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Taxis and private hire vehicles in the UK transport system: how and why are they changing?

Future of Mobility: Evidence Review

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Taxis and private hire vehicles in the UK transport system: how and why are they changing?

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1. Introduction

Characteristics of taxis and private hire vehicles

Taxis, or 'hackney carriages' as they are formally known, emerged in the UK in the 1600s, having evolved from horse-drawn coaches (Vuchic, 1981). Unlike other forms of public transport, such as buses, trams or trains, taxis provide a point-to-point (often door-to-door) service on demand, and do not operate to fixed routes or schedules; passengers effectively hire the vehicle and driver for a self-defined journey, as opposed to purchasing a seat or space on a vehicle that is shared with other people. Although taxis and private hire vehicles (PHVs) fulfil needs that cannot be met by fixed-service systems, they have been sometimes overlooked by planners and policymakers in comparison with other modes of public transport (Aarhauga and Skolleruda, 2014).

In the UK, currently, a two-tier system operates, in that there are two forms of taxi: taxis (also known as 'black cabs'), and private hire vehicles (PHVs; also known as 'minicabs'). The main difference between the two is that while both modes can be pre-booked at a registered office or through the internet or by telephone, only taxis can be hailed in the street or hired from taxi ranks (called 'plying for hire'). This distinction, however, is becoming progressively blurred. An increasing proportion of taxis now carry out pre-booked and contract hires, and PHVs are now frequently booked immediately before hire (e.g. at supermarkets or railway stations), so being used in a way that is almost indistinguishable from plying for hire (Butcher, 2018).

Current context in England

In 2017, there were 281,000 licensed vehicles in England, the highest number since comparable records began in 2005. Of these, 73% were PHVs and 39% were registered in London (DfT, 2017). Looking in more detail, while taxi numbers in London rose slightly (by 8%) between 2005 and 2015, they then fell by 5% between 2015 and 2017. By contrast, the number of PHVs in the capital rose by 25% from 2005 to 2013, and then by a further 75% from 2013 to 2017. Outside London, the number of licensed taxi vehicles grew steadily by 20% from 2005 to 2017, while PHV vehicle numbers grew by 22% from 2005 to 2013, then by a further 4% to 2015, followed by a further 14% in the subsequent two-year period to 2017.

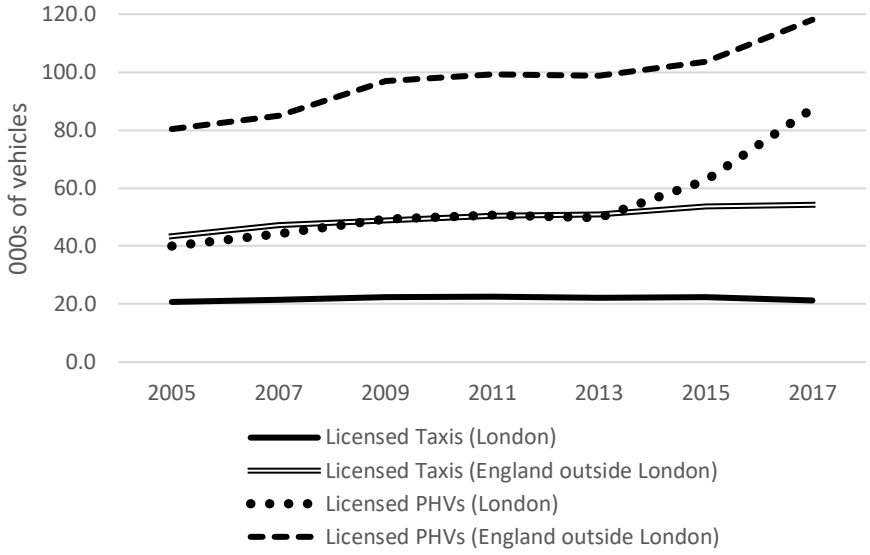

Figure 1: Trends in taxi and PHV licensed vehicle numbers in England 2005–2017 (based on data from DfT, 2017)

