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The UK public road transport system: how and why is it changing?

Future of Mobility: Evidence Review

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The UK public road transport system: how and why is it changing?

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Contents

1. How is the UK public road transport system changing?

For the purpose of this review, 'public road transport' is defined as **the bus and coach system**, including contract and non-scheduled services (e.g. schools), and also the taxi and private hire vehicle (PHV) sector, within which the local bus sector predominates. Most content relates to Great Britain rather than the UK as a whole (Northern Ireland is not subject to the deregulation which has applied in mainland Britain since 1985).

Usage of **local bus services peaked in the early 1950s**, then **declined**, mainly because of the **growth in car ownership, lower urban densities, and the rising real costs of providing bus services** (mainly due to staff costs).[1]

These factors led to **revenue losses**, which operators tried to offset by reducing service levels and increasing real fares. (A comprehensive review of readily quantifiable factors affecting demand is provided in Balcombe et al. (2004), and a review of 'soft factors' in Department of Transport (2009).)

Table 1 shows links between car ownership and bus use at household level for 2014. It reveals that those in car-owning households on average took less than one-quarter the bus trips taken by those in non-car households (335 compared with 1,341). Assuming that this cross-sectional relationship can be applied in future, further growth in car ownership would clearly have a marked effect on bus demand.

[1] Operating costs are dominated by labour (about 60–65% of the total), of which drivers alone comprise about 40%, and these costs vary by time buses are operated, rather than by distance run.

Table 1: Public transport use by car access, England 2014

Trips per person per year	Average for all persons in car-owning households	Main driver	Other driver	Non-driver	Average for all persons in non-car households
As car driver	471	797	245	4	10
As car passenger	235	91	255	468	84
Buses	35	14	49	66	167
Taxi/PHV	7	5	8	10	25
Other public transport [2]	30	27	63	23	50
Distance per person per year (km)					
As car driver	6,461	10,990	3091	43	209
As car passenger	3,315	2,029	4,110	5,207	1,032
Buses	335	165	526	533	1,341
Taxi/PHV	79	68	114	87	134
Other public transport[2]	1,043	1,113	2,045	673	1,177

Source: Table NTS0702 in NTS, 2014[3]

Despite the earlier decline in the use of bus transport, due mainly to the rise in car ownership, the last 30 years has seen a more positive outcome in that **operating costs per bus-km were sharply reduced following deregulation** (outside London) and **competitive contracting for services** (within London). Operating costs per bus-km fell by about 45% in real terms between 1985/86 and 1999/2000. Subsequently, costs have risen again, due to the need to improve staff wages and working conditions, and also associated with growing traffic congestion. Ridership decline has been mitigated by growth in concessionary travel and initiatives by operators, but in aggregate has fallen outside London (see table 2 below). In terms of modal share, average bus trips per head in England (an aggregate total for

[2] 'Other public transport', comprises surface rail, London Underground, air, ferries, and light rail.
[3] In the table, 'Buses' corresponds to 'local and non-local buses', and 'car' to 'car/van' within NTS0702. NTS data has been converted to km at 1.61km to 1 mile, and rounded to the nearest whole number. The data in NTS0702 for walk and 'other private' is not shown above

'London bus' and 'other local bus') fell from 66 in 1995/97 to 61 in 2015, during which period trips by all modes (including walking) fell from 1,094 to 914 (source: NTS Table 0303). Hence the bus share grew, from 6.0% to 6.7% – however, this was due to strong growth in London offsetting decline elsewhere.

Growth of ridership in London

From 1985/86 and until recently London has displayed strong ridership growth, compared with aggregate decline elsewhere, as shown in Table 2. The table shows that between 1985/86 and 2016/17 local bus trips fell by about 40% in England (outside London) and Scotland, and by 23% in Wales, while in London such trips increased by around 82%. In London a fairly stable demand remained in the late 1980s and 1990s, compared with a marked decline elsewhere in deregulated areas, especially large cities. A very marked ridership growth then followed from around 2000, associated with policies introduced by the elected mayor within the different governance arrangements introduced in London.

The strong ridership growth in London may be attributed to a mix of **external factors** (such as population growth, stable per capita car ownership, etc.) and **factors specific to the bus system**, notably very comprehensive service coverage by time of day/week, the convenience of non-cash ticketing, comprehensive passenger information, etc. (White, 2009). These factors have been aided by retention after deregulation of a regulated system in which a standard fare structure has been adopted. Transport for London's own analysis points to **population and economic growth** as the most important factors in the growth of bus ridership, followed by **service quality** (Daniels, 2015). The direct effect of the congestion charge on bus ridership is relatively small (White, 2009).

