couriers and their controller involves the use of code names, abbreviations, acronyms and terminology unknown to those outside this world, with all couriers able to listen in on an exchange between their controller and one of the courier (Chappell, 2016). Day (2015) provides an example of exchanges between a controller and their couriers:

'One-nine?'
'This is one-nine.'
'Direct at 78 Newman Street.'
'Roj.'
'Thirty-six?'
'Three-six.'
'Three-six, in the middle yet?'
A pause.
'Ah. Silence is golden.'
'Six-four.'
'Come again, who's calling?'
'Six-four.'
'Six-four?'
'On the bounce from west fifteen'.
'OK, keep coming, keep coming.'
'Nine-six?'
'Nine-six.'
'One on the island for you going west one.'
'Roger.'

Couriers in London teamed together to establish their own scheme, called the London Courier Emergency Fund (LCEF), to provide support and financial help to cycle couriers who suffer an injury whilst working that will prevent them from working for at least two weeks (London Courier Emergency Fund, 2018).

Several literary works have also included couriers: Anna Livia wrote a short story in the 1980s that focused on a female courier at a central London carrier company (Livia, 1986) while Will Self focused on a motorcycle courier in his short story 'Waiting' (Self, 1991). Meanwhile, Jon Day's account of his time as a cycle courier in London attempts to provide a reader with hands-on insight into experiences and encounters from the courier's perspective blended with psychogeography, situationism, art theory and travel writing (Day, 2015a).

A Hollywood movie, *Quicksilver*, released in 1986, starred Kevin Bacon in the lead role as a former city commodities trader who has fallen on hard times and becomes a cycle courier. He enjoys his new lifestyle and freedom (of wearing what he wants, choosing his own city routes to make deliveries, being an observer of the urban streetscape and what is happening on it), despite his girlfriend's and parent's reservations. Some of his fellow couriers are treated badly, some are used by drug dealers to make their deliveries. He uses his business knowledge and experience to help his fellow couriers in difficult situations with which they are confronted, including helping one raise the money needed to give up being a courier to follow his dream to become a hot dog street seller. Bacon has described his role in this film as, "the absolute lowest point of my career" (Anon, 2011).

The look of the cycle courier has become popular among some cyclists who never worked in the sector. They adopt the bikes, single-strap carrying bags, clothing and cycling caps to

appear as couriers. They are referred to as 'fakengers' (as opposed to messengers among some couriers) (Chappell, 2014; Day, 2015a).

A review of various online forums for cycle, motorbike and van couriers show a marked decline in posts in the last five years, except among those working in the recently initiated takeaway meal delivery sector. This decline could indicate a reduction in the number of couriers who view being a courier as a way of life which they identify with strongly. One courier turned memoir-writer explains the decline in bohemian couriers during his time making deliveries in London who aspired to be artists, writers, designers and other creatives (Day, 2015a). Possibly the decline of pay rates for couriers in the last couple of decades has taken the allure off of the way of life.

16. Traffic, Social and Environmental Impacts of Same-Day Deliveries

16.1 Traffic and environmental impacts of same-day operations

Same-day deliveries impose various traffic and environmental impacts where they take place. The most important traffic effects result from: i) the road space and time these vehicles occupy while driving between their origins and destinations, ii) the total distance that they travel on these journeys, and iii) the time and space they occupy at the kerbside while collections and deliveries are carried out on-foot by couriers.

These transport activities can result in a range of social and environmental impacts including greenhouse gas emissions and local air pollutants (resulting in health and wellbeing impacts for society and impacts on water and soil quality), traffic congestion, collisions and injuries (involving couriers, other road users and pedestrians), noise disturbance, visual intrusion, crime, and the consumption of raw materials and non-renewable energy sources (to manufacture and dispose of transport vehicles and to power them).

The traffic and environmental impacts of deliveries depend on a wide range of factors about how the delivery operation is carried out. These factors include:

- **The type of vehicle used** – the choice of vehicle and its fuel type
- **Vehicle capacity** – the maximum load size and weight that a vehicle is capable of carrying
- **The load carried** – the actual size and weight of the load carried
- **Distance from point of dispatch / collection to point of delivery** – the transport activity that is expended in making the delivery
- **Empty running** – the proportion of total distance over which the vehicle operates empty (i.e. without goods on board)
- **Delivery failure rate** – the incidence of an inability to fulfil the delivery as the consumer is not present to receive it
- **Delivery drop density** – the number of delivery locations to be served in a given unit of area (which affects the driving distance between delivery points as well as the scope to walk between several delivery points making deliveries without having to move the vehicle)
- **Delivery lead-time** – the time from the order being placed to it being delivered to the consumer
- **Routeing and scheduling** – the choice of vehicle route and sequence in which deliveries are carried out
- **Time of delivery activity** – the time at which delivery operations are carried out
- **Product return rates** – the extent to which products are returned to retailers by consumers
- **Safe driving** – the extent to which the driver is capable of minimising the risk posed by their driving to themselves and other road users (financial incentives or penalties levied on couriers based on achieving rapid delivery time are an obvious barrier to safe driving)
- **Efficient driving** – the extent to which the driver is capable of minimising fuel use through their driving style

There are several features of same-day deliveries that are different from many other delivery operations in relation to the above factors and which affect its transport impacts. These are discussed below.

- **Vehicle modes used** – a considerable usage of bicycles, cargo cycles, mopeds and motorbikes
- **Vehicle capacity** – the carrying capacity of the above listed vehicles is small both in weight and volume terms by comparisons with vans and HGVs.

- **The load carried** – with the exception of multi-drop grocery deliveries by van, in many same-day deliveries the actual size and weight of the load carried is small. In a substantial proportion of work the delivery activity is point-to-point with only one order carried at a time. This is the case in virtually all takeaway meal deliveries and many B2B and some B2C non-food deliveries.
- **Distance from point of dispatch / collection to point of delivery** – the majority of same-day deliveries take place over short distances all within a single urban area. The only exception is B2B non-food deliveries which may be interurban and involve long distances.
- **Empty running** –the point-to-point nature of many same-day deliveries results in the vehicle running empty to its next pick-up point. Empty running rates are therefore higher than in many other freight operations involving multi-drop operations.
- **Delivery failure rate** – B2C same-day delivery failure rates are lower than those that occur less quickly after the order is placed as the consumer is expecting to receive it, and is often provided with a likely delivery time-window in which this will happen.
- **Delivery drop density** – in the case of non-food point-to-point same-day operations, higher drop densities provide greater opportunity for couriers to pick up additional items on their existing journey as orders are received by the carrier – this helps to reduce the transport intensity of the operation. In the case of multi-drop grocery deliveries and B2C non-food deliveries higher drop densities help to reduce the total distance travelled and vehicle fleet requirements, especially when limited delivery time-windows must be achieved.
- **Delivery lead-time** – given the rapid response required in many same-day deliveries this reduces the potential for achieving the higher drop densities that would be possible if more time were available. For takeaway meals which deteriorate rapidly this will never be possible. However in the case of non-food deliveries, greater lead time between the order and the delivery would permit opportunities to carry out multi-drop rather than point-to-point single deliveries.
- **Time of delivery activity** – much grocery and takeaway meal delivery takes place outside of peak-time traffic, in the early morning and evening, thereby having less impact on road traffic than deliveries during the peak. Weekend deliveries are also of growing importance in all sectors of B2C same-day delivery. However, evening and weekend work can impose noise disturbance and other nuisances.
- **Product return rates** – product return rates are very low in many same-day delivery sectors given the nature of the products. Only B2C non-food orders have sizeable return rates.
- **Safe and efficient driving** – the high rate of courier turnover in many same-day sectors poses difficulties in terms of safe and efficient driving giving that this requires experience and training. High proportions of self-employment are another barrier to training. Many companies using couriers provide only limited, if any road safety and driver training to couriers. Financial incentives or penalties imposed on couriers in accordance with whether delivery times are met are another factor that can affect safe driving. The young age and lack of driving experience of some couriers, especially those in the meal delivery sector, also contributes to difficulties of achieving safe driving, as does the fact that some companies do not require moped/motorbike couriers to have passed a driving test. The lack of vehicle insurance checking and provision by some companies using self-employed couriers also raises safety issues. As does the fact that many self-employed couriers provide their own vehicles, and therefore the safety and maintenance of these vehicles is not directly checked by companies using them.

See section 17 for analysis of the extent of these traffic, energy and environmental impacts in various same-day delivery sub-sectors, and for different vehicle types used.

16.2 Cycling in urban areas – environmental, health and wellbeing impacts

Cycling is associated with reductions in greenhouse gas emissions and local air pollution compared with other transport modes such as car, vans, motorbikes and mopeds used in the same-day delivery sector (see **section 11**). However, although manual and electrically-assisted cycles (and cargo-cycle) are CO₂ emissions- and local air pollutant-free at the point of use, there are CO₂ emissions associated with the extra food and drink consumption that a cyclist requires compared to a motorbike, car or van driver. These have been calculated to be approximately 16 g CO₂e / km for a cyclist and 6 g CO₂e for an electrically assisted bike user (European Cyclist's Federation, 2017). Also, research has shown that, like for other transport vehicles, there are CO₂ emissions associated with the manufacture and production of bicycles and cargo bikes. Although lower than for other, larger heavier vehicles this has been calculated to be approximately 5 g CO₂e / km for a bicycle or assisted cycle with a life of 8 years that travels 2400 km per year (compared to 42 g CO₂e / km for a car) (European Cyclist's Federation, 2017). While CO₂ free at the point of use, it is important to recognise the electricity used by assisted cycles is not necessarily generated from renewable sources.

Cycling is also associated with improved physical activity, with physical inactivity being an important cause of death and disability. Research has shown that cycling does typically lead to increased overall physical activity, rather than substituting other forms of physical activity and could thereby lead to improved physical health (Donaire-Gonzalez et al., 2015, Rojas-Rueda et al., 2016). However, while cycling typically leads to fitness improvement for the individual, it does result in exposures of the rider to dangerous and toxic fumes, and the risk of traffic collisions and resulting injuries. There is therefore a trade-off between health benefits and disbenefits for the cyclist (de Nazelle and Nieuwenhuijsen, 2010). Work has indicated that an individual driver who switches from car driving to cyclist for a 5km journey five days per week, 46 weeks per year the health benefit from the physical activity is worth about 1300 € per year, and in a large city associated reduction of air pollution is worth about 30 € per year. For the individual concerned in making the mode switch, the change in air pollution exposure suffers a loss of about 20 € per year, and the increased risk of collision and related injury or fatality implies a cost of about 300 € per year (Rabl and Nazelle, 2012). Another study found that physical activity benefits of cycling outweighed the harm caused by air pollution in all but the most extreme air pollution concentrations (Tainio et al., 2016). In addition, survey work has indicated that healthy, adult bicycle commuters have lower risk of being stressed than commuters of other transport modes, with those cycling four or more days per week having a lower risk of being stressed than those who cycled less often (Avila-Palencia et al., 2017). Also, research has indicated that people lower their body mass index when starting or increasing cycling (Dons et al., 2018).

16.3 Trip generation and noise and nuisance at restaurants

The sectors of same-day delivery have different impacts in terms of trip generation and its impacts. Non-food same-day deliveries are typically point-to-point so have unique origins and destinations for each job. Grocery same-day deliveries usually take place from a single origin (a shop or a fulfilment centre/depot) and are then made to multiple unique destinations. These deliveries can result in substantial trip generations at these origins. In the case of fulfilment centres and depots these are often located on industrial estates so the point of origin is often remote from general road traffic activity. In the case of supermarkets and high street grocery stores, the potential for road traffic disruption due to this additional trip generation is greater.

By contrast, meal deliveries have the greatest local trip generation impacts for several reasons. First, these deliveries emanate from high street restaurants and takeaways, with some outlets generating substantial vehicle activity. Second, these trips are generated within short peak periods of demand, especially in the evening from 18:00 onwards, so can conflict with evening peak road traffic. Third, these restaurants and takeaways usually have no off-

street parking space, so all arriving and waiting vehicles make use of on-street kerbside space. Fourth, dwell times while couriers wait for orders to be cooked and packed at the restaurant/takeaway are considerably longer than the time taken for a delivery at the destination. This can result in sizeable numbers of vehicles and drivers congregating outside a single restaurant outlet waiting for deliveries to become available. Fifth, many of these meal deliveries are made by bicycles and motorbikes/mopeds, and couriers therefore often choose to mount the kerb with their vehicles. These vehicles take considerable pavement (and kerbside) space and moving them across the pavement can lead to conflicts with pedestrians. In addition, couriers waiting for deliveries outside a restaurant can make considerable noise while socialising. However, they are usually not employed by the restaurant, which is therefore not responsible for their conduct. Given that meal deliveries continue late into the night, this can lead to considerable noise disturbance for residents living in close proximity to the restaurant/takeaway.

This has become a recognised problem in some dense, mixed-use urban areas, in which residents and restaurants are located close to each other. In the City of Westminster in central London, for instance, there are approximately 3,000 restaurants. The council received more than 25 complaints from residents living close to a branch of Nando's in Westbourne Grove. These residents said they were repeatedly disturbed by large groups of moped couriers waiting for orders in the street. Complaints included: disturbance by a large truck that made daily deliveries that arrived before 07:00 and which could take up to 1.5 hours; 3-4 mopeds parked up outside the restaurant at any one time after 19:00; several hundred delivery vehicle trips generated over the course of a weekend; risk of traffic collisions with pedestrians; poor driving behaviour; couriers often congregating in the street in the evening in good weather and creating substantial noise; the holding of street parties by couriers; verbal and physical abuse directed at residents when they asked couriers and customers keep the noise down; litter dropped by Nando's customers and couriers; and customers and couriers eating food on residents' steps (Hexter, 2017).

The council served a Planning Contravention Notice (PCN) on the Nando's branch which required the business to provide details of how it operates. The council also sent Enforcement Officers to monitor the situation over several weeks, and they reported "seeing drivers parking inappropriately, making noise and causing congestion" (Makortoff, 2017). After discussions with the restaurant but no improvement in disturbance, the council eventually used the planning system to issue a notice to prevent the Nando's branch from offering deliveries (Price, 2017). The council carried out a licence review on the grounds of increased public nuisances over many months due to its online delivery service, for which it had no planning consent (as it was only licensed for A3 (restaurant) use only and does not have an A5 consent for takeaway use or a mixed A3/A5 consent (Hexter, 2017). It is possible that many restaurants that have commenced making large-scale deliveries in recent years as a result of the rise of platform providers such as Deliveroo and Uber Eats do not have the necessary takeaway licences to permit such activity. Therefore, similar action to that taken by Westminster City Council against Nando's may be taken against by other planning authorities against other outlets in future in the face of similar problems.

The Westminster City Council cabinet member for planning and public realm has said that meal delivery platforms and their couriers have the potential to create "traffic chaos" if not dealt with. He stated that, "It is a popular, much-needed service but we can't allow the city to be swarmed with delivery drivers," and that, "the council needs policies to keep up with new technology, ensuring that areas can cope with the increased demand for food deliveries" (Makortoff, 2017). Westminster City Council is currently seeking to establish a policy for meal and other deliveries as part of its new City Plan. This is intended to help to manage trip generation in busy, mixed-use areas, as well as tackling noise disturbances and anti-social behaviour. Restaurants offering deliveries through phone-based apps (such as Deliveroo and Uber Eats) to the point that deliveries are no longer an incidental, secondary use of the building

may have to apply for planning permission under rules being drawn up and also demonstrate that they minimise disruption in local neighbourhoods. In these new rules, due to be introduced in 2019, it is expected that the volume of deliveries will determine whether a restaurant's deliveries constituted an incidental use or not (BBC News, 2017; Price, 2017b). If restaurants do not abide by certain rules they could become subject to formal enforcement action (Edgar, 2017).

As noted in **section 5**, Deliveroo has started to introduce stand-alone kitchens, which they refer to as 'RooBoxes' and 'Deliveroo Editions kitchens'; but which critics refer to as 'dark kitchens' (Butler, 2017; Neilan, 2017). Each development can comprise several different kitchens. It provides these kitchens to companies who then provide Deliveroo with a percentage of the kitchens' revenue or enter into a lease agreement (Intel, 2017c; Santariano, 2018). Many of these kitchens are producing takeaway food for high-demand and upmarket restaurant chains and popular independent restaurants so that it does not need to be made in, and collected from, the restaurant's own kitchen (Butler, 2017). These facilities have recently appeared in many London locations including: Battersea, Camberwell, Canary Wharf, Islington, Dulwich, Swiss Cottage, as well as in Hove near Brighton. They are located in metal shipping containers, disused carparks and industrial buildings (Pathiaki, 2017). Some of these facilities have been built in close proximity to residential accommodation and are leading to similar complaints concerning traffic generation by mopeds, motorbikes and vans; danger of traffic collisions with pedestrians; poor driving behaviour; and vehicle and courier noise during the evening and night (Hexter, 2017). It has been through these complaints to councils that it has then been found that some of these kitchens have been developed without obtaining planning permission. Several planning authorities (Brighton and Hove, Haringey, Islington and Southwark) have discovered that Deliveroo did not apply for planning permission before building these kitchens. Planning enforcement notices have been issued in at least two of these cases, requiring Deliveroo to shut its kitchens due to lack of appropriate planning permission and a refusal to grant change of use (Neilan, 2017; Pathiaki, 2017; Wadsworth, 2018). The company did not seek planning permission for its Deliveroo Editions kitchen in Islington despite its own consultant admitting that it is open from 11:00-23:00 and generates up 1,000 moped delivery journeys every day (Morris, 2018). These kitchen sites can generate up to 200 deliveries and vehicle trips per hour, especially when the weather is poor or a major event is on television and customers do not want to go out (Satariano, 2018). Deliveroo had planned to have opened 200 such kitchens in the UK by the end of 2017, but this was not achieved due to the complaints and planning investigations that have resulted (Butler, 2017). Instead, only 105 of these kitchens had been opened by January 2018 (Satariano, 2018). The Managing Director of Deliveroo in the UK and Ireland has said that the company is considering using more bicycles to deliver food, instead of mopeds, to reduce noise disturbance where that is a problem (Butler, 2017).