Meanwhile, local authority data shows that of the 356,300 licensed drivers, 61% were for PHV only, 17% were taxi-only and 22% were dual taxi and PHV drivers.[1] Overall, private hire services were provided by 14,600 operators in 2017, down by 12% since 2009, and with a much steeper (19%) fall in London. In terms of supply, on average there were 5.1 licensed taxis and PHVs per 1,000 people in England in 2017 (up from 4.1 per 1,000 people in 2013), a number that was higher in London (12.5), but which was lower in more rural areas at around 2.4 per 1,000 people. To summarise, the overall increase in taxi and PHV provision has largely occurred in PHVs, mostly in London, and most significantly since 2013 – the year that ridesourcing operators (alternatively called Transport Network Companies (TNC)) such as Uber began operating in England. This is discussed in further detail below.

Passenger satisfaction levels followed a similar pattern, with average satisfaction being slightly higher in London than the 68% national average, and lower in rural areas. In England, in 2016, the average person made 11 taxi or PHV trips a year (a figure that has remained broadly stable at around 10 for the past decade and which has dipped to 9 in subsequent 2017 data), with 59% of users travelling by taxi or PHV once or twice a year at most, 27% at least once a month, and 8% on a weekly basis (DfT, 2017). The average travel distance of 90 km a year was 9% higher than a decade previously, with 24% of journeys being under 3.2 km and half between 3.2 and 8 km. The average journey time of 20 minutes in 2016 was 26% longer than in the period 1995–1997.

[1] These figures show some discrepancy with data provided through the Labour Force Survey (ONS, 2017), which instead estimated that there were 197,000 drivers operating in England during 2016/17 (97% men, 81% self-employed and 26% part time) compared with 169,000 a decade previously.

Licensing environment

Butcher (2018) provides a comprehensive review of the UK taxi and PHV licensing context. In summary, in London both taxis and PHVs are regulated by a part of Transport for London, while in England outside the capital, taxis and PHVs are licensed by 292 unitary or district-level local authorities, 239 of which had a dedicated taxi and PHV licensing policy statement or equivalent (DfT, 2017). PHV licensing regimes in Scotland and Northern Ireland vary slightly from those in England, whilst the Welsh Government is considering reforming the framework for licensing taxis and PHVs in Wales.[2] It should also be noted that taxi and PHV markets, as well as the levels of competition, are very different across different local authorities (Linton and Bray, 2018). Typically, the role of these authorities is predominantly to protect the public, which they may do via a combination of quality controls, quantity controls and/or economic controls (see below, and DfT, 2010).

[2] See Part II of the Civic Government (Scotland) Act 1982 and the Air Weapons and Licensing (Scotland) Act 2015; and The Taxis Act (Northern Ireland) 2008 and Taxi Licensing Regulations (Northern Ireland) 2015 respectively. In Wales, devolved powers are only now being developed for the taxi sector under the Wales Act 2017.

2. The current taxi and PHV product

User profiles

A survey of taxi and PHV use in Paris, London, New York, Amsterdam, Lisbon, Berlin, Dublin and Stockholm revealed that taxi users in London and New York were mostly men, older, and lived in neighbourhoods well-served by public transport (Darbera, 2010). Private hire users were mostly women, younger and on lower incomes. In England in 2016, women made an average of 12 journeys by taxi or PHV and men made 9, while since 2002, those aged 17 to 29 have used taxis and PHVs the most (DfT, 2017). In addition, people without access to a car made 4 times as many taxi or PHV journeys than those with access to a car (29 vs 7), and travelled twice as far (181 km vs 75 km). Those people in the poorest 20% of households made an average of 14 journeys a year by taxi or PHV (at 7.4 km per journey) whilst those in the richest 20% made an average of 11 trips a year (at 12.2km per trip). Taxi use by time of day was considered by Grau and Estrada (2017), who report that demand for taxis in Barcelona fell from 30 journeys per unit area/space at midnight, to 20 between 1 am and 5 am. It then rose steadily to 140 journeys at 9 am, dropped to 130 until 1 pm, and then dipped to 90 at 3 pm (perhaps due to the siesta in Spain), before rising to 130 again at 6 pm. Thereafter, there was an almost uniform drop in demand until it reached 30 again at midnight. Yang et al. (2018) developed hourly demand models for Washington DC, and found that the demand for taxis was much higher in areas where the numbers of houses and jobs were extremely unbalanced, such as for large commercial centres, central business districts and residential neighbourhoods. Schaller (2007) drew on data from cities across North America in a pre-electronic booking context, and reported that taxis and PHVs were predominantly pre-booked in smaller urban centres; that proportionately more of the taxi market was from cab ranks in larger cities (e.g. Dallas Fort-Worth and Boston); and that the dominant market segment in New York City was street hailing. Almost in parallel within a single city context, in London, PHVs were more popular in the suburbs, taxi ranks were well used in inner London, and street hailing predominated in the city centre (London Assembly, 2014). That said, the recent rapid growth in PHV licences (and ridesourcing) in many jurisdictions around the world does suggest that online bookings are becoming an increasingly important way of accessing taxi and PHV services.