Table 2: Trends in local bus use in Britain, from operator data (Million passenger trips per annum)

Year	Region			
	England outside London	Scotland	Wales	London
1985/86	3,650	671	133	1,230
1999/ 2000	2,510	455	117	1,294
2002/03	2,437	471	115	1,527
2005/06	2,254	466	120	1,881
2006/07	2,325	476	119	1,993
2007/08	2,394	487	121	2,160
2008/09	2,432	484	125	2,228
2009/10	2,397	458	116	2,238
2010/11	2,372	430	115	2,269
2011/12	2,337	436	116	2,324
2012/13	2,276	421	109	2,311
2013/14	2,310	422	107	2,361
2014/15	2,285	414	101	2,364
2015/16	2,237	409	100	2,293
2016/17	2,212	393	102	2,241

Source: Derived from DfT table BUS0103[4]

Although ridership has declined overall, there is substantial variation in the picture, with growth in a number of other areas than London, such as Brighton and Hove, linked with operator and local authority initiatives. However, using London as a ‘control’ case to compare with impacts of bus deregulation in other large cities creates some difficulties, due to the unique factors involved in the case of London. It might have been better had deregulation been set up as a monitored experiment, with introduction of service contracting in some other large cities. The Bus Services Act 2017 may enable franchising (i.e. contracting) to be introduced in other cities

[4] Notes and sources: ‘Local Bus trips’ (including London) are derived from DfT Table BUS0103, as updated June 2017. There is a discontinuity in definition from 2004/05. ‘Trips’ correspond to boardings, resulting in some overstatement.

(and/or 'Enhanced Partnerships' which are similar in many respects), but it will be some years before outcomes are clear.

Demand from younger and older people

A striking characteristic of the public road transport system is the high demand from younger people and older age groups, with a smaller penetration of the main working-age population, as shown in National Travel Survey (NTS) data.[5]

The higher bus trip rate of younger people is partly a result of low car ownership and driver licence holding, now substantially lower than the equivalent cohort 20–30 years ago[6] (Chatterjee et al., 2018). The high demand by older users is driven by both lower car ownership and free concessionary travel. While the younger persons' market is fare-paying, many operators have found it worthwhile to offer lower fares to passengers up to about 19 or even older; i.e. they seem to have found these commercially justifiable.

Purposes of bus trips

Most bus journeys are for shopping not work. Britain differs substantially from other similar countries in Europe in that it has less extensive rail provision, especially in conurbations outside London, making such areas more dependent on buses. The very generous concessions for older people are also noteworthy (reduced fares are common in other countries, but free is rare). In contrast to rail, adult journeys to work form a much smaller proportion of demand, but for buses non-work travel (notably shopping) has a more substantial share: see Table 3.

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[5] NTS Table 0601 for 2016 indicates an average bus trip rate (as main mode) per head of population of 51 averaged across all age groups, but 100 for the age group 17–20, 46 for ages 30–39 and 63 for 70 and over.

[6] Current ONS projections (as cited in NTS 2016 report) indicate the 17–20 group will form an approximately stable share of total population, from 4.8% in 2016 to 4.7% in 2039. ONS 'National Population Projections: 2014 based' Statistical Bulletin (Table 4) indicates total population growing from 64.6 million in 2014 to 74.3 million in 2039, within which the number of people 'of pensionable age' would rise from 12.4 to 16.5 million.

Table 3: Bus and rail journeys by purpose, England 2014

Trip purpose	Percentage of all bus trips	Bus market share of trips by all modes (%)	Percentage of all rail trips	Rail market share of trips by all modes (%)
Commuting	18.6	7.5	48.4	10.2
Business	1.7	3.1	9.7	9.4
Education	18.6	9.7	6.5	1.8
Shopping	25.4	8.6	6.5	1.1
Personal business	11.8	7.5	6.5	2.1
Leisure	20.3	5.0	25.8	3.3
Other purposes	3.4	2.3	0	0
All purposes		6.4		3.4

Source: Derived from table NTS0409.[7]

Forecasting of future demand could thus be seen as largely determined by population (especially for the two age groups just mentioned), together with car ownership trends, along with factors affecting specific journey purposes such as shopping. A recent analysis of bus usage decline in Scotland by KPMG (2017) indicates growth in car ownership as the largest factor, but also identifies many other factors including a shift to online services, and worsening bus journey times. Growth in taxi and PHV numbers appears to be a very small component.

