



Flexible transport services: A new market opportunity for public transport

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ABSTRACT

The term Demand-Responsive Transport (DRT) has been increasingly applied in the last 10 years to a niche market that replaces or feeds (usually via small low floor buses or taxis) conventional transport where demand is low and often spread over a large area. More recently, the concept of DRT as a niche market has been broadened to include a wider range of flexible, demand-responsive transport services and is increasingly referred to as Flexible Transport Services (FTSs). The contention of this paper is that well-implemented FTS has the potential to revitalise bus-based public transport services which are traditionally based on fixed networks with variable geographical coverage and levels of service.

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1. Introduction

In an ideal world public transport would be as convenient as private transport, suggesting that ‘all public transport should be demand responsive.’ The term Demand-Responsive Transport (DRT) has been increasingly applied in the last 10 years to a niche market that replaces or feeds (usually via small low floor buses or taxis) conventional transport where demand is low and often spread over a large area. More recently, the concept of DRT as a niche market has been broadened to include a wider range of flexible, demand-responsive transport services and is increasingly referred to as flexible transport services (FTSs). The contention of this paper is that well-implemented FTS has the potential to revitalise bus-based public transport services which are traditionally based on fixed networks with variable geographical coverage and levels of service.

Historically, DRT evolved from door-to-door dial-a-ride services (sometimes referred to as Special Transport Services – STSs) provided by statutory authorities and community groups for restricted usage (usually the disabled and elderly). Interested users would telephone in their requests some days before they intended to travel and the operator would plan the service manually the day before the trip. These traditional services have often been criticised because of their relatively high cost of provision, their lack of flexibility in route planning and their inability to manage high demand.

As already noted many of the earlier limitations have subsequently been overcome through the introduction of transport telematics/Intelligent Transport Systems (ITSs) and the development of a much broader definition of flexible transport services (FTSs) which is discussed below. In Gothenburg, for example, as long ago as 1992 the city invested in PLANET, an advanced DRT system for Special Transport Services (STSs), and a fleet of shared-ride taxis and specially equipped vans.

Telematics-based FTSs have the scope to bring public transport closer to the flexibility and convenience of private transport, whilst retaining a fare structure more in line with public transport journeys as opposed to the most flexible – but costly – private hire and taxis.

This paper is organised as follows: Section 2 considers the current state-of-the-art in FTS noting in particular the role of transport telematics in enhancing the potential capability of flexibly organised and delivered public transport services. Sections 3 and 4 focus on the challenge of providing public transport in rural areas and focus in this context on the use of taxi-based services which are widely recognised as one of the most effective forms of DRT.² Whilst the context in this paper is on the provision of flexibly delivered services as part of the public transport mix in rural areas, the discussion is equally applicable to areas of low demand that exist within urban and peri-urban areas whether this is at the urban fringe or within areas where for socio-demographic reasons there is insufficient demand to make a conventional, fixed route, viable or suitable for subsidy. The discussion highlights a number of questions that are important to the further development of FTS; the development of a research agenda is discussed in Section 5.

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² For example, the Nexus (Tyne and Wear) *LinkUp* DRT is advertised as ‘the bus you book like a taxi’.

2. Today's flexible transport services

Telematics-based FTSs are based upon organisation via Travel Dispatch Centres (TDCs) using booking and reservation systems which have the capacity to dynamically assign passengers to vehicles and optimise the routes. Automated Vehicle Locationing (AVL) systems are used to provide real-time information on the status and location of the fleet for the route optimising software; it is not uncommon for one software supplier to have products for both the taxi and (niche) DRT markets. FTS is an emerging term which covers services provided for passengers (and freight) that are flexible in terms of route, vehicle allocation, vehicle operator, type of payment and passenger category. The flexibility of each element can vary along a continuum of demand responsiveness from services where all variables are fixed a considerable time before operation (e.g. a conventional public transport bus route) to services whose constituent variables are determined close to the time of operation. Taxi services typify the demand responsiveness of public transport.

Demand responsiveness can also vary within and between modes in terms of the type of service that is offered. Drawing on a British example of a registered bus, that is a bus service which is permitted to carry passengers at separate fares, this can be the traditional fixed route public transport, it could be a semi-fixed DRT route with perhaps fixed points along its route from which it can deviate, it could be a flexible area-based DRT with no fixed points other than a notional start and end point and which only runs on demand by users, or it could be a service primarily designed for some other purpose (e.g. the delivery of post or school children) which has been registered as a bus service to provide additional supply. Flexibility is not restricted to the bus mode and can be seen in both the taxi and private car sectors. For the taxi, the most demand-responsive service is the single ride for the private passenger since this gives door-to-door access. However, where shared-ride taxi journeys (either spontaneous or pre-planned) are allowed, this decreases the demand responsiveness and importantly the cost. In the car mode, there can be differences in flexibility from the most flexible private car to a car pool where, like the taxi example above, a reduction in flexibility is offset by a reduction in cost. One of the issues highlighted by environments in which flexible transport has been promoted is that there is often a mismatch between demand and supply. Only one person might demand a journey in a particular area and the operator only has a minibuss. Or five people living reasonably close plan an outing and the operator has a traditional four-seater taxi. Better matching between supply and demand for all modes can be increased by brokering vehicles and operators.