Deliveroo is attempting to address noise management at its Editions kitchens. The company has stated that, "In relation to planning permission, we agree that noise management should be considered at the earliest stage possible in any development process. For Deliveroo, this means undertaking a noise impact assessment to help determine the existing noise sensibilities and feasibility of a proposed Editions site". It also supports good acoustic design, and ensuring that all heating, ventilation and air-conditioning at Editions sites have noise attenuation factored into the design (Deliveroo, 2018a).

Deliveroo has also put in place on-site mitigation measures to address residential amenity issues arising from new Editions kitchen. These include a dedicated email point of contact for local residents, a Travel Plan, a Delivery Management Plan and an Operation Management Plan. The Operation Management Plan requires a 'robust appraisal process is undertaken with input from the professional consultant team, including planning, transport, noise and plant/ventilation advice' prior to the launch of an Editions kitchen site. The Travel Plan includes: attempting to ensure through the Deliveroo courier app that couriers only arrive at

the Editions kitchen when the order is nearly ready to be despatched (to prevent couriers congregating on site); ensuring that couriers collect meals from within the kitchens; provision of an internal courier waiting area inside the kitchens; provision of courier assembly points in areas as far from any nearby residential properties as possible, and the provision of on-site signage to remind couriers to leave the area as quietly as possible once the order has been despatched. Also, when deemed necessary by Deliveroo, an on-site Traffic Marshall can be deployed, who is responsible for managing vehicle and worker arrivals/departures to ensure minimal disturbance (Deliveroo, 2018a).

As part of the Delivery Management Plan each of the restaurant brands operating at an Editions kitchen is required to provide Deliveroo with full details of the number and frequencies of deliveries to the site each week (i.e. of food and other supplies, not of couriers delivering meals to customers). Deliveroo states that it will then review this information and seek to combine the deliveries of different restaurant brands at the Editions kitchen where possible, and will issue delivery time windows to waste collection and delivery vehicles (Deliveroo, 2018a). In addition, Deliveroo is trialling a scheme in north London to subsidise the costs of quieter, electric bikes for its couriers operating from its Editions kitchens and is also providing free recharging facilities at these trial sites (Volpe, 2018).

In situations where restaurants have the necessary licensing to make deliveries, or in the case of takeaways which are permitted to deliver to customers, these problems of traffic disruption and noise can still arise, and the ownership structure of the delivery operation makes addressing these problems extremely difficult. Prior to the rise of these companies and the growth in demand for meal delivery, restaurants tended to employ their own staff to take phone orders and make the deliveries, with demand sufficiently low so as to not result in much traffic generation, noise and nuisance. Given that in the platform provider meal delivery operation, the couriers are not employed by the restaurant or takeaway, then it is no use for residents to approach the shop owner/manager to make complaints about delivery activity and its impacts. In turn, the platform providers may well also argue that they are not responsible for the behaviour of couriers as they are self-employed (Hexter, 2017). The current licensing and planning system is therefore not well placed to cope with such a situation. Ideally, large-scale meal delivery activity would originate from kitchens on industrial estates rather than restaurants, takeaways and kitchens located in close proximity to residential property.

16.4 Behaviour on the road and the law concerning riding moped and motorcycles

As mentioned in **section 16.3**, some residents have been making complaints about the noise disturbance and driving/riding behaviour of same-day meal delivery couriers near the restaurants where they wait for and collect the meals.

As previously mentioned non-food parcel couriers and meal couriers often drive/ride fast and endanger themselves, other road users and pedestrians in their haste to complete work and earn more pay. This can involve weaving in and out of the traffic, and even riding on pavements in some cases. This partially stems from their self-employed status, whereby the faster that jobs can be carried out, the more the courier can earn (see **section 7**). It also stems from the fact that cycle couriers can achieve higher speeds than all other vehicle types in dense, busy, city centres which results in couriers often trying to negotiate stationary, or very slow moving traffic, which places them in danger (see **sections 15** and **16.6**).

Other factors are also likely to have a bearing on the road behaviour of some couriers including:

- Lack of driver/rider training in many companies/carriers especially, when couriers are self-employed

- Age profile of couriers – especially those working in meal delivery which has the youngest couriers of all same-day sectors. Many have little experience on the road prior to being engaged as couriers.
- Lack of driving qualifications among many moped and motorcycle couriers, especially in the meal delivery sector. Many of these couriers often have little driving experience prior to taking the job (except the CBT course), and often only hold a provisional moped/scooter licence in order (not having taken a practical or theory driving test). The restaurants, takeaways and platform providers that these meal delivery cycle and moped couriers work for often do not typically require driving qualifications as part of the recruitment process only proof of having attended a CBT course (see below for further details about the law on motorcycle driver licensing).

In order to ride a moped, learners be 16 or over. To ride a moped unaccompanied on the public road, riders must have a provisional licence, and satisfactorily complete a Compulsory Basic Training (CBT) course. They are then allowed to ride unaccompanied on the road on a a two-wheeled vehicle with a maximum design speed of 45 km/h (28 mph), with learner (L) plates for up to two years (Department for Transport, 2018).

In order to ride a motorcycle motorcycles up to 125 cc, with a power output not exceeding 11 kW (or tricycles with a power output not exceeding 15 kW) unaccompanied on the public road, motorcycle riders must be aged 17 and have a provisional motorcycle licence, and satisfactorily complete a Compulsory Basic Training (CBT) course. They are then allowed to ride unaccompanied on the road on a motorcycle up to 125 cc, with a power output not exceeding 11 kW, with learner (L) plates for up to two years (Department for Transport, 2018a).

CBT is a course that has to be taken before a learner can ride a moped or motorcycle on the public roads. The CBT training is intended to ensure that a learner can ride safely on their own while practising for their full moped or motorcycle test. The CBT course usually takes a full day to complete, but can take longer depending on how quickly someone learns. There are five parts to the CBT course:

- introduction and eyesight check
- on-site training
- on-site riding
- on-road training
- on-road riding

CBT isn't a test that someone passes or fails. A person only moves on from one part to the next when their CBT trainer is happy that they have: learnt the theory, and shown the practical skills to a safe basic level. The on-road riding part has a duration of at least two hours. Each CBT course has a maximum number of four learners per trainer for on-site parts, and two learners per trainer for on-road parts. A 'certificate of completion' is issued upon the successful completion of the course. Once someone has obtained this CBT certificate they can then ride a moped or motorcycle (up to 125cc and with a power output of up to 11kW) on the public roads with learner ('L') plates. A learner must then pass their theory test and full moped or motorcycle driving test within 2 years, otherwise they have to complete CBT again or stop riding ((Department for Transport, 2018b).

For those who passed a car driving test before 1 February 2001, they are qualified to ride a moped without L plates, although it is recommended that they complete CBT before riding on the road. If a car driving test was passed after this date they must complete CBT before riding a moped on the road (Department for Transport, 2018a).

In addition to the CBT course, some organisations, such as Transport for London, have set up additional training courses for riders. There are no compulsory courses or riding qualifications that are required by law prior to riding a bicycle. However, voluntary training schemes do exist (see section 16.5 for further details). There are no compulsory courses or riding qualifications that are required by law prior to riding a bicycle. However, voluntary training schemes do exist (see **section 16.5** for further details).

There are numerous reports in the local media of couriers, especially those using mopeds and bicycles, of driving in places that it is not legal for them to operate, such as on pavements, in parks and through alleyways in order to take shortcuts in the hope of reducing journey times (for example see Marsh and Boswell, 2016; Zhuravlyova, 2018). This can place pedestrians, other road users and members of the public at risk. Arguments and fighting between couriers, especially among those making meal deliveries have taken place. Such altercations often occur when these couriers gather outside busy restaurants and takeaways.

16.5 Road safety and training

The lack of same-day delivery driver/rider experience and training among some couriers, together with the pressure they place themselves under to finish each job as soon as possible in order to acquire another job and more pay, means that as well as exhibiting poor behaviour on the road to other road users and pedestrians, they also put their own safety at risk. Much of this delivery work takes place on bicycles, motorbikes, mopeds and scooters. These are vehicles which when involved in collisions are disproportionately involved in serious injuries and fatalities to their riders. The majority of meal deliveries take place at night, which also increases the risk of collisions. Riding two wheeled vehicles in poor weather also increases the risk of collisions and the severity of any traffic incidents. Meal and parcel couriers working at night (or even during the daytime) making deliveries to residential addresses may be confronted by aggressive or drunken customers. Work alone after dark, and sometime handling money, can also make such work dangerous (European Agency for Health and Safety at Work, 2010). In the last couple of years, attempts to steal couriers' motorcycles, mopeds and bicycles have led to acid attacks on some couriers that have resulted in life-changing injuries (McGoogan, 2017). The road worthiness of the vehicles used also plays an important role in road safety. Couriers on two-wheeled vehicles are exposed to the elements and are subject to poor air quality, especially in dense, congested urban areas. In addition, the physical strain of cycling requires a higher and more intense rate of breathing. This results in cyclists being more exposed to polluted air. Chronic exposure to air pollutants can reduce lung function permanently (Hendry, 1999).

Levels of driver/rider training among couriers is low, both before and during their work in the sector. This is likely to be due to a combination of the price of such training courses, the self-employed status of many couriers (meaning that such training would not be freely provided to such couriers by carriers), and hence the loss of working (and hence earning) time that would result from participating such training courses. Also, given the part-time status of some couriers who may have other jobs or are in education, they have little free time to participate in training programmes even if such courses were affordable. As many bicycle and moped/motorbike same-day couriers are self-employed they are often responsible for their own provision and use of safety equipment such as helmets and protective clothing.

A survey of 160 meal delivery bike couriers in Australia (mostly working for Deliveroo, Uber Eats and Foodora) found many reporting that they received little or no training. Three couriers with experience of all three platform providers said that Uber Eats provided the least training. One reported only being emailed a PowerPoint presentation about safety issues by Foodora, while another said that Uber Eats only provided them with a bag and no training (Zhou, 2018).

In response an Uber Eats spokesperson said that couriers were provided with 'safe bike riding tips', that the Uber app 'often includes safety information', that the Uber website also provides safety tips, and that the company was working to enhance the information provided to couriers on road regulations and bike safety. In response, a spokesperson for Foodora said that couriers are required to do a road safety quiz and are contractually obliged to carry out more advanced tests if Foodora requests. Meanwhile Deliveroo provides new riders with eight safety videos before they commence work (Zhou, 2018). Deliveroo has stated that all its UK couriers undertake a practical and theory training session with qualified trainers, who also conduct regular spot checks on delivery workers (Ainsworth, 2017).

In Australia, addition to the perceived lack of training among couriers, some reported that their risk of work-related injury was increased by companies they work for sending them messages urging them to continue working in poor weather conditions, when demand for meal deliveries increases. Even if the companies do not encourage riders to continue working in poor weather, some couriers feel pressurised to do so as they are concerned about future work with the company if they 'clock off' in bad cycling conditions. Companies including Foodora and Deliveroo responded to these accusations by saying that couriers are not obliged to work in poor weather conditions and that they regularly sent out safety alerts to remind couriers of road safety or warn of weather conditions (Zhou, 2018).

It is not untypical for new couriers to be only provided by the carrier/company with the most rudimentary safety advice and training on commencing work. The extent of safety advice and training provided is often even less in the case of a self-employed courier than it is for an employed courier. The legal liability and requirements of a carrier/platform provider that employs couriers are more onerous than for one that uses self-employed couriers. In the case of an employed courier they would usually be provided with limited safety equipment such as a basic helmet and a hi-vis vest.

Companies employing couriers can be liable for the provision of inadequate training and provision of safety equipment in the case of a traffic collision involving one of their employees. In addition, the courier would be entitled to sick pay if such a situation arose. The carrier/company does not have the same legal responsibilities with respect to self-employed couriers.

Most same-day delivery companies do not require motorcycle, moped and bicycle riders to have any previous riding or delivery experience. Survey work among parcel and meal delivery companies operating in London in 2006 found that 40% of parcel delivery companies and 30% of meal delivery companies did not require previous riding or delivery experience from prospective couriers. The survey found that 34% of parcel delivery companies and 63% of meal delivery companies deployed powered two-wheel riders who held provisional rather than full driving licences.

The type of licences held by motorbike and moped riders differed across the two same-day delivery sectors. Meal delivery companies were significantly more likely to state that their motorbike and moped riders held provisional licences for vehicles up to 50cc (37% of meal delivery companies, compared to 15% of parcel delivery companies). Parcel delivery companies were significantly more likely to state that their riders held full licences covering all capacities of powered two-wheelers, which includes vehicles over 125cc (92%, compared to 22% of meal delivery companies). This difference in licences held by meal and parcel delivery powered two-wheel riders is reflected in the types of vehicles they use. Meal delivery riders were found to be more likely to ride vehicles up to 50cc and parcel riders were more likely to ride vehicles over 125cc. Therefore delivery riders were found to be likely to hold licences up to the size of the vehicles they ride. The frequency of driving licence checks by companies using couriers were found to vary considerably from company to company and no industry-

wide policy appeared to exist. While most delivery companies stated that they inspected licences more than once a year, 21% only checked them annually (Synovate, 2007).

The 2006 survey of parcel companies operating in London found a high level of agreement from these companies that injuries and accidents are a real concern to the organisation (75% of respondents agreed with this statement), the majority of respondents do not agree that their company needed to do more to improve the health and safety of riders or that the issue of health and safety should be taken more seriously. Only 31% of parcel companies felt that they as an organisation could do more to improve the safety of its couriers, and only 18% of parcel companies felt that there was a need in the organisation to improve the training given to its couriers. This may reflect the fact that given the high proportion of self-employed couriers in the parcels sector, there is an opinion among companies that the responsibility for road safety lies with the riders rather than the company, especially if the company believes that it is making use of experienced riders (Synovate, 2007).

The number of companies offering incentives to riders to drive safely or improve their skills and standards by undertaking training schemes or gaining qualifications was small, with only 13% of parcel delivery companies and 19% of meal delivery companies stating that they had such incentives in place in 2006. Where such incentives did exist, the most common form was financial reward, either in the form of extra payment or, in the case of a few parcel delivery companies, by giving couriers extra or guaranteed jobs (Synovate, 2007).

This 2006 survey work found that meal delivery companies were more likely to offer formal training and guidance to their riders than parcel delivery companies. While 52% of meal delivery companies had formal training schemes in place for their riders, only 21% of parcel companies offered this. Similarly, 62% of meal delivery companies provided new riders with guidance on safe riding techniques, compared to only 30% of parcel companies.

At present an individual can complete their motorcycle Compulsory Basic Training (CBT), and then ride a powered two-wheeler for payment without having passed a theory test of the Highway Code or a driving test (see **section 16.6** for further details). Transport for London began offering a free, one-day post-Compulsory Basic Training (CBT) course for motorcycle and moped courier riders in 2016, entitled 'Beyond CBT: Skills for Delivery Riders'. This is intended to improve riding skills and help better navigate London's busy roads. The course includes information about the Highway Code, motorcycle maintenance, load security, and how to use a satnav system while riding. It also includes planning and riding a route through a busy urban environment while delivering (Transport for London, 2018b). Transport for London has also created a free online course aimed at new motorcycle and moped riders that covers key elements of the Highway Code and riding theory (Transport for London, 2018c). The IoC code is considering establishing a Code of Practice which will require that the theory test is passed by motorcycle/moped riders before it is possible to gain paid work in the (same-day and next-day) parcel delivery industry (see **section 16.10** for further details).

Voluntary training courses also exist for cyclists, such as 'Bikeability' which is based on government-approved National Standards for Cycle Training. These courses are intended to teach cyclists the necessary skills to ride confidently on public roads. Bikeability offers three levels of training: Level 1 teaches basic bike-handling skills in a controlled traffic-free environment, Level 2 teaches trainees to cycle planned routes on minor roads, offering a real cycling experience, and Level 3 ensures trainees are able to manage a variety of traffic conditions and is delivered on busier roads with advanced features and layouts (Department for Transport, 2012). No data is available about the number of same-day cycle couriers who take part in voluntary cycle training schemes, but it is unlikely that many take advantage.