User requirements

Recent research has suggested that waiting time was the most important factor for frequent users of taxis and PHVs, while journey time was highly valued by almost all users, along with safety, accessibility and comfort. The cost of fares was not usually as important as might be expected (Alonso et al., 2018). Darbera (2010) reports that the most important reasons given for choosing taxis and PHVs are that they were perceived to be fast, safe, practical, easy to use when carrying luggage, and were available immediately. Taxis and PHVs were also preferred when the user was tired, when it was difficult to park a car, and when public transport options were deemed to be poor (for example, unavailable in the area, too slow, too many connections, unsuitable timetable). In sum, taxis and PHVs offer passengers a personalised, door-to-door service in situations where driving a car is undesirable, with its attendant difficulties of navigating congested streets, transporting luggage and finding suitable parking (Vuchic, 1981). The main barriers to using a taxi or PHV are the high cost, lack of availability at certain locations at night and in bad weather, and, in the case of taxis, uncertainty about waiting times at a rank (Alonso et al., 2018). Vuchic (1981) reports that taxis and PHVs are the most expensive mode to use; are unreliable at some times and in some locations, and that passengers can feel

insecure due to worries about being overcharged and/or being refused a journey by drivers looking for more remunerative routes.

Market niches

Consequently, taxis and PHVs perform strongest in specific niche market environments. Thus, Darbera (2010) finds the main market niche in every city studied was for recreation in the evening and at night (exhibitions, cinema, bar, restaurant, etc.), accounting for between half (in Dublin) and a quarter (in Lisbon) of all trips. Taxis and PHVs were also frequently used for work and business trips, journeys to and from airports and railway stations, trips to access medical care and visits to friends and family. Similarly, Alonso et al. (2018) note that taxis and PHVs were used most for trips to the airport or bus and railway stations or to return home after a night out at the weekend. Data for England in 2016 reports that leisure trips made up 49% of taxi/PHV journeys, followed by shopping (13%), commuting (12%), personal business (11%), education (8%) and business (3%) (DfT, 2017). Finally, taxis and PHVs are also often used by government as a policy tool to meet social inclusion goals. For instance, much of the special educational needs transport budget for England (£450 million in 2017/18) was spent on taxi and PHV fares (DfE, 2017).

Policy and regulation

From a policy standpoint, while taxis and PHVs are not the most sustainable mode of travel in urban areas, they do afford a quick and easy alternative to the private car, and reduce the number of cars searching for a parking space and the need for parking spaces (Alonso et al., 2018). In addition, taxis and PHVs are used for socially necessary journeys such as escorting children with special educational needs to school, and shared taxis and PHVs could potentially provide cost-effective public transport services in rural areas (Mulley, 2010).