Working-age adults and public road transport

Although working-age adults mainly use other modes of transport for commuting, there are examples of bus services being able to **divert the adult working-age groups from cars**, notably where park & ride (P&R) services are provided, and also services using busways, which offer much better speed and reliability than buses in mixed traffic (in some cases combined with P&R, as in Cambridgeshire). Recent surveys from several busways indicate that about 20% of trips were previously made by car (Fastrack Delivery Executive, 2006; Transport for Greater Manchester, 2016;

[7] Note that data in the table are shown with trips per person rounded to a whole number, from which above percentages are derived (and, as a result, percentage shares within each mode may not sum to exactly 100).

Brett and Menzies, 2014). While these services currently represent a small share of total bus demand, this could grow in future.

Another striking feature has been the expansion of provision and use of taxi and PHV services since the early 1980s, despite the labour-intensive nature of this mode. Some of this may be filling gaps in bus service provision. However, impacts of shared taxis offered since the 1985 Transport Act appear to be small.

Research gaps/issues

1. **Understanding the price elasticity for younger persons' travel** (overall elasticities are fairly well understood, and also those for older people, due to compensation agreements for free travel).

2. **Likely trends in car ownership and driving licence holding** – there is considerable debate in Britain and similar countries over whether current changes shown by younger adults are a long-term shift (i.e. the same cohort will continue to display low car ownership), or a temporary phenomenon (Grimal et al., 2010; Kuminhof et al., 2012; Garikapati et al., 2016). However, the latest study within Britain (Chatterjee et al., 2018) strongly suggests that it is a long-term shift. There is also the question of why car ownership per capita has remained broadly stable in London for about 20 years – indeed, in the last ten years the percentage of non-car households has slightly risen (Transport for London, 2015) – but continues to rise elsewhere. Does a higher level of public transport service affect car ownership *per se*, rather than this being a wholly exogenous variable?

3. **Potential growth in shared taxi/PHV supply and use**, and whether this is a competitor to bus, or could be used as an alternative in areas/time periods of low demand. At the aggregate level, there is a positive relationship between high public transport use and high taxi/PHV supply (for example, comparing London with other regions of Britain). This may point to a complementary relationship (e.g. the ability to make a late night journey home having travelled into a city centre by bus). However, it could also be a direct competitor, given the convenience of apps such as that for booking 'Uber' journeys, especially for younger users (Transport Focus, 2018).

4. **Outcomes of franchising and/or enhanced partnerships on bus use outside London.**

2. How do users engage with the public road transport system?

Accessing the bus system

The great majority of bus users access the system by walking to and from stops at each end of their trip (Department for Transport, 2015). In most cases, bus is the 'main mode' (i.e. that used for the greater part of the trip by distance), and only one bus is used (outside London, about 10% of bus trips involve interchange to another bus to reach the final destination). In London there is a higher proportion of bus–bus interchange (in about 20% of all trips,[8] and a substantial element of bus feeder to/from rail (NTS)).

Trip chains

While many statistics only measure single (one way) trips, it is important to bear in mind that almost all users are making 'trip chains' (i.e. starting at home, travelling to one or more activities, and back home), which may be detected in household-based travel diaries (as in NTS) or from smartcard data. Choice of the bus mode may thus depend on frequency of services offered over the day as a whole, not just when the first trip is made.

Walking to and waiting at bus stops

In terms of walk time, and waiting at stops, evidence indicates substantially greater disutility for these components than in-vehicle time (Balcombe et al., 2004), i.e. the experience is less pleasant, and it is more difficult to use the time for any other activity. Bus use may thus be stimulated by improving walking conditions, minimising walking distance, and minimising waiting time – the last by improving reliability (for a given frequency) and/or improved frequency (see below).

Physical access to the vehicle is now eased by universal use of low-floor buses, but obtaining the full benefits of these will also depend on stop design (especially raised kerbs), adoption of which is more gradual.

Accessing travel information

Users also interact with the system by seeking information prior to travel, a process that has markedly improved through real-time information at stops, and information available prior to travel such as 'Traveline' and mobile phone apps, growth of which is likely to continue.