16.6 Traffic incidents and casualties in the same-day sector

Survey work in the gig economy in the UK in 2018

A recent UK study of couriers and taxi drivers in the gig economy in the UK has found that pressures associated with the work and self-employment may significantly increase the risk of being involved in a traffic collision. The research involved 48 qualitative in-depth interviews with couriers, drivers and their managers (36 with couriers and drivers and 12 with managers), and an analysis of 200 responses to an online survey of couriers and drivers. The participants included self-employed couriers who delivered parcels and food, and self-employed taxi drivers who received their jobs via apps. Sixty three per cent of survey respondents stated that they were not provided with safety training on managing risks on the road. Sixty-five per cent said that they were not given any safety equipment such as a high visibility vest and over 70 per cent resort to providing their own. Sixty seven per cent reported that the company did not suggest they had rest breaks and did not give advice about using their phone whilst driving or riding. Forty two per cent of respondents stated that their vehicle had been damaged as a result of a collision while working, with a further 10% reporting that someone had been injured (8% of couriers and drivers reported being injured themselves, while 2% said that someone else had been injured). Forty per cent of respondents using an app as part of the work reported that they found them to off-putting while driving or riding. Most couriers using bicycles, scooters, and motorbikes reported receiving their work through an app on their mobile phone which makes a noise at intervals to alert them to a job becoming available, and then having a fixed time window in which to accept the job. Tiredness from overwork was identified as another risk factor for collisions, especially among parcel couriers. Overall, respondent couriers on two wheeled vehicles enjoy the freedom and flexibility of courier work and felt under less pressure than car and van couriers, but still face the challenges of tiredness, distraction by their work app and taking risks. Couriers on two wheeled vehicles also reported worries of being attacked and adverse weather conditions, when their companies would incentivise couriers to go out to work. Across both two and four-wheeled couriers, only 25 per cent agreed that the company cared about their safety whilst working. The research was funded by the Road Safety Trust, with support and fieldwork from Further Afield (Christie and Ward, 2018).

Couriers and drivers participating in interviews said that no training was required or given apart other than being informed of online videos (which mostly provided information about the delivery process rather than health and safety). Many of the couriers and drivers interviewed felt that the current legal and political consideration of worker status and rights was resulting in their company trying to avoid engaging directly with them so as not to be seen as treating them as employees. Many of the managers interviewed felt the way in which their companies dealt with safety and training issues conflicted with their own views about how these issues should be handled (Christie and Ward, 2018).

One of the authors of the report noted that, “as more workers enter the economy and competition rises, the number of hours they need to work and distances they must travel to earn a stable income both increase. We know this is an issue but don’t know exactly how far it extends as not all companies need to report the number of self-employed couriers they use to the government” (UCL, 2018). They went on to state that, “In previous years the UK had a good road safety record, but de-regulation over the last few years has left self-employed couriers and taxi drivers at an increased risk of exploitation. The Health and Safety Executive has regulations on safety at work, but these don’t apply to those whose work takes place on public highways (UCL, 2018).

The report provides recommendations for companies using self-employed couriers and taxi drivers to limit the pressure that these workers have to operate under. These include introducing payment by time period, rather than payment per delivery/ride. If drop rates are

used for worker payment calculation it is argued that these should take into account the time taken to travel safely within the speed limit and perform administrative functions such as scanning parcels and obtaining signatures (Christie and Ward, 2018).

Survey work with parcel and meal delivery companies in London in 2006

Survey work was carried out among parcel and meal delivery companies operating in London in 2006. These companies were asked how many collisions their motorbike and bicycle riders had been involved in over a 12-month period (from July 2005 to June 2006). Three types of incident were identified: damage only, collisions that caused injury to the rider and collisions that caused injury to another road user. Damage only incidents were the most common, with 47% of parcel delivery companies and 32% of meal delivery companies experiencing at least one damage only incident in the 12-month period. Thirty-five percent of parcel companies reported that one or more riders had been injured in a collision, compared to 25% of meal delivery companies. Collisions involving injury to another person were rare, with 4% of parcel companies and 3% of meal delivery companies stating that at least one of their riders was involved in this type of collision in the 12-month period. Of the 19 parcel companies who had at least one rider injured in a collision, 12 of these companies stated that the rider was slightly injured, 9 companies stated that at least one rider was seriously injured (requiring a hospital stay), and 1 company reported a rider killed. Of the 26 meal delivery companies who had at least one rider injured, 18 stated that the rider was slightly injured and 8 stated that the rider was seriously injured. Parcel delivery companies reported a greater number of rider days lost due to collision involvement, a finding that reflects the higher number of reported collisions involving courier riders. It should be noted there are more collisions and casualties involving couriers working for these companies than reported by companies in the survey as incidents are likely to take place each year that go unreported by both couriers and the company.

The situation in China

Meal, grocery and non-food same-day (and next-day) deliveries have grown faster in China in recent years than in any other country. The online food delivery market is estimated to have increased by 42% in the first six months of 2017. The two major providers of these services are Alibaba and Tencent. It has been estimated that there were three million couriers in China in 2017, with the vast majority working wholly within urban areas, and many of them riding electric scooters or three-wheelers. Chinese cities are now suffering with adverse traffic and safety consequences of this growth. It has been reported that couriers are traveling too fast and dangerously in their haste to complete deliveries on-time, and thereby avoid fines or earn bonuses. In doing so they are putting themselves and others in danger. In addition, training and insurance for couriers is reported to be inadequate (Shepherd, 2017).

In the first six months of 2017, 76 injuries and deaths involving food couriers were reported in Shanghai. It was reported that couriers from the two largest food delivery companies, Meituan-Dianping and Ele.me, were involved in approximately a quarter of these traffic incidents. As a result of this, Shanghai police met with the largest food delivery companies in to warn them that they needed to improve safety standards. In the city of Nanjing it was reported that couriers were involved in more than 3,000 accidents in the first half of 2017, of which couriers were responsible for more than 90%. Police in Nanjing also met with food delivery companies (Shepherd, 2017).

A spokesperson for Meituan said they had increased their safety training and procedures as a result of these collision and casualty statistics. Their drivers wear a fluorescent yellow jacket, the company has a safety training scheme for couriers, and ran more than 300 driver training courses in July 2017. The spokesperson reported that the traffic incidents in which its couriers had been involved had fallen by 14% the following month. A spokesperson for Ele.me said that the company recently implemented a system to track traffic violations by couriers, and

also offered rewards to members of the public who report incidents involving its couriers. The spokesperson also said that it informs its couriers that, “safety is first, speed is second” (Shepherd, 2017).

The Hong Kong-based China Labour Bulletin, has reported that couriers are increasingly complaining about their situation in public, and holding protests and strikes to demand better wages and insurance cover. Many couriers are not employed by the platform providers, instead they either work for agencies that provide courier services to the platform providers or are self-employed. A report by Meituan-Dianping in 2016 indicated that the majority of its couriers were migrant workers under the age of 26. Although most coverage of this issue has focused on food delivery companies and their couriers, it has been noted that the parcel delivery sector also has similar problems (Shepherd, 2017).

Survey work with meal delivery couriers in Australia in 2018

A survey of 160 meal delivery couriers in Australia (mostly working for Deliveroo, Uber Eats and Foodora) found that 50% had been injured on the job or knew a colleague who had. Injuries reported included: falls, twisted ankles, collisions with other vehicles resulting in stitches and hospitalisation, being ‘doored’ (i.e. when a car or van driver/passenger opens their roadside door without first checking if a courier is cycling passed). Many also reported damage to their bikes, some having been entirely crushed in collisions. Some reported being urged by the platform provider to continue working in unsafe weather conditions (Zhou, 2018).

Study of collisions involving cycle couriers in Montreal

Studies of bicycle couriers in Montreal have shown that they are six times more likely to be involved in collisions than other cyclists. This high incidence of collisions compared to other bicycle users is due to the distance the couriers cover and the amount of time they spend on the road (Messengerville, 2008).

Analysis of cycling injuries in London

This section refers to all cycling injuries in London, rather than specifically to cyclists working in the same-day delivery sector. In London, cyclists have an eight-fold over-representation in casualty figures, compared to their mode share of approximately 2% of road traffic activity (TfL, 2011). Road infrastructure, the design of vehicles, and road user behaviour can all contribute to cyclist injury (quoted in Aldred et al, 2018 - for example see Pai and Jou, 2014 on cyclist behaviour, Johnson et al., 2014, on driver behaviour, and Morgan et al., 2010 on HGVs and cyclist injury).

Modelling work has suggested that increases in cyclist flows decrease the likelihood of cyclist injuries. Meanwhile, increased motor traffic volume was found to be associated with higher risk of cyclist injury. The modelling results indicated that reducing motor traffic volumes from 6000 to 2000 motor vehicles per day is associated with a reduction in odds of cyclist injuries by about 70%. Speed limits of 20 miles per hour were found to be associated with 21% lower injury odds than roads with 30 miles per hour limits. Residential streets were also found to be associated with reduced injury risks, while junctions were associated with higher likelihood of injury (Aldred et al., 2018).

Analysis of incidents involving vans

This section refers to all van use in Britain, rather than specifically van use in the same-day delivery sector. Analysis of traffic collision data in Britain for the period 1993-2003 showed that while vans total incidents had decreased by similar proportions to all road traffic over this period, vans were overrepresented in fatal incidents from 1999 onwards (Lang and Rehm,

2006). In the period 1999-2003, 91% of the drivers of vans involved in all traffic incidents in which injuries occurred were male, 32% were aged 26-35, while 18% were aged under 25. Approximately 50% of all these injuries involving vans between 1999-2003 occurred on roads with speed limits of 30 miles per hour or lower. However, only 0.2% took place on roads with speed limits of 20 mile per hour or slower. Junctions were involved in 50% of casualties in these incidents in which vans were involved. Seventeen per cent of all injuries to van occupants or pedestrians in these incidents, were pedestrian casualties (with 65% of these casualties occurring when the pedestrian is either crossing or in the middle of the road in the absence of a pedestrian crossing) (Lang and Rehm, 2006).

16.7 Vehicle provision, maintenance and use

Self-employed couriers are usually required to provide their own vehicles (be it a bicycle, moped, motorbike, car or van). Some carriers will rent or lease vehicles to their couriers. In the case of couriers who are employed by a carrier, they are more likely to be provided with a vehicle by the carrier.

Ideally, a courier has a dedicated vehicle that is adjusted to their needs and requirements, and which they therefore have confidence in. However, in some same-day delivery operations, vehicles are shared between couriers. In these cases it is important that the courier is shown how to make adjustments to factors including seat height, mirror setup, and brake and clutch lever setup.

Ideally all couriers should carry out safety inspections of their vehicles before using them each day. In the case of a motorcycle this would involve a minimum of inspecting the following: tyres and wheels, controls, lights, oil, chassis, and stands.

However, a vehicle inspection is only as good as the person conducting it, and how regular it is done. If a courier has not been trained in how to check their vehicle then the check may be of little value even if it is carried out. Conversely, a well-conducted inspection can be invaluable in protecting the courier's safety and preventing collisions.

As well as vehicle inspections, attention needs to be paid to what goods can be carried, where these goods should be carried, on what the vehicle's limits on the carriage of goods are in terms of size and weight. Without such considerations, the safety of the courier and their journey will be compromised.

Survey work carried out among parcel and meal delivery companies operating in London in 2006 provides useful insights into companies' approaches to vehicle checks. Meal delivery companies were found to be more likely than parcel companies to check that vehicles were roadworthy. The survey results showed that significantly more parcel delivery companies (23%) never performed vehicle inspections, compared to meal delivery companies (5%). This is likely to have been due to the fact that couriers in the parcel sector were, in 2006, more likely to ride on a freelance, self-employed basis and be responsible for their own vehicles, than was the case for couriers in the meal delivery sector. This situation has changed in the last 12 years (Synovate, 2007).

The survey found that many staff members in companies where inspections were carried out often did not have any qualifications to do so. Over a third (37%) of parcel delivery companies, and a fifth (20%) of meal delivery companies allowed inspections to be performed by staff without any formal qualifications in 2006. The vast majority of companies whose riders used their own vehicles requested verification of a valid M.O.T certificate (92% of parcel delivery companies and 82% of food delivery companies) (Synovate, 2007).

Safety clothing and equipment is extremely important to couriers using bicycles, cargo cycles, mopeds and motorbikes. This includes helmets, clothing to ensure skin is not exposed, and equipment to make the courier and their vehicle as visible as possible (including hi-viz clothing, and reflective tape on boxes). Waterproof clothing is advised when operating in wet conditions. The courier then needs to ensure that they make use of all of this clothing and equipment all of the time. Research has shown that while safety clothing does reduce the extent of injury, there is scepticism among some cyclists about its effectiveness and a widespread dislike of using it (Aldred and Woodcock, 2018).

In Australia, to become a bike courier the company only requires a passport and birth certificate, and another form of ID. By comparison to become a car or motorbike courier, Uber requires documentation of driver's license, passport or birth certificate, and vehicle insurance. Bike couriers regularly reported that their insurance was not checked or mentioned by the company they worked for (Zhou, 2018).

Survey work carried out among parcel and meal delivery companies operating in London in 2006 showed that, at that time, meal delivery companies were more likely to provide vehicles and safety equipment to their motorbike and bicycle riders than parcel delivery companies. The quantity and type of equipment provided to riders differed significantly between the two types of delivery companies. Food delivery companies were significantly more likely to provide vehicles and safety equipment (e.g., high visibility clothing, helmets, and protective gloves) to all of their riders. Parcel delivery companies were less likely to provide this equipment. However, they were significantly more likely to provide communication devices to their riders. Parcel delivery companies utilised more self-employed couriers than meal delivery companies in 2006; this is likely to have influenced the provision of equipment in the respective sectors. Food delivery companies were far less likely to deploy experienced riders than parcel delivery companies. Parcel companies tended to provide their riders with more specialised delivery equipment (e.g., bags, panniers, communication devices) which were needed to manage deliveries (Synovate, 2007).

16.8 Personal and accident insurance

Self-employed couriers are not entitled to various protections and benefits that employees and dependent workers enjoy. They do not receive sick pay, holiday pay, minimum wage, discrimination protection, pension contributions or maternity/paternity pay.

Self-employed couriers have traditionally been able to take out insurance to protect themselves against the risk of injury and to provide them with public liability cover if they so wished. This is an important consideration for a courier, as an injury can result in them being unable to work, and therefore earn money, for a considerable period of time. However, as many couriers' earnings are roughly equivalent to the minimum wage and they also have to maintain their vehicle at their own expense, typically not many couriers take out such insurance. Not having such insurance means that they are not financially protected from collisions and injuries that prevent them from working, or from third-party claims against their being responsible for injuries to others and damage to their property.

If the other party involved in a collision is at fault, then the courier can bring a claim against them. If a courier is injured in a hit and run accident or by an uninsured driver they may be able to get compensation through the Motor Insurance Bureau (MIB). If the collision is the courier's fault and they are based in London, they may be able to get financial assistance from the London Courier's Emergency Fund (a charitable organisation which provides support and financial help to bicycle couriers who have suffered injury – see **section 15**).

However, some carriers/platform providers are, as a result of pressure exerted on them by politicians, unions and workers beginning to offer personal and accident insurance schemes

to self-employed couriers. In January 2018, Uber Eats launched a free insurance scheme for self-employed couriers working for it in nine European markets. The scheme includes personal accident insurance during a delivery trip, a cash benefit for severe sickness or injury that leads to hospitalisation up to a maximum of 15 days, and third party liability cover up to a maximum of €1 million. This Uber Eats scheme does not, however, provide insurance for sickness or injury that does not result in at least three days of hospitalisation (Fioretti, 2017; Lomas, 2017). In May 2018, Deliveroo announced it would introduce a new free accident insurance scheme for its couriers which provides up to £7,500 cover for medical expenses and 75% of gross pay as replacement income for up to 30 days of inactivity in case of injury at work (Makortoff, 2017; Roberg, 2018; Tassinari, 2018).

In May 2018, the European Commission issued a proposal that electrically-assisted cargo cycle (and other e-bikes, segways and electric scooters) users should require third party liability insurance. If this becomes law, users of these bikes will require third party motor insurance. The European Commission claims in its proposal that users of these pedal-assisted cycles should already currently have full motor vehicle insurance. If this is enacted into European law in due course, the European Commission points out that Member States have with the power to exempt electric bikes from motor third party liability insurance, and if doing so, national guarantee funds would have to “bear the costs of reimbursing victims of accidents caused by these new types of vehicles” (European Commission, 2018a, 2018b).

16.9 Work Related Road Safety and the Management of Occupational Road Risk

To bring about change in the behaviour and safety of couriers in the same-day delivery market it is necessary to engage companies (carriers, platform providers, and grocery retailers) in discussions and practical solutions about Work Related Road Safety (WRRS) and the Management of Occupational Road Risk (MORR). As discussed in earlier sections of this chapter, there are many road safety issues in the same-day market that need to be improved for the sake of the couriers, other road users and pedestrians, as well as wider society that is subject to the effects of noise disturbance, and negative environmental consequences of delivery activity.

It is likely that a substantial proportion of scooters and mopeds used for same-day deliveries, especially those used in meal deliveries, are ridden on ‘L’ plates by riders who have not passed the theory or practical tests, and have only attended the compulsory CBT course. Same-day delivery companies are potentially putting themselves at serious risk because in the event of a serious accident it would be very hard to claim that a provisional licence holder who had not passed the DVSA test was adequately trained.