Cooper et al. (2010) note that the regulation of the taxi and PHV market, both in respect of ‘cruising’ (for public hire) and ‘dispatch’ (for public and private hire) often follows all, or some, aspects of the quality, quantity and economic (QQE) control model. This comprises:

- **quality control,** which usually relates to vehicle age, appearance and disability requirements, all enforced by testing and inspections
- **quantity control,** which may limit the number of taxis operating within a particular area, adjusted for factors such as various indicators of demand, and local politics and vested interests (such as existing taxi operators)
- **economic control,** related to setting fares that provide fair compensation for operators and stable prices for passengers through cross-subsidisation of fares (i.e. off-peak fares subsidise on-peak journeys)

In exploring which regulatory model is the best, there is much literature debating the relative merits of regulated versus deregulated markets – an issue that is now arguably more important than ever, thanks to recent developments in ridesourcing influencing the sector (see below). In brief, the US experience showed that jurisdictions that deregulated or partially deregulated taxis and PHVs either benefited, or else there was little impact (Teal and Berglund, 1987; Cetin and Deakin, 2017), despite this, taxi and PHV regulations remain in place in many districts.

3. The changing environment

Impact of taxi and PHV apps

The rapid development of mobile and wireless communication technologies has led to a whole range of applications (apps) to engage taxi and PHV services, and these have already had a significant impact on the sector (Wang et al., 2016). Some of the best known, such as Uber (licensed in the UK), Didi Kuaidi (developed in China), and Ola Cabs (in India and seeking a PHV operator licence in the UK), have effectively created a new mode of transport known as 'ridesourcing' (see next section), but others such as mytaxi, Gett, kabee, Taxify and Karhoo are aimed at traditional taxi and PHV operators. These apps allow customers to communicate their travel needs to nearby taxis and PHV operators, and drivers logged into the app can instantaneously register nearby demand and choose whether or not to take the request, in contrast with the need for customers to stand on the street and hail a passing taxi that indicates it is available or call a PHV operator. Harding et al. (2016) suggest that taxi and PHV apps are significantly changing the market. First, they are increasing the number of both potential customers and providers of taxi and PHV journeys, meaning that sparse and geographically spread demand is better served, at appropriate prices, and therefore mitigating the need for restrictions on the number of taxis and PHVs serving an area. Second, enhanced service monitoring in the form of high volumes of customer feedback is reducing the need for external checks. However, they also note that fierce competition between apps could lead to unstable demand and/or supply profiles, thus reducing demand for taxis and PHVs, while conversely, a single dominant app could result in a monopoly whereby both passengers and drivers could suffer from unfairly set prices. These considerations suggest that future regulation might instead focus on the possibility of future monopoly and collusion in a market led by smartphone apps.

Ridesourcing

The emergence of ridesourcing operators, such as Uber and Lyft (in the US), which pair potential passengers with registered drivers through an app or digital service platform using GPS software, is a major challenge for the taxi and PHV sector. Known collectively as transportation network companies (TNCs), these firms are notable for using an online platform to locate the passenger, so permitting the driver to charge a distance-based fare. Many of these apps also use a rating system that allows drivers and passengers to rate each other after the journey is completed.

Although ridesourcing emerged from lift sharing (where drivers of personal cars and potential passengers link up online by announcing their journey plans), it shares more characteristics with traditional taxis and PHVs because ridesourcing drivers typically do not share a destination with their passengers and because the driver offers a journey in exchange for a fare – as such they are regulated in the same way as other PHV operators in the UK (Shaheen et al., 2017).

Impact of ridesourcing on the taxi and PHV market

In quantifying the impact of ridesourcing on taxi and PHV markets, evidence from San Francisco found that 39% of ridesourcing journeys had previously been made by taxi or PHV, and that the two types of service served similar journey lengths, but that crucially, the waiting times experienced by ridesourcing customers were shorter and more consistent by day, time and location (Rayle et al., 2016). They also observe that ridesourcing customers were younger, owned fewer cars and travelled with more companions than frequent taxi and PHV users did.