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[8] For example, in 2002–5, the ratio of 'boardings' to 'stages' (as defined in the National Travel Survey) was 1.18 in London, and 1.09 in the rest of Britain (DfT, 2006, p. 25).

Fare payment

Fare payment may create considerable inconvenience for bus users, but this may be minimised by use of non-cash systems (smartcards and contactless bank cards, mobile phone payments). London is already cashless, and this trend is also marked elsewhere. As well as improving convenience for individual users, reduced boarding time per passenger reduces total dwell time at stops, and its variability, thus speeding up services and improving reliability.

Trends to 2040

In terms of changes up until 2040, no radical change is likely, but existing trends are likely to continue. An important policy issue is the extent to which new development, especially housing, is structured to facilitate ease of access to bus services and stops (Chartered Institute of Highways and Transportation, 2018). Much of the existing building stock is likely to remain in place, given low rates of construction and replacement. A very important factor may be the degree of road congestion, affecting service speed and reliability (and hence ridership), and costs (and hence fares).

Research issues/gaps

There are no specific issues in this area, but it is necessary to monitor current changes, especially the rate at which ticketing shifts to non-cash payments, and the degree of congestion, and their implications.

3. How is technology changing the public road transport system?

Low-floor vehicles

The vehicle itself has been changed through the adoption of **low-floor vehicles**, with greatly improved passenger accessibility. In Britain, the full benefits of this are constrained by extensive use of double-deckers, in which by definition only the lower deck is fully accessible. Greater use of **low-floor articulated single-deckers** (common in most other advanced countries) improves accessibility. Operators have also found it commercially worthwhile to adopt greatly improved interior specifications, with leather seating, better lighting, etc. The small gain in revenue covers the extra costs, especially for inter-urban routes (such as Ripon–Leeds–Harrogate).

Reduced emissions

Emissions from use of diesel engines have been greatly reduced by the adoption of 'Euro' standards (currently Euro VI), especially in particulate matter, oxides of nitrogen, and hydrocarbons. As further fleet replacement occurs, improvements will arise in consequence (also made possible by retrofitting older vehicles). However, there is evidence that fuel consumption (km/litre) has worsened, thus increasing CO_2 emissions per bus-km (White, 2015). A wide range of alternative fuel and transmission systems are now being tested, as listed in the appendix. There is little evidence of alternative fuels attracting users to buses as such, but reduced emissions may be critical in enabling buses to continue to operate in environmentally sensitive areas, such as city centre shopping streets. Scope may also exist for **reduced energy consumption** through lower vehicle weight.

GPS

Use of **GPS-based location systems** (such as 'ibus' in London) have greatly assisted accuracy of real-time passenger information systems, and effective operational control.

Connectivity and use of wi-fi

Many bus and coach operators are now installing IT packages, building on established smartcard and GPS location technology, which also enable additional forms of connectivity to be added at low cost, such as wi-fi and entertainment. Smartcard technology enables much faster bus boarding times than for cash fare payments (although this will vary according to circumstances, e.g. whether a paper ticket is still issued for distance-based fares). This in turn reduces overall journey times, improves reliability from the passengers' perspective, and should thus stimulate demand. In addition to providing data for operational control purposes, GPS technology can drive real-time passenger information systems, making use of the service more convenient and having a positive effect on ridership in the long run.

In addition to use in real-time, such systems also enable downloading of more granular data for analysis purposes. For example, the 'ibus' system in London reports vehicle location in real time at intervals of about 30 seconds, but stores data at one-second intervals, which may be downloaded subsequently. Driver monitoring systems which detect speed, acceleration and braking, can be used to incentivise safer driving (especially to reduce risk of injury to passengers on board) and have also enabled reduced fuel consumption.

Additional passenger facilities can be provided such as wi-fi connections on board. This is generally offered free of charge (in contrast with some rail services), as imposing a charging system would be impracticable to operate for short-distance bus journeys. It is likely that its use is greater for longer-distance journeys, where a reasonable amount of time is available for its use. It thus reduces the disutility of in-bus travel time by enabling other activities to take place.

Assessing impacts on ridership of such developments may be difficult, because improvements are often introduced in combination. For example, Blackpool Transport has reported that vehicles fitted with free wi-fi, USB charging ports, next-stop audio/visual announcements and an improved interior specification for seating and flooring have shown revenue growth 2% higher than for other services (Eurotransport 2017, p. 5) (although subsequent problems with vandalism have resulted in the withdrawal of the USB facility).