Research has shown that approximately 25–30% of the fatalities occurring on Britain’s roads are likely to be work-related. It is therefore likely therefore that more people are killed in ‘at-work’ road incidents than in all other kinds of occupational incidents. In addition, drivers covering substantial mileage each year and much time on the road as part of their job appear to be about as likely to being killed at work as workers in acknowledged high hazard sectors such as construction and quarrying (RoSPA, 2002). Data for incidents involved those driving for work shows that in 2012 16,270 drivers were injured or killed, but 25,484 other road users were injured or killed in these incidents. In terms of fatalities in driving for work incidents in 2012, 87 were drivers and 422 were other road users (Helman et al., 2014). In 2014, road collisions known to involve work-related driving killed 547 people (which is likely to be an underestimate, as for cars journey purpose data was listed as ‘unknown’ in around 80% of cases. By comparison, 265 people (142 workers, and 123 members of the public) died in general work-related activity in the most recent annual data available from the Health and Safety Executive (Christie et al., 2017). Research has also identified an overrepresentation of vans in fatal accidents in the period 1999–2003, with drivers of other vehicles having a higher casualty rate Lang and Rehm, 2006).

Research has indicated that work-related road risk is increased in specific circumstances including: driving during the highest risk periods related to sleepiness (especially 02:00-06:00, and 14:00-16:00; driving while handling devices such as mobile phones, and driving under time pressure (which may result in increased speed) (Grayson and Helman, 2011). Research has also shown that attitudes and risk perception have a significant impact on the causes of road traffic accidents and on driving behaviour generally. In addition, many companies road safety may not be identified as a health and safety issue. As a result of this managers and peers may be reluctant to question, comment, or point out the dangers and risks of unsafe driving behaviour. Stress has been shown to increase risky driving behaviour and to be related to increased involvement in minor accidents. Increased stress has also been associated with tiredness when driving, which also increases the risk of accident involvement (Health and Safety Executive, 2002).

A UK study in 2002 found that 64% of organisations claimed to have a policy relating to safe driving procedures. However, when followed up, it was found that organisations reported having such a policy even if they only had a general health and safety policy, even where this did not specifically state road safety risks (Health and Safety Executive, 2002).

A review of Work Related Road Safety (WRRS) has stated that, "When the WRRS field is examined in terms of its history, and its literature and evidence base, it is tempting to be pessimistic.....While there are clearly pockets of what might be called 'good practice'.....and abundant provision of services and products to assist companies with the topic, it is not really clear that things have moved forward a great deal" (Helman, et al., 2014).

As part of the Health and Safety at Work Act employees are expected to ensure, so far as reasonably practicable, the health and safety of all employees at work (including those driving) and also to ensure that others are not put at risk by work related driving activities. The Health and Safety Executive 'Guide to Managing Work Related Road Safety', and the Management of Health and Safety at Work Regulations require Employers to Manage Work Related Road Safety (WRRS) and to have a Road Safety Policy. According to the Health and Safety Executive, the Management of Occupational Road Risk (MORR) applies to 'any employer with employees who drive, or ride a motorcycle or bicycle at work, as well as self-employed people. It also applies to those using their own vehicle for a work-related journey' (The Health and Safety Executive, 2014). Employers are responsible for assessing the risks from work-related road safety in their organisation, and should produce a health and safety policy. In doing so employers should take account of factors that can add to road safety risk including: journey distance, incentives that encourage vehicle speeds, the route safety, vehicle safety, the training and wellbeing of drivers (Health and Safety Executive, 2014).

The Health and Safety Executive has produced guidance for transport and logistics companies employing staff to explain to them the WRRS risks in the industry, their responsibilities as employers, and to provide guidance to them about how best to mitigate against workplace transport, manual handling and falls risks (Health and Safety Executive, 2003; 2014). A practical guide has also been produced to assist logistics and supply chain organisations with the effective management of work-related driver fatigue (RSSB, 2013). None of this WRRS advice and guidance is specific to companies working in the same-day delivery sector. If companies providing same-day delivery services have no Road Safety Policy or specific policies about rider training, the policy would be deemed inadequate. This can put Company Directors personally at risk.

It has typically been government practice not to apply Health and Safety legislation where more specific and detailed legislation exists, such as Road Traffic Acts, which adequately protects public and worker safety. Health and Safety enforcement authorities did not usually investigate at-work traffic incidents, except in the case of highly specialist vehicles. This led to

the available health and safety legislation often not being properly enforced, and incidents were instead subject to road traffic law, and enforced by the police and the courts (Lang and Rehm, 2006). However, there are signs that this government attitude to health and safety legislation and its enforcement are changing, especially given the increase in self-employment in the UK.

A recent review of MORR for the Parliamentary Advisory Council for Transport Safety (PACTS) commented on the growth in last-mile deliveries as a result of ecommerce and online shopping. It noted the importance of self-employment among couriers making meal deliveries, and those offering taxi services and noted that, "There is growing action to regulate these forms of employment to provide workers' rights however little is known about how health and safety is embedded in these types of employment and whether workers are provided with training or are required to have training. The new inquiry by the Business, Energy and Industrial Strategy Committee: "The future world of work and rights of workers" launched in December 2016 identified questions about employment rights but none about health and safety. An international survey by the McKinsey Global Institute (MGI) (2016) estimated that 162 million people worldwide are employed as independent workers with official statistics suggesting that there are five million such workers in the UK. The MGI report concluded that whilst these independent workers participate by choice and enjoy the flexibility and independence of such work there is a policy need to resolve the problems of employment rights and access to training. Given that many of those working in the gig economy are independent workers who provide transport based services - driving or riding- it seems critical to understand the health and safety issues around such employment. There are many health and safety issues to be addressed in such 'gig' employment. For example, evidence has shown that there is elevated risk for despatch riders/couriers, and such risks may also be experienced by gig workers who are offering transport based, time pressured services" (Christie et al., 2017). This review went on to identify key questions that need to be addressed including (Christie et al., 2017):

- How many workers are involved in transport based gig economy?
- How are or can they be represented in the casualty report?
- What sort of health and safety training do they have or are they provided with?
- What road casualty risks (or near misses) are associated with workers and their passengers (where applicable) in the transport based gig economy?
- Many of the transport based 'gig' services such as Deliveroo are time pressured and occur at night (and delivered by people who also work during the day) - what do we know about the role of fatigue in the safety of such services?

The review went on to identify the following implications of this for government policy (Christie et al., 2017):

- the Department for Transport needs to commission research into understanding the safety issues around unregulated transport based work in the gig economy
- the Department for Transport needs to work with coordinators of digital platforms such as Uber, Deliveroo to encourage uptake of safety training.

Transport for London (TfL) has implemented a Fleet Operator Recognition Scheme (FORS) to improve WRRS, as well as making specific efforts in the construction sector and its use of heavy goods vehicles through CLOCS (CLOCS, 2018; FORS, 2018).

16.10 Courier Code of Conduct/Practice

Just after the millennium, the Department for Transport (DETR as it was then) worked with the Despatch Association to come up with a Code of Conduct for those companies and couriers working in the (same-day and next-day) non-food parcel delivery industry, regardless of whether they were employees, workers or self-employed, and whatever vehicle type they used. This Code was aimed at maintaining the highest standards of road safety possible at all times, and at reducing accidents on the road to a minimum. The Code acknowledged that in order to achieve professionalism couriers need the highest consideration for other road users, pedestrians, and the general public. The Code contained responsibilities for carriers as well as for couriers (i.e. drivers and riders). The Courier Code recommended that all motorbike/moped couriers should have previous riding or despatch experience before starting work and that they should be properly trained. It also recommended that all motorcycle/moped couriers hold full licences before they begin delivering. It also recommended that all vehicles be roadworthy and that regular inspections should be carried out. A summary of the Code is provided in **Table 16.1** (Alpha Couriers, 2018).

The Courier Code of Conduct was entirely voluntary. Delivery companies had the option to sign up to the Code and in doing so both the company and associated riders had responsibilities. The current status of this Code is unclear. No information is available from the Department for Transport about how many companies and couriers signed up to the code, and what, if any, effects it had. Research conducted on behalf of Transport for London in 2006 found that only 2% of parcel and meal delivery companies had spontaneous recognition of the Courier Code. Similarly only 2% of these companies had any spontaneous awareness of Compulsory Basic Training programmes, and only 10% of the Health and Safety at Work Act. Once prompted, 56% of the parcel delivery companies surveyed were aware of the Courier Code. However, many of them had little or no understanding of the code guidelines. Awareness of the code among food delivery companies was much lower, with only 9% stating that they were aware of the code. Despite these low awareness levels of the Code and its contents, 47% of courier companies and 20% of food delivery companies indicated that they would be prepared to sign up to the Code (Synovate, 2007).

Efforts have been made to identify and bring together all the international advice and guidance for bicycle, motorbike and other couriers. During this work the authors noted that it was difficult to find existing guidelines, instructions or tips regarding safety and health in the sector of the freight transport industry (European Agency for Health and Safety at Work, 2010).

The Institute of Couriers (IoC) began to work with its members to consider a Code of Practice for the (same-day and next-day) parcel delivery industry in October 2017. An initial roundtable event was held with the UK Transport Minister, John Hayes. The majority of heads of industry from same- and next-day operators discussing these issues with the IoC do not consider themselves as part of the so-called, 'gig economy', as they have long-standing business models and physical (i.e. bricks and mortar) distribution networks rather than virtual, digital operations. (Institute of Couriers, 2018).

Table 16.1: Summary of the Courier Code of Conduct – issued in 2001 by DETR and the Despatch Association

Responsibilities of courier firms

Firms in the courier industry should ensure that:

- riders and drivers they engage and employ conform to the requirements set out in this code; in particular that riders or drivers and their vehicles are properly licensed, insured and roadworthy
- realistic delivery schedules are set so that the courier is not required to break the law
- deliveries should not involve dangerous loads
- they provide clothing and equipment for employee riders and drivers which clearly identify the name of the company
- equipment provided or used is appropriate for its purpose and is not a hazard to safety
- they do not require employees to use mobile phones while riding/driving.

Responsibilities of riders and drivers

Driving and Vehicle Licences and Insurance

- To meet the standard of professionalism required, motorcyclists and vehicle drivers need to have the appropriate full driving licence; a current excise licence with MOT Test Certificate, if necessary, for their vehicle, and be properly insured for the purposes of the Road Traffic Act, including cover for the use of vehicle for courier use.
- At all times motorcyclists and drivers must obey Road Traffic Law. They must not ride or drive their vehicles in any way that puts themselves, other road users or pedestrians at risk. Neither should they park their vehicle in any way which causes a danger to other road users or pedestrians.
- The law requires the wearing of Seat belts in cars, vans and larger goods vehicles, with few exceptions.
- It is important to be fit and alert when riding or driving.
- Riders and drivers must not operate their vehicles whilst under the influence of drink or drugs. They should never use a hand held phone when riding or driving.

All Parties

- Couriers should not drive when tired. A minimum break of at least 15 minutes after every 2 hours of driving is recommended. A maximum of 10 hours riding or driving per day should not be exceeded.
- It is best not to use hands-free mobile phones or other communication devices while driving/riding. Messaging services can be used. When communication is necessary, end it quickly.
- Motorcyclists and cyclists should wear proper protective clothing with reflective and/or fluorescent material. Motorcyclists must wear helmets.
- Vehicles and machines should be kept clean and roadworthy.

Standards

- Riders and drivers engaged or employed in the industry need to be competent, knowledgeable and have riding/driving experience.
- The qualities of professionalism required means that riders and drivers must meet high standards of appearance and behaviour.
- The courier is the ambassador of the dispatch company, whether on the road or meeting a client. The company's professional image is reflected by the professional conduct of the rider or driver.

(Source: provided by Alpha Couriers, 2018)

17. Improving the Efficiency and Sustainability of Same-Day Deliveries

City authorities in the UK will increasingly impose legislation that introduces vehicle compliance schemes to reduce the air quality impacts and carbon emissions of vehicles used. This is in response to the environmental and health-related problems that exist in many urban areas in the UK. For instance, research has shown that World Health Organisation (WHO) limits for PM2.5 (fine particulate matter) are exceeded in every area in London, with 95% of Londoners living in areas that exceed the WHO limit by at least 50% or more. In central London the average annual levels are almost double the WHO limit (Greater London Authority, 2017). Action is already planned in London and the first five UK cities that will have Clean Air Zones by 2020 have already been named (Birmingham, Derby, Leeds, Nottingham and Southampton). This will encourage road users including same-day carriers to switch to a cleaner vehicle fleet (Department for Environment, Food and Rural Affairs and Department for Transport, 2017). In London the Mayor will address carbon emissions and air pollution from freight traffic by enhancing the existing Low Emission Zone to an Ultra Low Emission Zone from 2019 onwards, and requiring that all new vans and lorries are zero emission capable from 2030 and 2040 respectively. In this way London's entire transport system would be zero emission by 2050 (Mayor of London, 2018).

However, the means by which city authorities in the UK will bring about less transport-intensive and safer freight transport operations are less certain. The Mayor of London's current Transport Strategy has set the following ambitious targets (Mayor of London, 2018):

- for no one to be killed in or by a London bus by 2030, and for deaths and serious injuries from all road collisions to be eliminated from the streets by 2041.
- to reduce freight traffic in the central London morning peak by 10 per cent on current levels by 2026, and to reduce total London traffic by 10-15 per cent by 2041,

Proposals as to how these targets would be achieved in the freight industry in London include (Mayor of London, 2018):

- Delivering a programme of training, education and enforcement activities, including the delivery of improved and new training for motorcyclists and working with stakeholders, including the freight industry, to improve standards of professional driving.
- Improving the quality of motorcycle safety training beyond the minimum required by law. This will include raising the safety standards of motorcycle courier businesses through training and accreditation.
- Supporting Business Improvement Districts and other clusters of businesses to jointly procure goods and services.
- Increasing the proportion of freight moved on non-road modes.
- Reviewing the potential benefits of a regional freight consolidation and distribution network and completing the network of construction consolidation centres in London.
- Establishing a network of micro-distribution services and facilities served by zero emission vehicles and walking and cycling deliveries.
- Re-timing goods and services to the times where they will have least impact on streets.

- Using local access and loading restrictions to support more efficient freight practices.
- Improving the design and management of loading and servicing activities at the kerbside and off-street.
- Ensuring that delivery and servicing plans facilitate off-peak deliveries using quiet technology, and the use of more active, efficient and sustainable modes of delivery, including cargo cycles and electric vehicles where practicable.

From the above, it would appear that the Mayor of London is placing great emphasis on load consolidation and retiming activity outside of peak traffic times as the means by which freight vehicle activity will be achieved, but it is unclear precisely how he intends that this will be realised, and whether it will extend beyond a voluntary approach remains uncertain. The innovations presented in this chapter are intended to provide insight into how such reductions in same-day transport intensity could be achieved in London and other urban areas in the UK (and potentially elsewhere).

The efficiency and the traffic, energy and environmental sustainability of current same-day deliveries in urban areas are addressed in **section 17.1**. The scope that exists for greater operational efficiency in same-day deliveries are discussed in **section 17.2**. **Section 17.3** then considers the operational innovations by which the efficiency and sustainability of same-day deliveries could be improved, to the benefit of carriers and the wider society.

17.1 Transport intensity and CO₂ emissions from same-day deliveries

Table 17.1 provides an analysis of the transport intensity (expressed in terms of kilometres travelled per tonne of product lifted) and the carbon dioxide emissions (expressed in grams of CO₂ per tonne of product lifted) associated with different types of same-day deliveries in central London (showing different results for various same-day sub-sectors and the type of vehicles used for the delivery).

The results in **Table 17.1** show the typical journey distance and consignment distance, the CO₂ emissions per journey and per consignment, and the distance travelled and CO₂ emissions per tonne of product lifted per same-day sub-sector and vehicle type used. CO₂ emissions are at the point of use rather than in total (i.e. taking account of vehicle production and disposal, and human food and drink intake by the courier). The table also indicates whether the delivery could have been made in an alternative way. The results indicate the potential transport intensity of using bicycles for same-day delivery per tonne lifted (given the light loads carried by cycle couriers). However, these results also indicate that in terms of CO₂ emissions at the point of use bicycles are obviously superior to fossil-fuel powered motorbikes, mopeds, cars and vans. Point-to-point medical journeys by motorbikes and vans carrying light, single loads can be seen to produce at least twice as much CO₂ per tonne of product lifted than any other same-day movement considered.

Multi-drop same day deliveries by van can be seen to produce superior results in terms of distance travelled per consignment and per tonne lifted than point-to-point journeys using smaller vehicles due to the benefits of consolidating consignments together. These multi-drop deliveries by van can also, in some cases, achieve better performance than smaller, fossil-fuel powered vehicles in terms of CO₂ emissions per consignment and per tonne lifted.

Same-day multi-drop grocery deliveries by van can be seen to be far less transport intensive than point-to-point operations by bicycle and moped per tonne lifted. In addition, these van journeys produce far less CO₂ emissions per tonne lifted.