Zhang et al (2016) analysed data from Beijing and found that users considered ridesourcing more convenient than taxis; that the biggest concern about using tailored taxis or PHVs was whether they were appropriately insured; and that low-income people were proportionally more likely to use ridesourcing than those on higher incomes. Jin et al. (2018) report that in comparison with taxis and PHVs, ridesourcing reached poor neighbourhoods with insufficient taxi services, better matched demand and supply and reduced transaction costs, and that passengers felt safer than when in taxis but were more concerned about insufficient driver training and insurance. They add that ridesourcing competes with public transport in high-density areas, but complements it at times of high demand such as evenings and weekends. There are some instances where ridesourcing is being used to provide feeders to public transport routes, or as a substitute for public transport on certain routes in low-density areas. For example, Linton and Bray (2018) report that the City of Altamonte Springs in Florida is subsidising Uber trips instead of buses, and public transport agencies in Centennial Colorado are working with the TNC Lyft to enhance public transport use and meet social inclusion objectives.

Shared taxi and PHV solutions

Another opportunity for developing taxi and PHV markets is to enable unrelated people to share taxi and PHV journeys, so making them cheaper for users and leading to a more efficient and effective transport system as a whole. However, while myriad schemes have been in operation around the world for many years (Cervero, 1997), they have tended to be of relatively limited application. This has partly been due to a lack of sufficiently detailed market intelligence, but also because shared taxi or PHV schemes are often constrained (either deliberately or incidentally) by the regulatory regimes in which they (would) operate (Enoch et al., 2004; Davison et al., 2012). Recent developments in data-collection techniques, however, and in particular the ‘big data’ revolution where sensors, smartphones and the ‘internet of things’ now deliver previously unimaginable quantities of refined, individualised data, suggest that the issue of lack of market intelligence is receding. Thus, whereas systems such as the ‘taxi train’ in Mauritius have historically operated as a supplementary on-demand bus, with passengers flagging down taxis en route (Enoch, 2003), several new app-enabled initiatives by ridesourcing companies are now being tested around the world. For instance, in the first two months of 2018 in London alone, Uber launched UberPool – a shared version of the standard Uber product; Citymapper launched Smart Ride, a hybrid bus and taxi or PHV service that will take riders around a fixed network; and Chariot (an offshoot of Ford) established four minibus services in the south of the city that will pick up (pre-booked) passengers at set stops along the designated routes. In assessing the likely effects of such services once scaled up, Barann et al. (2017) used almost 5 million taxi trajectories in New York City to simulate a one-to-one taxi rideshare approach that matched rides with similar start and end points based on users using a smartphone app, which they claim would match 48% of taxi journeys and save nearly 2.9 million vehicle-kilometres travelled and just over 0.5 million tonnes of CO_2 emissions per week. The Shared-Use Mobility Center (2016) reports that ridesourcing complemented, rather than replaced, public transport services in underserved areas, but that the long-term effects were still unclear. Conversely, anecdotal evidence from a train operating company manager in London speculated that the growth of Uber was one possible reason for a fall in the number of rail journeys in the capital after two decades of growth.

Other ‘new’ modes

Other new modes that present a threat to taxis and PHVs include car-sharing clubs (a Lisbon study found that car-sharing replaced taxis for 17% of journeys (Baptista et al., 2014)), and

bike-sharing schemes such as the Santander scheme in central London (informally known as ‘Boris Bikes’). Results from a New York City study demonstrated that bike-sharing schemes could potentially either be faster or a competitive mode of travel for over half of journeys that are shorter than 3 km (Faghih-Imani et al., 2017). Electric bikes too may one day challenge taxis and PHVs on shorter journeys. Although not yet widespread in Western countries, the number of electric bicycles in use in China currently is thought to be well over 100 million, while annual sales there now exceed 35 million units (Lin et al., 2017). Similarly, one could foresee a rapid growth in other motorised forms of transport such as hoverboards, Segways, powered skateboards, electric scooters and mobility scooters under certain future conditions (Stowe and Mulley, 2010).

Mobility as a Service

Mobility as a Service (MaaS) is defined as an end-to-end solution where the customer (passenger or freight) travels seamlessly from A to B. This involves using several different modes, without making separate payments to different transport providers; without owning the assets of travel (i.e. a car); and without planning journeys based on the mode of travel (i.e. it is 'mode neutral'). It envisages users buying mobility services across the piece as packages based on their needs instead of buying the means of transport (Kamargianni et al., 2016). Although it is not yet well established, MaaS is potentially a powerful model for the taxi and PHV sector because it should help make services more responsive to customer (and driver) needs by increasing information-sharing between the two, and potentially by introducing more partners (servicing companies, payment providers, insurance companies, advertisers, destination marketers, original equipment manufacturers) where appropriate and/or profitable.