Reducing waiting time, increasing frequency

As indicated above, waiting time forms an important component of door-to-door journey time. It may thus be reduced by improved frequency: at high frequencies (approximately 5 buses per hour or higher) passengers tend to arrive at stops independently of the timetable (although this may be changing with wider use of real-time apps). At lower frequencies they tend to aim for a specific scheduled journey, allowing a waiting time margin of about 5 minutes. In the latter case, improving a relatively low frequency (e.g. from 2 to 3 buses per hour, evenly spaced) will not necessarily reduce waiting time at the roadside but the probability of matching the user's desired journey timing is improved (White et al., 1992). A meta-analysis of ridership with respect to frequency (change in passenger trips to changes in bus-km) run indicates a value of about +0.4 (i.e. a 100% increase in bus-km would produce a passenger trip growth of 40%) (Balcombe et al., 2004). This was also borne out as a broad average when extensive high-frequency minibus operation was adopted in Britain in the late 1980s, albeit with considerable local variation (Watts et al., 1990). This was often commercially viable (for example, if the running cost per km of a minibus was 70% that of a full-sized bus, doubling frequency would increase total cost by 40%, in line with growth in demand). However, this rested on paying lower wages to drivers of minibuses, which became difficult to sustain, and such services generally reverted to larger vehicles. Stagecoach have recently reintroduced this concept in Ashford, Kent, but paying the same driver wages as for full-sized vehicles.

Demand-responsive services

The type of high-frequency fixed-route minibus operation described in the previous section should be clearly distinguished from demand-responsive (DR) services (i.e. those in which routing is determined by user requests) which also use small vehicles. These enable services to be provided in low-density areas that may be impracticable for fixed-route services but generally incur high cost per passenger trip, requiring high subsidies. A comprehensive review is provided in Mulley and Nelson (2016). This concept has also attracted increased interest from commercial bus operators, notably Arriva's 'Click' service in Sittingbourne, and RATP Dev's 'Slide' service in Bristol. In some cases, these services are run under PHV rules, rather than as registered local buses, which may make experimentation easier. However, if in consequence they do not carry concessionary travellers, operating economics are not equivalent to those of local bus services in general.

Scope for use of autonomous vehicles (AVs)

Given that driver salaries represent about 40% of total operating costs, and given the value of high frequency services, development of autonomous vehicles (AVs) could create major opportunities for bus services. Conversion of existing bus services to driverless operation would not only enable cost savings at current service levels, but provide scope for higher frequencies by using smaller driverless vehicles to replace existing larger vehicles at little extra cost. Indeed, a recent report from the Transport Catapult assumes a net increase in bus vehicle capital cost of only about £5,000 (Transport Catapult, 2017, Table 3.5). If this enabled complete replacement of the driver, the resultant payback period on investment would be as short as about six weeks.[9]

AV feasibility tests

The use of autonomous vehicles in public transport depends of course on the overall feasibility of such vehicles in everyday operation. This is being extensively tested in many countries. Most tests have involved small vehicles at low speeds, although a trial with full-sized buses has been conducted on the Schiphol busway in the Netherlands (Jack 2016). Subject to such technology becoming adopted on a large scale, it could then be used for buses. A number of simulations have examined scope for this, for example in work for the ITF (2016) based on Lisbon, but they have tended to conflate demand-responsive and autonomous operations. In practice, it may be useful to consider these modes of operation separately, as DR adds complexity both operationally and for the user. A parallel may be drawn with extensive use of automated metro systems based on fixed-track rail. Within many existing bus networks, there is a very wide range of frequency, from route headways around 2–3 minutes down to hourly. An extensive review of potential for AV systems

[9] Assuming a total operating cost of £2 per bus-kilometre – close to the average for all services in England outside London in 2014/15 (DfT table BUS 0408a) – and 40% of such costs being attributable to drivers, with utilisation of 1,000 km per week, a net saving of about £800 per week would be obtained, hence payback period ~ 5,000/800 or ~ 6 weeks.

in Switzerland suggests different outcomes for larger urban areas (Bösch et al., 2017).

'Last mile' AV transport

In some sectors, scope for 'last mile' transport by small AVs has been discussed – for example, for home delivery of shopping. It may also be applicable to rail services, to which access distances are considerably greater than for bus. There are also cases of AVs currently in operation in areas such as business parks, providing internal shuttle services which then connect with conventional public transport networks – for example, in Rotterdam.