Table 17.2 shows the effect of making B2B/B2C non-food deliveries in multi-drop rounds by vans. This can be compared with making these deliveries on a point-to-point basis by bicycle and motorbike or by vans on multi-drop rounds on a same-day basis (see **Table 17.1**). These results show that by delaying the deliveries to the next-day rather than same-day it is possible to achieve far greater product consolidation on the delivery vehicle (in this case, the load size is increased from 1 (point-to-point) or 5 (multi-drop) to 150 consignments). This results in a distance travelled per consignment of 0.1 km, which is far lower than for any vehicle type (point-to-point or multi-drop on a same-day basis in **Table 17.1**) Also, this next-day multi-drop van operation results in CO₂ emissions per consignment at the point of use of 0.03 kg, which is far lower than any fossil-fuelled vehicle in the same-day analysis.

In terms of other social and environmental impacts of transport activity such as local air pollution, noise, and visual intrusion these are linked to the transport intensity of the operation (as reflected by the distance travelled per tonne lifted), as well as the vehicle type used and its fuel source, and prevailing traffic conditions on the road (with busy roads leading to greater impacts).

Time spent at the kerbside by same-day delivery vehicles while couriers carry out collections and deliveries to receivers/senders in buildings contribute to road traffic congestion – the extent of a vehicle's impact depends on the difficulty encountered by the courier in finding a stopping place (and thereby preventing the need for circulating or queuing), the ease of ingress and egress in the stopping place, and the size (width and length) of the vehicle. Therefore, smaller vehicles such as bicycles, cargo-cycles, moped and motorbikes tend to cause less traffic disruption while parking and when parked compared to cars and vans.

As indicated in **Table 17.1** the transport operations associated with some same-day delivery sub-sectors are difficult to alter due to their time-critical nature (especially medical and meal delivery). In these cases switching vehicle type to cleaner, more efficient vehicles is far easier than reorganising the operation itself. Meanwhile the transport operations in other same-day sub-sectors are potentially more amenable to reorganisation (in addition to switching vehicle types) but this typically involves behaviour change among customers as it requires them to accept that rather than deliveries taking place instantly, there will be a longer period of elapsed time between despatch and delivery (either on a same-day or next-day basis).

Table 17.1: Transport intensity and carbon emissions of same-day deliveries by sector and vehicle type in London

Same-day sub-sector	Product type	Vehicle used	Journey type	Total journey distance (km), no. of consignments delivered per journey (C) and distance per consignment	CO ₂ emissions per journey (kg) and per consignment (kg)*	Distance travelled per tonne of product lifted (km)	CO ₂ emissions per tonne of product lifted (kg)	Is there an alternative delivery system?
Non-food	Medical	Bicycle	Point-to-point	5km / 1C / 5km	0.00	10,000	0	No (time-critical)
		Motorbike	Point-to-point	5km / 1C / 5km	0.67	10,000	1,330	No (time-critical)
		Van	Point-to-point	5km / 1C / 5km	1.17	10,000	2,330	No (time-critical)
	B2B / B2C parcel	Bike	Point-to-point	5km / 1C / 5km	0.00	5,000	0	Next-day, multi-drop
		Motorbike	Point-to-point	5km / 1C / 5km	0.67	5,000	665	Next-day, multi-drop
		Van	Multi-drop	15km / 5C / 3km	3.50 / 0.70	3,000	699	Same-day cargo cycle or Next-day, multi-drop
Grocery	Supermarket to home	Bicycle	Point-to-point	4km / 1C / 4km	0.00	1,600	0	Same-day, multi-drop by van
		Moped	Point-to-point	4km / 1C / 4km	0.33	1,600	131	Same-day, multi-drop by van
		Van	Multi-drop	20km / 10C / 2km	6.58 / 0.66	100	33	Next-day, multi-drop
Meal	Restaurant / takeaway to home	Bicycle	Point-to-point	4km / 1C / 4km	0.00	4,000	0	No (time-critical)
		Moped	Point-to-point	4km / 1C / 4km	0.33	4,000	328	No (time-critical)
		Car	Point-to-point	4km / 1C / 4km	0.47	4,000	472	No (time-critical)

Notes:

* - different values for CO₂ emissions per journey and per consignment are only given for multi-drop journeys involving more than one consignment. In all point-to-point journeys the CO₂ emissions values are the same for both.

CO₂ emissions for the entire journey – for multi-drop journeys only part of the load carried and distance is attributable to each delivery

Assumed product weights: non-food medical – 0.5kg; non-food B2B/B2C parcel – 1kg; grocery by bike/moped – 2.5kg; grocery by van – 20kg; restaurant meal – 1.0kg.

Journey distances derived from literature review: Restaurant meals and grocery by bike/moped: 4km is round trip distance (2km empty return trip); Grocery by van is round trip distance of 20 km from store with 10 customer addresses served; Non-food B2B / B2C parcel point-to-point trip distance of 5 km.

Product weight of multi-drop van operations: grocery - 200 kg (ten loads of 20 kg each); non-food B2B/B2C parcel next-day – 5kg (5 parcels with 1kg average weight).

Van types: groceries assumed to be large refrigerated van; non-food B2B/B2C parcels same-day assumed to be medium van.

CO₂ emissions per km by vehicle type – see **Table 11.3** for further details.

Table 17.2: Transport intensity and carbon emissions of next-day non-food B2B/B2C deliveries by van in London

Same-day sub-sector	Product type	Vehicle used	Journey type	Total journey distance (km), no. of consignments delivered per journey (C) and distance per consignment	CO ₂ emissions per journey (kg) and per consignment (kg)*	Distance travelled per tonne of product lifted (km)	CO ₂ emissions per tonne of product lifted (kg)	Is there an alternative delivery system?
Next-day, non-food	B2B / B2C parcel	Van	Multi-drop	20km / 150C / 0.1km	5.48 / 0.03	89	24	No (most efficient option)

Notes:

* - different values for CO₂ emissions per journey and per consignment are only given for multi-drop journeys involving more than one consignment. In all point-to-point journeys the CO₂ emissions values are the same for both.

CO₂ emissions for the entire journey – for multi-drop journeys only part of the load carried and distance is attributable to each delivery

Assumed product weights: grocery by van – 20kg per consignment.

Journey distances derived from literature review: round trip distance by van of 20 km from store with 150 consignments on-board each consisting of one parcel.

Product weight of multi-drop van operations: non-food B2B/B2C parcel next-day – 225kg (150 parcels with 1.5kg average weight).

Van types: B2B/B2C parcels next-day assumed to be large van.

CO₂ emissions per km by vehicle type – see **Table 11.3** for further details.

This analysis of the transport intensity and CO₂ emissions of same-day deliveries in London can be compared with all freight transport operations in London carried out by heavy goods vehicles (HGVs – i.e. goods vehicles over 3.5 tonnes gross weight). Data disaggregated from the Continuing Survey of Road Goods Transport (CSRGT) showing HGV operations was used for this analysis. The results of this analysis, sub-divided into activities performed by rigid heavy goods vehicles and articulated heavy goods vehicles is shown in **Table 17.3**. Comparing the results in **Table 17.3** with those in **Table 17.1** it can be seen that in terms of the distance travelled per tonne lifted, HGV operations provide far superior outcomes to all same-day operations analysed (by a factor of several thousand in some cases). HGV operations are also vastly superior to all fossil-fuelled same-day operations in terms CO₂ emissions per tonne lifted. Same-day deliveries can therefore be seen to have extremely high transport intensities and CO₂ emissions per unit weight of goods handled in urban areas.

Table 17.3: Transport intensity and carbon emissions of HGV journeys wholly within London in 2014

	Ave. trip length* (km)	Km per tonne of product lifted	kg CO₂ per tonne of product lifted
Rigid HGV	12.1	6.6	5.0
Articulated HGV	13.1	3.0	2.4

Notes:

Using data disaggregated from the DfT Continuing Survey of Road Goods Transport (CSRGT).

* - Average trip length derived from tonne-km / tonnes-lifted data.

CO₂ emissions rates per vehicle km for rigid and articulated HGVs taken from DBEIS and DEFRA, 2017.

In terms of the energy consumed in same-day meal preparation and delivery, one of the most energy-intensive approaches to come to light during the literature review was of companies that both prepared and delivered meals to customers using cars fitted with the necessary equipment to heat food during the journey to the customer (called ‘warming cases’), thereby removing the need for vehicles to keep returning to base after each delivery and allowing deliveries to be made in 15 rather than the more usual 30 minutes (Hurd, 2013, Kline, 2016). Meal delivery is also associated with a substantial quantity of cardboard and plastic packaging to contain the food and try to keep it hot, which is then disposed of once the meal is completed.

Analysis was carried out into the energy intensity of having meals delivered from restaurants and takeaways on a same-day basis compared with consumers purchasing food in grocery supermarkets by car as part of their weekly shop and then cooking this food at home. The results of this analysis is shown in **Table 17.4**. The results indicate that the energy consumed in transport meals to customer’s homes by moped or car is far higher than that consumed by a person using a car to purchase the ingredients for a single meal as part of their weekly shopping from a grocery supermarket (with the ingredients required weighing 1kg and the entire shop 20kg). The results also indicate that the combined transport and cooking energy for a same-day meal delivery is far greater than if a consumer purchases the ingredients themselves and cooks them at home. This was found to be approximately 2-4 times greater in the case of a chicken meal and 3-6 times greater in the case of a pizza meal for the specific cases studied.

Table 17.4: Comparison of takeaway same-day meal delivery with meal purchased during weekly supermarket shop by car and cooked in oven at home

Food type	Method of deriving meal	Vehicle Type	Cooking meal (kWh)	Transport (kwh)	Cooking plus transport (kwh)
Pizza	Meal delivery from restaurant / takeaway	Car	0.4	3.4	3.8
		Moped	0.4	1.5	1.9
	Personal shop in supermarket and cook at home in oven	Car	0.4	0.2	0.6
Chicken	Meal delivery from restaurant / takeaway	Car	0.8	3.4	4.2
		Moped	0.8	1.5	2.3
	Personal shop in supermarket and cook at home in oven	Car	0.8	0.2	1.0

Assumptions:

Oven cooking time: pizza – 10 minutes; chicken 20 minutes

Oven power rating: 2400 kWh

Home cooking and restaurant/takeaway cooking assumed to have the same energy requirements to cook pizza and chicken –no obvious difference in energy requirements has been identified in research as although restaurants may cook more meals at a time, their ovens are left on between cooking of meals (see for example Calderón et al., 2018; Schmidt Rivera et al., 2014).

Trip distances: restaurant to home and supermarket to home – both 4km round trip by car.

Supermarket weekly shop by car – 20kg of goods purchased, 1kg of which is the meal

Meal delivery weighs 1kg.

Car and moped have fuel consumptions of 30 and 70 miles per gallon respectively.

1 litre of petrol has 9.1 kWh of power.

In busy urban areas, forecast growth in B2C same-day deliveries (see **section 6.1**) pose the risk of contributing to existing traffic congestion and traffic-related social and environmental impacts, especially when the same-day delivery is not replacing a private motorised vehicle journey. It is therefore important for same-day carriers, their customers and end consumers to think about how best to design the delivery services that support growth in demand for various products to avoid unwanted traffic and environmental impacts. Policy makers also need to maintain a watching brief on the traffic consequences of this expanding component of modern urban economies.

17.2 The scope for greater operational efficiency in same-day deliveries

This section considers the opportunities that exists for greater operational efficiency in same-day deliveries. There is much potential for operational improvement in same-day deliveries which would benefit carriers, road traffic and the environment, and which would help to mitigate against the impacts of growing demand for same-day deliveries. There is scope for same-day carriers, their users and end consumers to think about how best to design the delivery services that support growth in demand for various products to avoid unwanted traffic and environmental impacts.

Measures to achieve operational improvement include the deployment of technology to assist inexperienced couriers in their routing selection and finding the actual delivery point for a building, and helping them to find and obtain suitable parking locations. There is scope for the use of cleaner vehicles; locker banks; collection points and concierge services (to remove the

need for couriers to ascend inside in large, multi-tenanted buildings); greater consolidation of orders in some same-day sectors (for users that accept deliveries will be same-day but not immediate); and other logistics management approaches including collaboration between sectors.

Table 17.5 indicates the authors' views on the key operational characteristics of same-day delivery sectors and the potential for greater efficiency in these operations through reorganisation. It also identifies the role that customers (businesses and private individuals) could play by altering their ordering patterns and preferences, as well as the scope for greater collaborative working between carriers.

Policy makers could also take action to address the traffic and environmental impacts of same-day operations if growth in demand is strong, and these negative impacts increase. If the anticipated growth in B2C same-day deliveries were in future to be identified as a major contributor to urban traffic and environmental problems (especially instant same-day deliveries) it may become necessary for policy makers to seriously consider how best to alter current operations. One policy approach would involve interventions that focus on improving vehicle selection, and increasing the extent of consolidation of products delivered and thus increasing vehicle load factors (thereby reducing the total distance travelled per item delivered) and ensuring that peak traffic periods were avoided by all but the most critical services.

Another, more drastic, policy maker approach would be to seek to reduce demand for the most traffic intensive and environmentally harmful same-day delivery services. The growth in parcel vehicle activity levels has been exacerbated by many retailers offering 'free' or under-priced deliveries in order to generate sales turnover. Coupled with this, the demand for ever-faster same-day services has serious potential implications for the quantity of parcels carried by each vehicle at any one time, and hence the transport and environmental intensity of parcel delivery in urban areas. Policy makers in the UK and elsewhere have so far failed to develop strategies and initiatives to counter this threat to society and the environment. Some of the environmental challenges posed by growing parcels-related traffic levels will be countered by the adoption of more stringent vehicle emissions standards, Low Emission Zones, and measures to encourage the uptake of alternatively-fuelled vehicles. However, these interventions will do nothing to address the growing demand for road and kerbside space and time that these new parcel delivery services are generating.

Policy maker action would be likely to be more contentious if their measures and interventions were aimed at applying pricing mechanisms that sought to reduce the demand for same-day and instant deliveries by increasing the price of these services. However, depending on the scale of the social and environmental threat posed, such action could prove necessary at some point in future. Two factors are the most likely to initiate such consideration from policy makers. The first would be a growth in provision of 'free' or under-priced same-day deliveries by retailers in order to generate sales turnover. The second would be a growth in the relative and absolute demand from consumers for ever-faster, instant, same-day services (with same-day services winning an ever-greater share of next-day and economy parcel traffic). Behaviour change among retail consumers to the imposition of the plastic bag tax indicate the extent to which such interventions can result in radical changes in consumers' decision-making processes.

Table 17.4: Operational characteristics and scope for greater efficiency by same-day delivery sector

	B2B parcels and documents	B2B medical	B2B technical and parts	B2C non-food retail	B2C groceries	B2C takeaway meals
Current delivery operation	Point-to-point sometimes collecting other items on the way.	Point-to-point sometimes collecting other items on the way.	Point-to-point	Point-to-point and multi-drop	Point-to-point and multi-drop	All point-to-point
Urgency of delivery (to indicate potential for i) collect more items enroute and/or ii) multi-drop journeys)	Ranges from any time same-day to immediate. Scope for delivery later in day for some items.	Ranges from any time same-day to immediate. Scope for delivery later in day for some items.	Ranges from any time same-day to immediate.	Ranges from later in day with time slot to immediate. Scope for delivery later in day for some items.	Ranges from later in day with time slot to immediate.	Immediate
Hub / depot location (to indicate potential for multi-drop journeys)	Typically none. But some origins and destinations generate high volume.	Hospitals and test centres generate high volume.	None, but service desks can be used for parts supply	Deliveries despatched from depot or store, so scope for multi-drop depending on service level and throughput.	Deliveries despatched from depot or store, so scope for more multi-drop depending on service level and throughput.	Typically none. But some restaurants generate high volume.
Journey Distance	Short-long	Usually short but exceptions can be long	Short-medium	Short	Short	Short
Vehicle volume capacity required for multi-drop work	Small-medium	Small-medium	Medium-large (depending on equipment / tools required)	Medium	Medium-Large	Small
Driver status	Usually self-employed	Usually self-employed	Employed or self-employed	Usually self-employed	Usually employed	Usually self-employed

Table 17.4: Operational characteristics and scope for greater efficiency by same-day delivery sector (cont.)

	B2B parcels and documents	B2B medical	B2B technical and parts	B2C non-food retail	B2C groceries	B2C takeaway meals
Geographical coverage of individual journeys	Usually local but can be national depending on company.	Usually local but can be national depending on service/product.	Local-regional	Local	Local	Local
Current in-company operational efficiency	Hard to improve other than vehicle suitability unless customers relax time requirements. Scope for consolidation on long (non-urban) journeys.	Hard to improve other than vehicle suitability unless customers relax time requirement. Scope for consolidation on long (non-urban) journeys.	Hard to improve other than vehicle suitability unless customers relax time requirements.	Scope for improved vehicle suitability and consolidation.	Hard to improve unless customers relax time requirements.	Hard to improve other than vehicle suitability.
Inter-carrier collaboration potential	On long (non-urban) journeys	On long (non-urban) journeys	Common-user collection points/ service desks for parts	Little	Little	Little
Scope for couriers to carry out delivery tasks for other carriers / sectors outside of peak hours	Yes	Yes	Little. None if employed.	Yes.	None if employed.	Yes
Scope for business receivers to use nominated suppliers / carriers to reduce journeys to building or in vicinity	Yes	Yes	Yes	Yes	N/A	No

Table 17.4: Operational characteristics and scope for greater efficiency by same-day delivery sector (cont.)