Autonomous vehicles

The widespread adoption of autonomous vehicles is probably, along with the taxi and PHV app, the ultimate ‘game changer’ for the taxi/private hire sector, and perhaps the transport sector as a whole, thanks to reduced operational costs being translated into lower fares for users and network efficiency and accident benefits at the societal level (Enoch, 2015). Burns et al. (2012) report that the adoption of autonomous taxis in Manhattan in New York City could see a fleet of 9,000 automated vehicles providing an average passenger waiting time of 36 seconds and an average fare of about $1.00 per journey, compared with the current figures of more than 13,000 taxicabs, an average 5-minute waiting time and an average fare of $7.80 per journey. However, they add that such a change would likely see 50,000 cab drivers needing to find alternative employment.

Alternative power sources

One other factor likely to change how taxis operate in future relates to the shift in power sources from petrol and diesel towards natural gas, hydrogen or electric battery (Latham et al., 2008). This is largely due to a large number of cities around the world adopting policies to improve air quality and reduce global warming. For instance, in London, a new ultra-low emission zone (ULEZ), to be introduced in September 2019, means that changes in taxi and PHV licensing will state that from January 2020, new taxis and PHVs will need to be zero emissions capable (ZEC), whilst all licensed vehicles will need to be ZEC by January 2023 (Linton and Bray, 2018). In meeting that goal, London launched its first electric black cabs in January 2018 with the hope of seeing more than 9,000 in service by 2021 (BBC News, 2017).

There are precedents: C&C Taxis of St Austell in Cornwall has operated a fleet of 13 electric vehicles (EVs) as PHVs since 2013, making it the most experienced fleet in the UK (Fleet News, 2017). Internationally, HDT Taxis in Singapore began operating 100 electric taxis in 2016 and requested permission to add another 800 to its fleet in January 2018 (Lim, 2018), while Beijing was expected to have more than 5,000 EV taxis in service by the end of 2017 (Zou et al, 2016). Shi et al. (2016) compared the environmental impacts of petrol- and electric-powered taxis over the full lifecycle based on the 2010 Beijing electricity generation mix, and found that the environmental impact of the EV was less than the petrol taxi, due to lower fossil fuel consumption during use.

Areas least affected by technological change

Given the changes mentioned above, it would seem the core taxi business – street hailing and taxi ranks in the busier parts of larger cities at peak times – will be the least affected by technological change, in the short to medium term at least, though perhaps with fewer taxis assigned to these tasks. In the longer term, however, the emergence of autonomous vehicles (AVs) may see the disappearance of this market too, at least in its current form. By contrast, PHV operations have for some time been evolving in larger cities, with the market growing significantly as app-based bookings become an increasingly important element in delivering efficiency benefits – not only by better matching supply with demand, but also by facilitating far more shared journeys than was possible previously. Ultimately, AV technology in this space could even lead to (shared) ridesourcing modes becoming perhaps the major mode in a number of transport contexts (Enoch, 2015).