However, the case for wider operation of this sort in urban bus travel may be limited, since as NTS data indicate, accessibility to bus services is generally good, with a high proportion of households within a relatively short walking time of their nearest bus stop: for example, in England in 2014 93% of sampled households were within 6 minutes' walk of the nearest bus stop, and further 5% within 7–13 minutes (NTS England 2014, Table 0801). However, the frequency of service provided may be low, especially during evenings or Sundays. Creation of additional shuttle services at such times may alleviate this problem, but may also require the user to interchange. Small AVs offering an improved frequency over the week as whole may be a better option.

Subject to feasibility of the AV technology, an appropriate start may therefore be to test AVs on a guided busway, segregated from other traffic, as has been suggested for Cambridge, which might then lead to a system with larger fixed-route AVs complemented by flexible-route services (University of Cambridge, 2017). They could then be extended to operation in mixed traffic if feasible. The choice between fixed-route and DR operation would then depend on local demand characteristics rather than AV adoption as such.

Research issues/gaps

To a large extent, extensive research is already underway on a number of the themes described above, especially **alternative fuels** and **transmission systems for buses, AVs in general, and demand-responsive services**.

The starting point would thus be to collate results of such research and its application to buses in the UK.

A gap to be filled would be a simulation of an existing urban bus network, to identify the potential impacts of AVs, and separately scope for high-frequency fixed-route networks and DR services, drawing on the recent Cambridge feasibility study.

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5. Appendix

Current fuels and transmission systems being trialled

- **Diesel–electric hybrid.** Final drive via an electric motor, small diesel engine at low revs, storage of energy from deceleration phase in batteries. Overall energy savings are up to about 20–30%. Main issues are high cost and probable life of batteries, currently making this option unattractive on a purely commercial basis.

- **Flywheel storage of energy from deceleration phase**. Currently less successful in terms of net energy savings, but lower capital cost.

- **Pure electric transmission, from on-vehicle batteries**. Zero emissions at point of use (but whole energy chain needs to be considered). Similar constraints to batteries on hybrids, plus power supply to depots for charging. Vehicles are now available with range for a whole day's operation, or recharging in service can be used.

- **Biodiesel**, used in similar form to conventional diesel, but reduced pollutant emissions and CO_2.

- **Compressed natural gas (CNG)** with reduction in pollutants vis a vis diesel, but lower energy density. If in the form of biogas (for example, from conversion of waste materials), significant CO_2 reductions may be obtained.

- **Hydrogen fuel cell.** Currently pilots are running in London and Aberdeen. These buses are also augmented by electric batteries, and regenerative braking (Ventura, 2018).

Examples of all these types (and others) may be found in Britain and other countries, including double-deckers with CNG/biogas, and electric battery, systems. As further developments in battery technology occur, this may become the dominant option. A comprehensive review of environmental impacts of different fuels is provided by EMBARQ (2012).

General issues in statistics and research

The quality of statistics for bus and taxi use in Britain is generally good, notably from the National Travel Survey and operator data collected by DfT. However, in **monitoring changes in this sector** there are some notable gaps:

1. Inconsistencies between England, Wales and Scotland as a result of the NTS now being confined to England only, with a separate household survey in Scotland (but not wholly consistent), and also inconsistencies in the level of regional detail shown in operator-reported statistics.

2. No data series on express coach travel has been published for many years, making estimation of trends very difficult.

3. Market shares for bus operators within defined administrative areas are shown by scheduled local vehicle journeys, not passenger volumes.

4. No national data series is collected on use of park & ride, or DRT services, in contrast to the comprehensive statistics on light rail systems published by DfT.

5. For taxis and private hire vehicles, good data is available on licensed drivers and vehicles by area (a proxy for supply for service), but there is nothing on usage at a local level. NTS gives a broad indication of national trends, but sample is of limited value for local analysis. In some other places (e.g. New York) operators are required to submit anonymised passenger trip data, which is now more easily generated available through booking systems such as that used by Uber (Schaller Consulting, 2016). This is of critical value in assessing recent growth in taxi/PHV use both in total scale, and the extent to which it is in the form of traditional single-hirer demand, or shared ride services.

It is also the case that no central point exists for bringing together research in the bus industry, analogous to the Passenger Demand Forecasting Council (PDFC) for rail. Such an organisation might be very useful both in drawing together evidence from demand-based studies and those in technology.

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