	B2B parcels and documents	B2B medical	B2B technical and parts	B2C non-food retail	B2C groceries	B2C takeaway meals
Scope for use of locker banks	Yes, especially to reduce need for couriers to ascend inside large, multi-tenanted building	Yes, especially to reduce need for couriers to ascend inside large, multi-tenanted building	Yes	Yes, especially to reduce need for couriers to ascend inside large, multi-tenanted building in case of personal deliveries to workplace	Yes, but would require refrigeration	No
Scope for use of single delivery point on ground floor and internal concierge service	Yes, especially to reduce need for couriers to ascend inside large, multi-tenanted building	Yes, especially to reduce need for couriers to ascend inside large, multi-tenanted building	Yes	Yes, especially to reduce need for couriers to ascend inside large, multi-tenanted building in case of personal deliveries to workplace	No	No
Scope for use of high street collection points	Little	No	Yes	Yes	Yes, but would require refrigeration	No
Scope for additional technology to reduce transport intensity and its impacts	Yes, especially among inexperienced couriers.	Yes, especially among inexperienced couriers.	Yes, especially among inexperienced couriers/technicians.	Yes, especially among inexperienced drivers/couriers.	Some	Some
Scope for customer behaviour change to reduce transport intensity and its impacts	Yes, through relaxing time constraints	Yes, through relaxing time constraints and pricing	Little	Yes, through relaxing time constraints and pricing	Yes, through relaxing time constraints and pricing	Little

Source: based on the authors' own judgement using available information.

17.3 Potential innovations in same-day delivery operations

The following sub-sections consider the operational innovations by which the efficiency and sustainability of same-day deliveries could be improved, to the benefit of carriers and the wider society. While this provides insight into the actions that same-day carriers could take (and in some cases are already taking) it also raises various issues that policy makers could address in order to assist in improving same-day delivery operations and thereby help to reduce their traffic, energy and environmental impacts.

17.3.1 Increasing the operational efficiency of couriers

Same-day couriers have to carry out many tasks each day in the course of their work, each of which influences their operational efficiency. These tasks include (Bates et al., 2018):

- Vehicle routing decisions.
- Picking the best vehicle stopping location.
- Optimizing walking routes – from the parked vehicle to the delivery/collection point.
- Locating point of entry to the building – which may not correspond with the delivery/collection address.
- The journey inside the building to the point of delivery/collection – and gain whatever proof of delivery/collection is required.
- Make decisions about what to do when no-one is available to receive the delivery/provide the collection.

Same-day and next-day couriers have to make decisions each day about how to route their vehicles between deliveries and which stopping locations to use to park their vehicles while making collections and deliveries. In addition, next-day multi-drop parcel delivery drivers have to decide how to group deliveries together in walking tours. All of these tasks are highly challenging and the latter is a little researched optimisation task which the FTC2050 research team has been investigating. Results for the next-day delivery sector suggest that the total time taken for delivery work may be reduced by making fewer vehicle stops than at present and making a greater number of deliveries and collections on-foot each time the vehicle is parked. Such a solution is capable of reducing the total round time by approximately 25% and the total driving time (and distance) in the delivery area by approximately 50% but with a 20% increase in parking time and an up to 50% increase in walking time and distance (Allen et al., 2018). While same-day deliveries do not include this same complexity due to couriers usually only handling a single or several deliveries at any one time, unlike multi-drop next day drivers, this research still suggests that important time and distance savings are possible from improved routing solutions and from identification of suitable stopping locations.

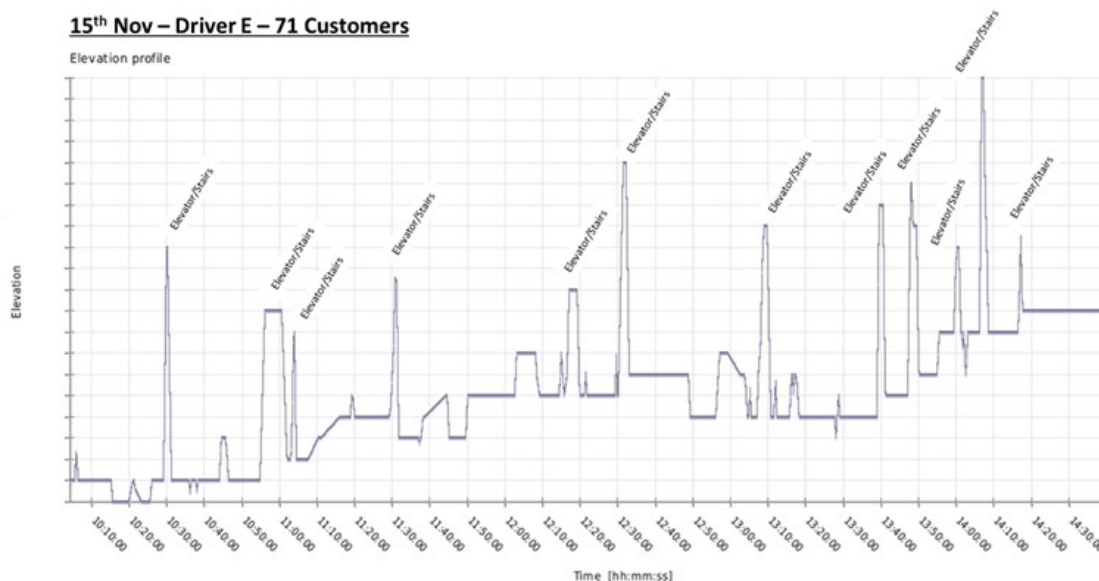
As mentioned above, finding the entry point to the building to make a collection or delivery when this is not the front door or address registered on the paperwork or computer system issued to the courier can result in lost time and additional driving distance. A trial conducted by a provider of a precise geographical location tool worked with a carrier to test the benefits of using their tool in a situation in which the precise delivery point location had been logged using their tool. Two couriers were despatched to carry out exactly the same delivery round involving visiting 20 addresses in London. One of the couriers used the tool, called what3words, to immediately locate the precise delivery point, whereas the other courier was issued with only the street address of the building. Both couriers successfully completed their delivery rounds but the first driver using the tool was 30% faster than the other, which equated to approximately 6 minutes on average per building delivered to and therefore two hours in terms of total time savings over the course of the entire 20 deliveries (what3words, 2017).

Research in the FTC 2050 project has indicated that there are major differences in operational performance between couriers of very different levels of experience working on the same next-day multi-drop delivery round on different days. In one such case, an experienced driver was found to drive 44% less distance per parcel, spend 35% less total time per parcel, and 39% less parking time per parcel than the inexperienced driver. The variation in effectiveness of the couriers related to better route planning and exploitation of accumulated knowledge (Bates et al., 2018). Providing couriers, especially novice ones, with computer-based tools to assist vehicle routing, vehicle parking and driver walking strategies, and locating the building entry point for deliveries/collections can improve their efficiency. Providing inexperienced couriers with training programmes can also assist in raising operational performance as well as road safety (see **section 16.5**).

In delivering to consignees, couriers often have to ascend and descend staircases and lifts. This can be the case for both commercial consignees, especially those in multi-tenanted office blocks, and residential consignees in block of flats. This results in couriers spending substantial periods of time inside buildings (e.g. waiting for lifts to different floors, climbing and descending stairs), thus increasing vehicle kerbside dwell time and total working time taken. As an example of this, **Figure 17.1** provides data from one vehicle round in the City of London studied in the FTC 2050 project (Clarke et al., 2018). It shows the ascents the courier had to make within buildings (it should be noted that some fluctuations occur in the graphs due to temperature sensitivity of the altitude sensor). The elevation tracking during the entire survey work showed that couriers had to travel vertically to reach approximately 15% of consignees whilst serving their rounds (this includes consignees not located in multi-tenanted buildings, so the proportion of multi-tenanted, multi-storey buildings in which this is necessary is considerably higher).

From a kerbside space perspective and in terms of the working time taken by couriers to make a delivery, multi-tenanted buildings that provide the opportunity for drivers to deliver tenants' items to a single mail room or loading bay is preferable. Policy makers have an important roles to play in implementing future land-use and building planning permission approval that requires ground floor reception facilities to be incorporated into multi-tenanted buildings and other substantial single-tenant sites that are major freight trip generators (such as hospitals and council buildings).

Figure 17.1: Elevation graph for a multi-drop, next-day delivery driver's work in the City of London (15 November 2017)



17.3.2. Locker banks and collection points

Locker banks have an important potential role to play in facilitating the retiming of non-food same-day deliveries (so that deliveries can be made when the receiver is not present). However, there are various logistical and planning issues that need to be addressed for lockers to play an important role in the same-day supply chain. These include planning regulations concerning their siting on public land, the affordability and availability of such land, the design of lockers to maximise their potential to accommodate a wide range of products, and commercial issues concerning whether the use of the locker is dedicated or agnostic (i.e. allowing many different retailers and carriers to use it).

Locker banks can also be installed in the ground floors or loading areas or large buildings such as multi-tenanted offices or hospitals so that same-day (and next-day) couriers can make deliveries to these locker banks rather than having to ascend lifts and stair cases within commercial buildings to reach the consignee (see **section 17.3.1** for further discussion of this issue). Such locker banks could be used for both B2B deliveries in these buildings as well as for B2C deliveries for employees who have registered their work address as their chosen delivery location. Such a use of locker banks would help to reduce vehicle dwell time at kerbside as these deliveries will be made more quickly.

Collection points also have a role to play in non-food same-day deliveries as, like locker banks, they offer the ability for couriers to make deliveries without the receiver needing to be present. However, these add additional handling costs to the supply chain. Also, like locker banks they have the potential to increase trip generation, especially by those collecting their goods, at specific locations which can lead to traffic problems depending on the location, time of day and vehicle types used by those picking up their products.

17.3.3 Consolidation opportunities

There is little scope to consolidate current delivery activity in some same-day sub-sectors in order to increase operational efficiency. For instance, meal deliveries have to be made singly as soon as the meal is ready so that it reaches the customer as soon as possible and as fresh and hot as possible. Similarly, some same-day medical deliveries, such as organs for transplant and urgent test samples, need to be transported as soon as they become available.

However, in some same-day delivery subsectors there is scope to either group jobs together, or make use of courier spare time between jobs to do work in another same-day delivery sector. For instance, this grouping of deliveries already takes place in same-day (and next-day) grocery deliveries by leading retailers such as Tesco and Sainsbury with several customer orders delivered on a multi-drop route by the same vehicle. Similarly fleet controllers try to give their parcel couriers more than one job at a time to increase their income and efficiency.

Consolidation in same-day deliveries could take several forms:

- (i) Parcels collection and delivery involves grouping parcel collections together and then using a single vehicle that makes all these deliveries, thereby handling several customers' orders at the same time.
- (ii) Merging together the work activity in different same-day delivery sub-sectors which are currently operated entirely separately from each other by a single carrier (e.g. the same-day delivery of parcels and medical items - some same-day carriers such as CitySprint provide services in both of these sub-sectors but run these as separate operations)

- (iii) Merging together the work activity in different same-day and next-day delivery sub-sectors which are currently operated entirely separately from each other by different carrier (e.g. the delivery of next-day parcels by same-day couriers or meal delivery couriers when they have time to spare between same-day parcel/meal jobs)

Each of these consolidation opportunities in the same-day delivery sector is discussed below. While options (ii) and (iii) are not likely to have any effect on the lead time between ordering and receiving same-day deliveries (as they solely aim to improve the utilisation of couriers during the working day), option (i) would be likely to result in deliveries to consignees taking longer than if they had been despatched using a dedicated point-to-point courier (as instead the courier would visit several customers to collect deliveries before making these deliveries). Option (i) is therefore only viable in situations in which the customer is willing to accept a less than instant delivery. However, the urgency of many non-food B2B and B2C same-day parcel deliveries is questionable (even if customers claim that instant delivery is essential) and adding a couple of hours into the delivery process is likely to be acceptable to many users of these services as long as the item is still delivered same-day. Given that this form of consolidation will lead to operational efficiency gains leading to reductions in total distance travelled, fuel consumption and CO₂ emissions and air pollution (derived from transporting several items together on a single vehicle between delivery areas) this option of a slower same-day delivery could be promoted to customers as a 'green delivery option', which may prove especially attractive to business users with strong Corporate Social and Environmental Responsibility agendas, and private individuals with strong concerns about the environmental impacts of their behaviour.

For customers with less conviction about traffic and environmental issues, some of the operating cost savings that carriers could derive from consolidation activities could be passed onto customers in the form of price reductions to encourage the uptake of these services. Such a 'green delivery pricing' strategy would promote less transport-intensive services that reduce environmental impacts while still provide customers with same-day, albeit less rapid, deliveries. Alternatively, customers opting for the 'green delivery' option could be provided with credits (or 'reward points') proportional to the price of their purchase, which could be redeemed against future same-day delivery orders with the carrier. Amazon is already offering its Prime customers a credit scheme similar to this which is called 'No-Rush' delivery – customers opting for these 'No-Rush' deliveries receive their goods within 3-5 working days after despatch, rather than same-day or next-day delivery (Amazon, 2018).

Option (i) was investigated using data provided by a same-day parcel carrier. Analysis was carried out to compare the effects of: (a) couriers collecting items from customers and carrying out immediate delivery to the delivery location (i.e. point-to-point delivery), and (b) couriers consolidating more of their jobs, both those for collection and delivery within the same urban area, as well as those that are to be transported between urban areas. This would involve couriers remaining in a given location for longer collecting jobs as they arise, before then transporting these parcels to their destinations. It would be conceivable to operate a system in which local collection and delivery work was carried out by different couriers than those trunking these parcels between collection and delivery locations in urban areas. A case study of specific jobs arising within a short period of time on a single weekday with collection addresses in Mayfair and delivery addresses in either Mayfair or the City of London (postcodes EC2 or EC4) was analysed. The results of consolidating these collection and deliveries with a single courier collecting them and then a single courier providing the trunk movement from Mayfair to the City of London showed a reduction in total distance travelled of approximately 50%, and a reduction in the total working time taken to carry out these jobs of approximately 40%. However, the results indicated a 70% increase in the minimum elapsed time taken to carry out this collection and delivery work (as the courier would wait for collections to arise before making deliveries) – and the success of such an approach would therefore be dependent on customer acceptability of these same-day deliveries not taking place instantly.

Wider analysis of the carriers' entire workload on a given day indicated that jobs with contiguous collection and delivery locations that could therefore be consolidated together by using a holding-off policy of two hours after the time of collection would result in reductions in total distance travelled and working time required of 6% and 8% respectively for the carrier across the entire operation for that day (despite relatively few jobs being subjected to this consolidation – and analysis of the number of jobs eligible for this consolidation was found to be 8% of total monthly jobs). A holding-off policy of two hours was found to be sufficient to achieve these consolidation benefits, as waiting longer than this did not result in significant additional savings in the analysis (Beardshall et al., 2018).

Working with a same-day carrier that provides delivery services in several sub-sectors it has also been possible to verify that scope exists for couriers currently dedicated to working in one sub-sector could be carrying out deliveries in another of the carrier's sub-sectors at the same time without affecting the quality of their service (for instance carrying out both parcel deliveries and non-urgent medical deliveries) Beardshall et al., 2018). This relates to consolidation option (ii) in the list above.

Portering solutions, in which the final leg of next-day urban parcel deliveries are made by on-foot porters rather than delivery drivers, have recently been trialled as part of the FTC 2050 project (Clarke et al., 2018). Porters are provided with bag loads of parcels by drivers at the kerbside. These solutions show considerable promise in terms of reducing vehicle kerbside stopping durations as well as the total vehicle distance travelled, together with potential financial viability from a carrier perspective (Clarke, et al., 2018). The porters for the delivery of these next-day parcels could be same-day parcel or meal couriers who carry out this portering to deliver a bag load of parcels in quiet periods between their same-day jobs arising, or during parts of the day when they are not required for same-day work (such as during the morning and mid-afternoon for meal couriers). This relates to consolidation option (iii) in the list above in which same-day couriers carry out other same-day or next-day delivery work during their quiet periods. Such portering solutions could also be used in future in conjunction with autonomous vehicles when these become available for general use in urban areas, and would overcome the safety, security and operational challenges associated with the proposed use of aerial drones and pavement droids in urban environments.

17.3.4 Operational collaboration

There is much scope for collaboration between same-day carriers, and between these carriers and retailers to make better use of existing vehicle and logistics infrastructure capacity in urban areas. However, at present, most of these companies are unwilling to work with each other in terms of delivery services, even if it can be demonstrated to lead to lower operational costs. The advent of big data and new analytical tools, together with case studies showing how trust, loyalty, legal and allocation issues can be addressed in shared delivery solutions have the opportunity to play an important role in making urban parcel deliveries more efficient, thereby reducing their undesirable impacts.

Such collaboration could take the form of work sharing between large carriers or could involve the use of a neutral, third-party carrier by these other carrier. This neutral carrier can be referred to as a carrier's carrier, as in order to retain its neutrality it would be likely to have to only offer its service to other carriers, rather than also providing service direct to businesses and individuals requiring delivery services. This approach would potentially provide the trust required by other carriers to make use of such a neutral carrier.