Many applications of FTS are associated with serving particular classes of user and this use reflects their origins. However, even in the UK where there is a history of experimental FTSs, there are examples of services which are open to all users. *LinkUp* in Tyne and Wear is a typical open access (i.e. for everybody) FTS. Services operate a fully flexible route in a predefined area with fixed timing points to provide journeys at times when regular services are not operating or where direct services are not available. Passengers are picked up and set down at the meeting points which are all existing bus stops and predefined places such as shopping centres, doctors' surgeries and leisure facilities. The service also picks up and drops off passengers at any doorstep with a small additional fare, if requested and possible. It is necessary to pre-book the service at least 45 min before travelling.³ The service is supported financially by Nexus (the Tyne and Wear Passenger Transport Executive).

An interesting recent development which has been enabled by the application of telematics is the move to integrate Special Transport Services (STSs) with other forms of FTS in a joint operation. For example, Nexus now combines operating contracts for their Care Service and the *LinkUp* services which are dispatched via a common dispatch centre under a single brand. This service is supplemented by *TaxiLink* which provides a door-to-door service using accessible taxis for users with greater mobility difficulties. This experience has also been partly mirrored in Scotland where the Strathclyde Passenger Transport open access Ring and Ride services may also be used by registered Dial-a-Bus users.

Similar but more extensive developments have occurred in the Netherlands. This followed a Government initiative to promote a national approach to the combination of mobility services for users with special needs and open access DRT services filling the gap in services between mainstream public transport and conventional exclusive ride taxi services. *RegioTaxi*, a combination of a community transport, STS and the provision of open access shared-ride taxi service for non-eligible users has become very popular and since start-up in 2000, *RegioTaxi KAN* in the Arnhem-Nijmegen region has grown to almost 1.4 million passengers per year. About half of the users are eligible for a higher subsidy and half are the general public paying a larger portion of the transport cost. Their fare is still about half of that for a corresponding exclusive taxi ride. Similar developments can be seen throughout Europe (Denmark, France, Germany and Switzerland) at varying degrees of scale of operation. The role of taxis in the provision of public transport in areas of low demand is considered in more detail below.

The use of IT in the delivery of FTSs and the ability to explore extended brokerage between both users and suppliers were the motivation behind FAMS (Flexible Agency for Collective Mobility Services), an EU funded project. Fig. 1 shows the structure of the FAMS business model for FTS. FAMS tested the concept of a virtual agency to coordinate, multimodal DRT service delivery at sites in the Angus region of Scotland and in Florence in Italy (Ambrosino, Boero, Eloranta, Ferrari, & Finn, 2004). The project provided valuable evidence to demonstrate that technologies such as GSM, GPRS, SMS, real-time scheduling and dispatch technologies could provide improved services in high density urban and low density rural areas. These concepts continue to be developed in the newly-launched FLIPPER project (Nelson & Masson, 2009).

In North America, the term *paratransit* is used to embrace ADA-complementary paratransit and all other forms of DRT (Lave & Mathias, 2000). As in Europe, there is approaching 40 years experience with dial-ride, shared taxis, ride-sharing, fixed route and route-diversion jitneys, shuttles, etc. Schofer et al. (2003) define DRT as 'specialised transportation for older persons, persons with disabilities ... also provided to the general public, particularly in areas with lower population densities or lower levels of demand'.

With the passage of the American with Disabilities Act (ADA) the growth in demand for FTS has been tremendous; the first ADA-complementary paratransit services began in 1992 and by 2004 paratransit ridership increased by 58.3 per cent, to more than 114 million trips, most of which were ADA-complementary (Chia, 2008). Chia (2008) emphasises that the increase in paratransit trips and the substantial difference in service trip costs when compared with the cost for other modes are prompting transit agencies to seek more effective and efficient ways to meet the growing demand for ADA-complementary paratransit services.

The CONNECT Consortium (2005) contrasts the Nordic and North American experience with STS noting that the big difference is that the tax funding for both mainstream and flexible public transport is proportionally much less in the car-oriented USA. Nevertheless, 20 of the 30 largest FTS providers are North

³ More information is provided in the *LinkUp* leaflet available at <<http://www.nexus.org.uk/wps/wcm/connect/Nexus/Bus/LinkUp/>>.

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