4. Implications for governance

Key challenges and possible solutions

There are two key challenges facing decision-makers in this space. The first is that regulatory systems around the world have been outpaced by the developments in smartphone apps, the internet, and the resulting emergence of ridesourcing operators (Shaheen et al., 2017). This is in part because these systems have generally evolved in a piecemeal fashion, and consequently are complex, fragmented, lacking in an overarching rationale, and inconsistent (Law Commission, 2014). In addressing this, Linton and Bray (2018) recommend the adoption of a national, strategic approach to standardise how taxis and PHVs are regulated, with district authorities retaining some autonomy in applying the rules to the local context. Cetin and Deakin (2017) propose reducing the current regulatory differences between taxis, PHVs and ridesharing operators, particularly relating to driver background checks, vehicle inspection and some other social regulations. Harding et al. (2016) meanwhile suggest that future regulation might instead focus on the risk of monopoly and collusion in a market led by smartphone apps. More radically, Enoch and Potter (2016) propose realigning the regulatory framework such that transport operators would be regulated according to their level of commitment as a transport operator rather than by mode. Under this approach, the day-to-day aspects of each transport operator (driver licensing, subsidy allocation, etc.) would barely change, but as the operator progressed from ‘occasional’ to ‘regular’ and then ‘specialist’, the regulations would become tighter as the operational benefits and opportunities increased. This would mean that providers of new modes would no longer be obliged to operate to pre-conceived service patterns (constrained, for example, by limitations on seats, timetables or routes), and should allow for occasional providers to ‘safely’ join the transport market when an opportunity arises. Such an approach is worth considering, given the current regulatory issues mentioned previously, and the considerable uncertainty as to what modes might, or might not, be available in the future. It seems likely that a regulatory environment based on the current modal-based model will never be flexible enough to accommodate emerging modes of transport, potentially stifling innovation until existing structures are suitably modified.

The second challenge relates to the societal implications of addressing these changes, and others not yet identified. The widespread adoption of AVs – and not least the issue of how to treat the 200,000 or so drivers who might lose their livelihoods in England alone – is a subject beyond the scope of this report. Less ambitiously, Kümmel et al. (2017) look at how operational arrangements in terms of driving, vehicle servicing, refuelling/recharging, accepting passengers, searching for passengers, defining working hours, dispatching taxis and PHVs, defining the fare structure, and estimating the fleet size (operationally and over the longer term) might change with the adoption of driverless taxis and PHVs. They suggest that for AVs, strategic manager and service provider roles will be required rather than the current roles of driver and fleet manager. Walker and Marchau (2017) propose that governments might accommodate an automated taxi-based future through a policy design phase and an implementation phase, with the latter comprising key steps in assessing policies that seek to address these vehicles.

One last point relates more generally to how any proposed solutions will need to learn from failure. King and Goldwyn (2014) report that while a shared van-based 'jitney' project trialled in suburban areas of New York City highlighted the potential importance of shared commuter vans for populations reliant on public transport, ultimately the project failed for four reasons:

1. a lack of subsidy to maintain service and build demand
2. a two-month gap between the initial service cuts to bus routes and implementation of the jitney service
3. poorly branded service
4. confusing language used to describe the programme

King and Goldwyn argue that even though some of these factors were more perceived than real, all of them reflected the difficulty of scaling up a niche jitney service to a general-purpose transit service.

5. Conclusions

This report finds that the future of taxis and PHVs is currently extremely uncertain, and could go in several directions. On the one hand, Enoch (2015) suggests that a universal automated taxi or PHV service could one day replace private cars and conventional public transport for a large range of journeys in many different locations as a form of 'modal convergence' occurs. On the other hand, the ongoing 'big data' revolution coupled with a strong momentum behind the development of autonomous vehicles, could see the evolution of a far more diverse range of transport modes (Currie, 2018). Here, traditional taxi and PHV companies would likely struggle, as not only ridesourcing operators, but also a proliferation of other 'new' modes look set to dominate this market unless they (are allowed to) adapt to the new environment in which they find themselves. In any event, while the medium-term future generally looks positive for travellers, with better service quality promised for lower fares, it appears rather less so for drivers, and it is this issue, along with the increasing importance of data security and privacy, traveller safety and the threat of marketplace distortion by dominant unscrupulous suppliers that will need managing in the future.

There are a number of areas in which more research would be beneficial. In particular, more (publicly available) research is needed on how users access taxi and PHV services (particularly via apps), and their reasons for choosing that option. Next, not much is known about taxi and PHV travel or ridesourcing by the time of day or time of year, particularly in smaller towns and rural areas. Finally, more information is needed about how autonomous vehicles, and ridesourcing and shared ridesourcing will impact on existing modes (taxis, PHVs, public transport, walk/cycle and private car) in different operational contexts, and on society more broadly in economic, social and environmental terms.

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