Such operational collaboration could result in important reductions in logistics land requirements in urban areas, together with reductions in vehicle activity and kerbside usage and the associated environmental impacts. These benefits would result from the fact that not

all carriers would no longer have to provide delivery services in all locations in the urban area, resulting in a reduction in the current extent of service duplication.

A case study carried out in the FTC 2050 project of next-day parcel operations indicated that the merging of the parcel flows of three such London depots into a single delivery operations could lead to a 14% reduction in total distance travelled on delivery operations in the urban area. Given that this case study only included three depots, which represented a small proportion of the total next-day parcel delivery market, there is clearly great scope for traffic reduction and related environmental benefits from such collaborative working. However, although such collaboration would provide transport and environmental improvements, there are challenges that would need to be overcome to ensure that such an arrangement did not fall foul of competition law.

17.3.5 Logistics land availability and affordability

As discussed in **section 10.1.2**, the lack of availability and affordability in London and other urban areas is resulting in logistics depots moving ever further from central urban areas, towards the urban periphery and beyond (known as 'logistics sprawl'). Logistics sprawl makes the achievement of large-scale B2C same-day delivery even more challenging as longer journey distances typically increase journey time and journey time unreliability. This is expected to worsen over time as logistics sprawl continues together with decreasing road and kerbside space allocation for goods vehicles (due to space reallocation to bus and cycle lanes). As well as adding to delivery costs, these factors also lead to greater difficulties in meeting same-day delivery time windows, especially when order-to-delivery times of several hours or less have been offered by retailers.

Parcel and other traditional same-day carriers are unlikely to be in a position to afford suitably located fulfilment centres to serve central urban areas. Only ecommerce retailers with substantial financial resources such as Amazon is likely to be able to afford a network of such facilities. There is therefore an important role for policy makers to play in their management of land-use in urban areas to ensure logistics land is available and affordable for logistics depots / fulfilment centres as well as other logistics infrastructure that serves same- and next-day deliveries, including locker banks and collection points. The Mayor of London is currently drawing up a new version of the London Plan - these logistics issues have been identified and highlighted by the Industrial and Logistics Sounding Board (ILSB) in its effort to provide independent scrutiny of the draft, new London Plan's policies relating to industry and logistics land. A successful logistics land policy is likely to require, at the very least, protection of existing logistics land (with refusal to grant change of use), and safeguarding of sufficient quantities of industrial land on which logistics facilities can be built in the future as the demand for urban parcel deliveries increases as a result of the demise of physical and high street retailing, with its consequent loss of stockholding space in central urban areas (see **section 18.2** for further discussion of the difficulties experienced by British high streets).

17.3.6 Vehicle switching: using clean vehicles for same-day operations

The use of bicycles, electric cargo bikes, and electric cars and vans rather than fossil-fuel powered vehicles will help to reduce fossil fuel consumption, carbon emissions and local air pollutants at the point of use. Bicycles have very small carrying capacity, but cargo bikes can offer carry considerable quantities and weight of products. The cargo cycle also has a smaller vehicle footprint than a van or car in terms of the amount of road- and kerbside space that the vehicles uses. CitySprint has been extremely active in this approach to convert its vans in central London to cargo cycles, to reduce environmental impacts and meet the requirements of the forthcoming Ultra Low Emission Zone ((CitySprint, 2018b - see **section 11** for further details).

However, there are important considerations about whether switching from the use of van to cargo cycles will lead to additional vehicle trips (due to carrying capacity constraints). It also raises important logistical challenges for any carrier switching vehicles. These include: vehicle and load security during the working day, the suitability of the vehicle's carrying capacity for the goods carried (in terms of weight and volume – see **section 11** for further discussion), and issues (and costs) concerning the overnight storage space and recharging infrastructure required by the carrier for such an electric cargo cycle or van fleet (especially given that the courier is unlikely to take a cargo cycle home). In addition, both van drivers and cycle riders may not be keen on riding cargo cycles, and in such a situation new couriers must be recruited. There are important roles that policy makers will need to perform to help to overcome some of the barriers identified above.

17.3.7 Concept of free or under-priced delivery

The growth in parcel vehicle activity levels has been exacerbated by many retailers offering 'free' or under-priced deliveries in order to generate sales turnover. Coupled with this, the demand for ever-faster, immediate same-day services has serious potential implications for the quantity of parcels carried by each vehicle at any one time, and hence the transport and environmental intensity of parcel delivery in urban areas. Policy makers in the UK and elsewhere have so far failed to develop strategies and initiatives to counter this threat to society and the environment. Some of the environmental challenges posed by growing parcels-related traffic levels will be countered by the adoption of more stringent vehicle emissions standards, Low Emission Zones, and measures to encourage the uptake of alternatively-fuelled vehicles. However, these interventions will do nothing to address the growing demand for road and kerbside space and time (and hence growing vehicle kilometres) that these parcel, grocery, meal and other same-day delivery services are generating.

As discussed in **section 17.3.3** and **section 17.3.4**, carriers may choose to engage in practices such as offering customers green delivery options or collaboration in order to improve delivery consolidation and efficiency and thereby reduce operating costs. But if carriers do not take such action, and growth rates in same-day delivery continue at current rates, then policy makers will have to consider whether it is necessary for them to act to address the additional pressures that these activities are placing on the urban road network. Such innovative measures by policy makers would need to either require or encourage opportunities for improved vehicle load consolidation, reduced vehicle dwell time at the kerbside and the use of cleaner vehicles. Examples of initiatives that offer such potential are being investigated in the FTC 2050 project and are summarised in the previous sections of this chapter.

17.3.8 Freight Traffic Controller

If the vehicle technology and logistics management initiatives by carriers and policy makers, as discussed in this chapter (and highlighted in **section 17.3.7**) fail to provide reductions in the transport and environmental intensity of same-day deliveries in urban areas, it may become necessary for policy makers to consider intervening more directly. We have referred to this possibility as the 'Freight Traffic Controller'.

This could include ensuring that the price charged to consumers for parcel (and other) delivery services reflect the traffic and environmental costs of these activities, in order to reduce demand for the most inefficient and harmful of these urban vehicle operations. Whilst this may sound unlikely and far-off, a similar government intervention, through the application of a tax, has resulted in a dramatic reduction in plastic bag consumption and landfilling.

Other methods include the future use of big data by urban authorities and national governments to regulate and restrict the use of road and kerbside space and time, either

through the application of road and kerbside pricing, or through the more direct restriction of those vehicles/carriers permitted to operate in the urban environment (possibly through either forms of quantity control or the issuing of exclusive contracts to carriers that win tenders to perform these delivery services in given locations that are subject to such restrictions).

18. The Future of Same-Day Deliveries

This final section considers the challenges and prospects facing same-day delivery market and its operations, and contemplates the future of the provision of these services.

18.1 Challenges facing the same-day delivery market and operations

As discussed previously, same-day deliveries are forecast to grow in urban areas in the coming years, especially in B2C product categories. However, in the course of the literature review and analysis carried out in producing this report it has been possible to identify the challenges facing the same-day delivery market and its operations that need to be addressed in order to make this growth in demand successful for carriers, couriers and society. These are summarised in **Table 18.1** under the following headings:

- market challenges
- operational challenges
- technology challenges
- traffic and environmental challenges for policy makers
- regulatory and other policy challenges (in addition to traffic and environmental challenges).

Same-day B2C parcel delivery poses the challenges of processing, picking and delivering an order within several hours. The operations currently used by next-day parcel delivery companies (handling large parcel volumes, which makes use of national hub-and-spoke networks) are not suited to such a challenge given the long-haul trunking operations that are required between local collection and delivery depots. But, at the same time, existing same-day couriers tend to have insufficient resources to deal with the needs of major retailers and the volumes of orders they generate (Hausmann et al., 2014). For same-day deliveries to become more economically viable substantial volumes are required within smaller geographical areas than exist at present, so as to increase drop density and justify the investment that is required in warehouses and capital equipment, so that multi-drop operations with relatively low stem mileages are possible.

Table 18.1: Challenges facing the same-day delivery market and operations

Area of challenges	Challenges faced
Market challenges	<ul style="list-style-type: none"> • Changes in demand: B2B flows not expanding, B2C non-food flows forecast as major growth area in coming years. • Many new ‘disruptor’ entrants to the market posing a risk of overcapacity. This will worsen if next-day and economy parcel carriers also enter the market. • Traditional same-day parcel carriers having to adapt to this rapidly changing market place. • Blurring of same-day delivery sectors (non-food, grocery, takeaway meals, B2B and B2C) with a likelihood of carriers becoming less specialised and entering a greater number of same-day sectors over time. • Currently a rapidly changing, and congested marketplace comprising traditional carriers, grocers, platform providers, disruptor start-ups, technology providers etc. • Only largest carriers may survive in the longer-term with commercial upheaval for the losers. • Courier employment status has generated much unhelpful media coverage for same-day carriers and is now subject to government scrutiny. Traditional same-day parcels carriers have been caught unawares by this has been the norm for many years. • Couriers earn relatively low wages (and were better paid in the past). Given the knowledge and experience needed to do the job efficiently the pay is unattractive. • This results in carriers experiencing courier-retention issues which impacts on delivery efficiency. • B2C same-day delivery sectors clearly growing. But unclear how much it will grow and extend beyond a niche of consumers willing to pay more for convenience. • If retailers offer same-day delivery services without charging prices that recoup these costs they will fail to develop business profitable models for grocery, takeaway, non-food B2C. This will in turn, affect profitability of carriers, and limit courier earning potential. • Failure to recoup the cost of same-day delivery will also risk generating demand for transport services which are generally less efficient than deliveries with longer lead-times, where this is possible. • Threat of diminishing custom at physical stores and restaurants and the challenges associated with this. • Lack of availability and affordability of logistics land in central urban areas for logistics infrastructure such as cross-docking facilities, vehicle storage and vehicle charging.

Table 18.1: Challenges facing the same-day delivery market and operations (cont.)

Area of challenges	Challenges faced
Operational challenges	<ul style="list-style-type: none"> • Growing urban traffic levels and lower vehicle speeds impact on delivery efficiency (however, carriers using self-employed courier models transfer costs to couriers). • Stable B2B parcel flows and rising B2C flows may lead to average parcel size/weight rising (as fewer letters and documents). This is not well suited to bicycle/motorbike transport. More suited to cargo bikes. But these have a set of operational challenges associated with them in terms of land requirements for overnight storage and recharging. • B2B and B2C parcel flows have different geographical flows – especially if end consumer wants goods delivered to home – leading to growth in same-day outer urban delivery locations. Calls into question the vehicle types most suited to this operation. • London regulations including the CCZ, Toxicity Charge and ULEZ pose operating cost challenges to companies and non-employed couriers using diesel vans, motorbikes and mopeds. Such regulation will spread to other urban areas in UK in efforts to improve air quality and reduce carbon emissions. • Need for multi-drop rather than point-to-point B2C non-food operations for efficiency improvements (but difficult to achieve if instant delivery is required and/or time windows required). • Multi-drop B2C same-day deliveries may require depots/fulfilment centres but land prices/rental values are prohibitively high in urban areas. • Courier employment models that are common across same-day operations would permit more working across carriers and different types of products during working day to reduce transport impacts and create better courier earning potential. • The above points call into question the best operational model and vehicle mix to use for B2B and B2C non-food.
Technology challenges	<ul style="list-style-type: none"> • Many computing software challenges in developing systems that provide effective and seamless interfaces and communication between retailers, suppliers, shippers, consumers, and carriers. • Need for more software applications that assist inexperienced couriers in the course of their deliveries to increase their efficiency and reduce their time and distance on the roads. • Traditional same-day carriers need to develop apps/software to provide interfaces with customers and couriers. • Potential for software development to replace human controllers in traditional same-day carriers (but this would reduce work for humans). • Autonomous vehicles, pavement droids and aerial drones all being developed with potential applicability to same-day deliveries (but this would reduce work for human couriers).
Regulatory and policy challenges (in addition to traffic and environmental challenges for policy makers below)	<ul style="list-style-type: none"> • Consideration of greater deployment of health and safety legislation in relation to the Management of Occupational Road Risk including companies using self-employment couriers (especially in relation to their road safety policies and practices). • Review of the energy intensity (transport and cooking) of meals delivered to customers. • Need for formulation of a policy approach to the deployment of new transport technology in the UK (e.g. autonomous vehicles, aerial drones, droids etc.) and related logistics infrastructure. • Development of a clear position on the working status and entitlements of, and tax arrangements for, self-employed couriers and the companies they work for (so that it is unnecessary for couriers to resort to employment tribunals). • Consideration of how to ensure there is sufficient daily work for independent couriers to earn at least the minimum wage. • Protection of lone worker couriers from robbery and attack (especially when working at night). • What to do with vacant former shop and restaurant space on the high street. • Addressing packaging waste associated with meal deliveries.

Table 18.1: Challenges facing the same-day delivery market and operations (cont.)

Area of challenges	Challenges faced
<p>Traffic and environmental challenges for policy makers</p>	<ul style="list-style-type: none"> • Same-day delivery services and impacts relatively poorly understood by policy makers – need for policymaker awareness raising. • Education of the public to make them aware of traffic and environmental impacts of same-day deliveries. • Expected growth in demand for, and provision of, same-day services has potential for negative implications in terms of road traffic intensity and associated energy and environmental impacts. • Role of policymakers in implementing green delivery charges/taxes in accordance with traffic and environmental impacts of delivery options / to overcome problems associated with ‘free’ delivery offers by retailers. • Unsuitable vehicle selection and point-to-point (rather than multi-drop) operating models could contribute to traffic levels and air quality impacts. • Depending on growth in demand for last-mile delivery services, policy makers may have to form opinions and actions in relation to B2C delivery services that do not cover their costs and stimulate traffic demand. • Policy makers could play an important role in encouraging the use of environmentally-friendly same-day vehicle options. • To stimulate same-day services that are more sustainable in traffic and environmental terms policy makers could consider their role in providing affordable land for vehicle, storage and recharging, and for inner-city distribution facilities that can support multi-drop, same-day deliveries. • Logistics land requirements for electric vehicle recharging and overnight storage. • Other potential interventions to support more sustainable same-day services at the point of delivery including logistics infrastructure required at/near kerbside to assist couriers based on foot to complete the delivery on behalf of human drivers/riders and, in future, autonomous vehicles, including the implementation and use of collection points and locker banks. • Trip generation rates and associated noise and disturbance especially during the evening and night at takeaways and restaurants engaging in large-scale meal delivery using platform providers. • Planning and transport issues raised by restaurants and non-retail kitchen being used for meal deliveries. • Review of whether the use of protective safety equipment by cyclists (including cycle couriers) should be made compulsory and means by which this could be enforced. • Research into what locations are best for personal deliveries in traffic and environmental terms and how this can be achieved. • Compulsion for multi-tenanted buildings and other sites with substantial same-day trip generations to provide concierge services so that couriers can deliver to ground floor (and not have to ascend inside buildings). • Prevention of poor driving behaviour and anti-social behaviour by some couriers (especially in meal delivery sector). • Scope also for greater policy maker intervention in road safety and efficient driving training for same-day couriers and companies, even when couriers are self-employed. • Stronger requirements of vehicle safety checks and vehicle insurance validity for companies using self-employed couriers. • Review of suitability of current driving requirements for moped/motorcycle couriers (i.e. whether CBT is sufficient for powered two wheeled riders working as couriers). • Review of whether compulsory road safety training should be required for cycle couriers. • Introduction of improved driver training / company compulsion to provide driver training regardless of whether couriers are self-employed. • Working more closely with carriers and retailers to develop innovative operational solutions and analysis of exist data to produce more sustainable transport futures. • Joint working with same-day service providers to provide a Code of Conduct for companies and couriers.

Source: authors’ own work based on research carried out.

18.2 The demise of high street retailing

Retailers with physical stores and restaurants in the UK are struggling. Several household names have ceased trading, gone into administration in the last three years including Woolworths, BHS, Toys R Us, Blacks, Poundworld, 99p stores, Multyork, HMV, MFI, Beales, Austin Reed, My Local, Netto Store 21, and Linens Direct. In addition Staples took the decision to close all 106 of its physical stores in 2016 (Centre for Retail Research, 2018). Major restaurant chains including Jamie's Italian, Byron, Strada, and Prezzo have all announced site closures, and there has been a 20% increase in restaurant insolvencies in 2017 and a report that indicated one third of the top restaurant chains in the UK are currently loss-making (Butler, 2018b; Davies, 2018). Profit warnings among companies in the retail sector have risen to 'exceptional' levels with nearly a quarter of FTSE General Retailers issuing warnings in the first half of 2018 (double the number of a year earlier) (EY, 2018a).

A key factor in these retailers' economic difficulties has been the rise of online retailers without the overheads and business rates of those with physical shops, the emergence of online platform providers providing convenient meal delivery services, and falls in the number of customers deciding to visit physical stores and restaurants (EY, 2018b). Retail footfall data and retail spending data shows that customer behaviour has changed quickly since the introduction of online services for non-food, meals and groceries (see **sections 4 and 5**). Lowest levels of online penetration have been in the grocery sector (with online sales only account for approximately 6% of total expenditure – see **section 4**) but even in this sector the cost to a retailer of providing both online/delivery and physical store options has important effects on profitability. The online transparency of prices charged by retailers, together with the rise of price compassion websites, has resulted in downward price pressure and hence also led to declines in profitability.

Platform providers have started constructing and letting kitchen not open to the public and off the high street, which cater entirely for the meal delivery market (see **section 16.3**). This will lead to further pressure for high street restaurants and takeaways. The boss of Pho, the Vietnamese cuisine specialist Pho, expects platform providers such as Deliveroo and Uber Eats to charge restaurants even greater proportions of their sales revenue in future for the services they offer in order to overcome their own loss-making. He also foresees a future in meal retailing in which platform providers such as Deliveroo become the operator of the off-high street, so-called 'dark kitchens', and thereby control the entire process of customer order, charging, making the meal and delivering it. He thinks such organisations have the resources and the data for this to be viable (Peskest, 2018). In such a business model, the platform provider would retain all the revenue earned from the customer in the meal delivery industry, thereby potentially resulting in a highly profitable business.

As a result of all the pressures on retailing discussed above, shop vacancy rates in UK high streets are currently 11%, with about 14,000 shops standing empty. The oversupply of shops in the UK is forecast to rise to 20% (approximately 100,000 shops) (The Grimsey Review, 2018). While the first Grimsey Review in 2013 presented means by physical retailing could be promoted and saved, the second Grimsey Review in 2018 argues that this is no longer possible given what has happened in the intervening five years, and the lack of action by policy makers (The Grimsey Review, 2013; The Grimsey Review, 2018). The latest Grimsey review, although outlining measures that could help support the remaining physical retail high street, instead argues that, "There is a need for all towns to develop plans that are business-like and focused on transforming the place into a complete community hub incorporating health, housing, arts, education, entertainment, leisure, business/office space, as well as some shops." It goes on to argue that the key to a successful future high street in the UK is outstanding and committed leadership from either elected mayors, or plans that while co-ordinated by local government, reflect the views of all stakeholders, including the community (The Grimsey Review, 2018).

The continued contraction in physical retailing in the UK that is expected in the coming years and the related rise in ecommerce is likely to further increase the demand for last-mile deliveries, including same-day services. However, the demise of physical shops will result the loss of important logistics space from which last-mile deliveries can be fulfilled. Therefore, in designing the future use of high streets it is important to take account of the logistics space required for last mile deliveries and how to make the use of such space affordable.

18.3 The future provision of same-day delivery operations

This report has shown that a range of companies are already providing and operating same-day delivery services and are experiencing growth in demand for such services. These include traditional courier companies, disruptor, on-demand start-up companies, major grocery chains, and meal delivery platforms. The greatest current uncertainty in the same-day delivery market is the extent to which the demand for B2C non-food same-day services will increase in the coming years and how this will be provided, given the operational challenges it poses. Three possible routes to the provision of large-scale same-day services for B2C non-food deliveries have been suggested (Hausmann et al., 2014):

- Next-day and economy parcel carriers operating hub-and-spoke networks begin to provide same-day evening delivery waves. For this approach to be viable these carriers have to make trunk-haul movements between local depots and the sortation hub earlier than they do at present, so as to allow enough time in the evening for delivery to customers from local depots. In order to justify this shift in the timing of operations together with additional evening delivery rounds, these carriers would require sufficient volumes of parcels. Such a development would also increase the degree of competition in this market, and may have the effect of depressing prices charged to retailers, leading to worsening declining profitability in offering such same-day services for some providers.
- Disruptor, on-demand start-up organisations enter the marketplace to provide sufficient courier capacity for major retailers who want to make same-day deliveries. The existing same-day courier companies jointly have substantial service supply, but are individually too small and fragmented to provide a joint service. Therefore a new entrant, or a change of operation by an existing, large player (or an industry acceptance of operational collaboration) in the same-day courier market is required to harness all of this existing courier potential via a single service proposition. Retailers could place their volumes via a single online platform that would allocate between the various couriers providing services. It has been argued that this business model could prove cheaper than one provided by hub-and-spoke next day providers if there is sufficient volume requiring delivery within a less than 15 mile radius.
- Retailers with sufficient order volumes can set up and provide their own in-house same-day delivery operations from their warehouses. Again this requires major investment in warehouse locations as well as vehicle fleet. However, in the UK two non-food retailers, Amazon and Argos have already taken this approach to same-day service provision. In addition, the major grocers, Tesco and Sainsbury's, have also taken this approach despite the even greater costs involved due to handling and temperature controlled requirements.

For any of these three approaches to same-day delivery on a large-scale to be viable for retail B2C non-food deliveries it is necessary for there to be sufficient parcel volumes to drive down unit costs of processing, handling and delivery. Each approach requires a sophisticated IT-based solution that is capable of handling large volumes of orders, and allocating transport resources to these so that the necessary collection, handling and delivery activities are possible within a few hours of the order being placed. This IT system would need to interface

with retailers' inventory management and ordering systems so that the potential for same-day delivery can be determined and these orders can be allocated to carriers. The picking process once orders have been placed needs to be fast, so that items can be dispatched quickly on vehicles which requires substantial investment in warehouse automation.

An issue that is due to receive further attention from the UK government are the rights and entitlements of workers in self-employment, agency workers and those on zero-hours contracts. This has the potential to alter current courier working arrangements for many same-day carriers. This could involve the government making a substantial break with the past and deciding to implement radically different employment model that offers couriers the same rights as employees. However, more likely, based on recent government statements and (in)actions is that self-employed couriers are provided with some additional rights such as holiday entitlement/pay, similar to those granted by employment tribunals, without gaining the additional rights of employees (such as sick pay, maternity/paternity leave and a company-supported pension). However, government actions could extend to carriers having additional costs such as national insurance contributions for couriers imposed on them.

A group of analysts from McKinsey has suggested that almost 25% of B2C consumers would already pay a premium for same-day parcel deliveries and that this will increase given that younger consumers are even more willing to pay extra for same-day and instant deliveries. They predict that three business models will exist in same-day parcel deliveries in the future: (i) autonomous ground vehicles together with parcel lockers, (ii) aerial drones, and (iii) bike couriers/droids. As the authors note, options (i) and (ii) will be based on substantial automation and required significant assets. They believe that these two options will in future deliver 98% of deliveries to consumers and 80% of all items (i.e. including B2B same-day parcel deliveries). By contrast, they expect bike couriers or droids to deliver about 2 percent of items – these would transport items required to be delivered instantly in urban areas. Meanwhile, more traditional delivery operations (using vans operated by humans) will, they predict, account for the remaining 20% of all items, as B2B receivers with specialist delivery requirements and those with substantial flows (greater than 10-15 parcels per item) and in dense areas will continue to want existing services operated by humans rather than having to access parcel lockers. They expect aerial drone deployment to take place for serving rural locations. They also predict that grocery deliveries to consumers will also continue to operate as they do now, as many customers will want these to be carried to their front doors and to have a collected returns service. The authors expect these changes to commence soon in developed countries with timings determined by public attitudes, regulatory change to accommodate these technologies and labour costs. They also expect similar developments in developing countries but with a slower uptake due to labour costs remain sufficiently low for this time-period. They acknowledge that regulatory change will be necessary to permit autonomous vehicles and drones but expect these to be overcome in the next ten years, due to the influence of major vehicle manufacturers. They believe that public opinion about drones has already become favourable or indifferent, thereby paving the way for their introduction within the next 10 years. They foresee little role for self-employed gig-economy deliverers/riders in this future due to employment law issues, quality and reliability issues and difficulties in staffing up to cope with peaks but acknowledge its potential for market entrants due to low investment costs, and for coping with exceptional peaks such as at Christmas (Joerss et al., 2016). **Table 18.2** shows their expectations about the future of all B2B and B2C parcel deliveries by delivery lead-time and geographical area.

Table 18.2: Future predicted parcel delivery models within ten years - Joerss et al., 2016

Overarching product categories	Increasing drop density/decreasing cost				
		Rural areas with low to average density (pop. below 50K)	Urban areas with average density (pop. 50K – 1 million)	Urban areas with high density (pop. above 1 million)	
X2C (including B2C and C2C)	Regular parcel	Autonomous ground vehicles with lockers			
	High reliability (i.e. time window)				Aerial drones (same-day)
	Same-day				
	Instant	Fulfilment likely not possible at economical cost levels		Bike couriers or droids (if the latter are not cheap/fast enough)	
B2B		Today's delivery model			

Source: adapted from Joerss et al., 2016.

While these views about the future of parcel delivery are of great interest, we have differing views on several of the points expressed. We agree that autonomous ground vehicles will play an important role in the future of same-day (and next-day and economy parcel deliveries). However, although we think that while there will be some use of locker banks in conjunction with them, we believe that the more prevalent delivery system in inner and central urban areas will involve the use of human couriers (which we also refer to as delivery porters) at the kerbside who will be responsible for receiving the items transported by these autonomous vehicles and then making the last-leg of the delivery to the customer. This approach will satisfy receivers' (both businesses and private individuals) desire for human interaction and their potential dislike of leaving their buildings and homes to collect items from a locker bank. It will also provide replacement work given the removal of the need for courier riders/drivers with the advent of autonomous ground vehicles.

There are various models as to how these kerbside couriers and autonomous vehicle operations would be organised. It could involve a rendezvous between vehicle and courier at the kerbside; couriers travelling on-board the autonomous vehicle and briefly leaving it to make deliveries; or these vehicles making deliveries to lockers, or staffed collection/delivery points from which couriers obtain these items as required.

The use of collection/delivery points and locker banks in conjunction with autonomous vehicles is likely to be a preferable model in outer urban, edge of urban and even rural locations, as the drop densities make the economics of door delivery far less viable (as at present). In these

locations, the receiver (business or private individual) would be responsible for collecting their items from these collection facilities).

There is likely to continue to be some demand for cyclists and cargo-bike riders to provide urgent, time-critical B2B deliveries in built-up urban areas. We believe that aerial drones will have a role to play at some point in the future when regulators have made the necessary policy changes for delivering small, urgent items in rural locations and within large, secure sites. However, we do not foresee these aerial drones playing a role in deliveries in urban areas given heightening concerns regarding security and terrorism, together with the risk of serious injury that they would pose, and their inability to access buildings and hand over items to receivers.

Similarly, we do not foresee pavement droids playing a meaningful role in urban deliveries within the next decade, given several factors including: (i) the technology developments required to permit them to adequately replace a human being (in terms of being able to perform actions in an outdoor and varied environment such as to safely cross roads, climb stairs, call and use lifts, ring doorbells entering etc.), (ii) their vulnerability to theft and vandalism, (iii) the policy changes required to permit their widespread use on pavements, (iv) the existing high levels of pedestrian footfall in built-up urban areas, and (v) the relatively low cost of using humans to perform these roles. Therefore in our opinion, the application of droids is likely to remain indoors within buildings such as hospitals, offices, production facilities, and warehouses given the far fewer technology interactions and challenges these controlled environments present.

We also expect non-food same-day delivery operations to vary between: i) dense inner-city and city centre areas, ii) outer city areas and towns, and iii) rural areas. And we expect B2B non-food services to differ from today's same-day delivery services depending on location and lead-time. **Table 18.3** provides our vision of the future of parcel deliveries in the next 10-20 years, adapted from the figure of Joerss et al., 2016 in **Table 18.2**.

Table 18.3: Our future predicted parcel delivery models within 10-20 years

Overarching product categories	Increasing drop density/decreasing cost			
		Rural areas with low pop. density	Towns (up to pop. 200K) and outer areas of larger settlements	Inner and central areas of larger settlements over 200K pop.
X2C (including B2C and C2C)	Regular parcel	Autonomous ground vehicles with lockers / collection points		Autonomous ground vehicles with human porter
	High reliability (i.e. time window)			
	Same-day	Aerial drones (same-day)	Autonomous ground vehicles with lockers / collection points	Bike and cargo-cycle couriers
	Instant		Clean vans / motorbikes	
B2B	Regular parcel	Autonomous ground vehicles with lockers / collection points	Autonomous ground vehicles with human porter	
	High reliability (i.e. time window)			
	Same-day	Aerial drones (same-day)	Clean vans / motorbikes	Bike and cargo-cycle couriers
	Instant			

We expect takeaway meal deliveries to continue as at present. Given the instant nature of these meal orders, we expect these deliveries to be made by couriers using bicycle and environmentally-cleaner mopeds. Grocery deliveries are also likely to have to continue to take place to people’s homes given the temperature-controlled requirements of some products. This could be performed by autonomous vehicles with a human on-board to take it to the front door, as customers are unlikely to want to come to the kerbside to collect these deliveries, especially at night-time. There is also the possibility that, with suitable security systems in place, customers may permit remote entry to the delivery person if they are regular and known to them, thereby facilitating deliveries even when the customer is not at home.

18.4 Conclusions

City authorities in the UK will increasingly impose legislation that introduces vehicle compliance schemes to reduce the air quality impacts and carbon emissions of vehicles used. This is already happening in London and the first five UK cities that will have Clean Air Zones by 2020 have already been named (Birmingham, Derby, Leeds, Nottingham and Southampton). Further cities will be announced in future. These actions are likely to stipulate the engine standards of vehicles allowed to operate within a defined geographical area. This

will encourage road users including same-day carriers to switch to a cleaner vehicle fleet. In London the Mayor will address carbon emissions and air pollution from freight traffic by enhancing the existing Low Emission Zone to an Ultra Low Emission Zone from 2019 onwards, and requiring that all new vans and lorries are zero emission capable from 2030 and 2040 respectively. In this way London's entire transport system would be zero emission by 2050 (Mayor of London, 2018).

However, the means by which city authorities in the UK will bring about less transport-intensive and safer freight transport operations are far less certain. It would appear that the Mayor of London is placing great emphasis on load consolidation and retiming activity outside of peak traffic times as the means by which freight vehicle activity will be achieved, but it is unclear precisely how he intends that this will be realised, and whether it will extend beyond a voluntary approach remains uncertain. The innovations presented in **section 17** of this report are intended to provide insight into how such reductions in same-day transport intensity could be achieved in London and other urban areas in the UK (and potentially elsewhere).

To sum up, same-day deliveries play an important role in a modern, rapidly changing, and highly responsive urban (and national) logistics system. Same-day deliveries are responsible for performing the important role of moving time-critical medical and business documents around the urban area and the country as fast as possible. These same-day operations also provide customers (retailers, businesses and private individuals) with a wide range of other delivery services (including non-food, grocery and meal) that they demand at prices they are content with.

However, there are problems associated with these same-day delivery services. For some carriers they are unlikely to be financially sustainable in the long-run, as the prices charged fail to reflect the internal costs of providing them. This has arisen due to the entry into the marketplace of start-up, 'on-demand' carriers with sizeable venture capital financial resources that are attempting to gain market share and a foothold in the 'gig economy' delivery industry, including Amazon, Deliveroo, Uber and many smaller carriers. Traditional same-day carriers have been forced to alter their thinking and update their operations and its planning to compete with these new entrants. This has resulted in a same-day marketplace that is currently going through much change and upheaval.

In addition, same-day deliveries are among the most transport- and environmentally intensive operations in the entire freight transport industry, given the small quantities of product often transported in dedicated vehicle movements. As the total quantity of these same-day transport activities continue to grow rapidly, in urban areas in which efforts are being made by policy makers to reallocate space and time to bus and cycle facilities, and to deter unnecessary and inefficient private motorised vehicle journeys, these operations are likely to come under commercial and political pressure to change and innovate.

As described in this report there are many potential innovations that can be applied to same-day delivery operations to make them more efficient, plus efforts could be made by carriers, retailers and/or policy makers to alter customer behaviour in order to reduce the demand for unnecessary, immediate same-day deliveries.

Due to recent worker challenges, arising from concerns about the 'gig economy' same-day couriers in both traditional and start-up carriers have begun to challenge their self-employed status. Virtually all of the cases dealt with by carriers or Employment Tribunals to date have resulted in couriers being awarded dependent contractor status and the employment rights that go with this. As a result of these rulings and the national government's current deliberations about employment legislation in the wake of the Taylor Review, there is current uncertainty over future changes to employment law concerning same-day (and next-day) couriers. It seems likely that changes to the current employment arrangements will be made

by government, but the exact nature of these remains uncertain. However, it is conceivable that self-employment will cease to exist in the same-day delivery sector.

In the meantime uncertainty about the future worker status of couriers appears to be holding back carriers from implementing some innovations and changes that would help increase operational efficiency and improve road safety for fear of how such action may be interpreted by judges and politicians making rulings and legislation concerning this issue. Once the government decides about the future employment status of couriers who are currently self-employed, this will hopefully free-up carriers to embrace the innovation that is needed to bring about important changes in the industry that will make it more efficient and sustainable in transport and environmental terms.

There is also an important role to be played by policy makers to facilitate the implementation of some of these changes by carriers in terms of infrastructure provision and regulation. If such innovation is insufficient to bring about sufficient improvements in efficiency and sustainability, then policy makers may well also have to consider whether they have a role to play in relation to ensuring that rates charged to customers reflect the external traffic and environmental costs of these same-day transport services. Such pricing changes whether implemented by carriers or policy makers have the potential to influence the purchasing decisions of private individuals and business customers and thereby help to increase the sustainability of same-day delivery operations by reducing the traffic and associated negative impacts they currently impose.

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