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# Demand Responsive Transport: lessons to be learnt from Less Developed Countries

*Marcus Enoch examines three Demand Responsive Transport (DRT) schemes which are being successfully operated in Turkey, Hong Kong and Mauritius and asks what the UK can learn from their experiences.*

**W**ith the rapid increase in car ownership, the market share of public transport systems has been gradually declining throughout much of the industrialised world since the 1950s. This has a consequence not only of the car directly replacing specific trips, but also of indirect mechanisms that affect the demand for transport through dispersing activity and land use patterns making them less suitable for buses and rail-based modes to serve.

One response enthusiastically adopted by a number of Governments such as in the Netherlands, United States and the UK, has been for public

transport agencies and operators to develop systems able to operate effectively with lower and more dispersed patterns of demand than the bus, ie Demand Responsive Transport (DRT<sup>1</sup>). In Britain, such DRT schemes have tended to have been driven by public policy goals (particularly improving social inclusion) backed by the ready availability of Government cash in the form of grants for which local authorities had to compete. This has had the effect of setting up 'innovative' schemes that are relatively high tech and high quality (such technological innovation being necessary to secure the funding), in areas where fares need

to be kept as low as possible so as to enable the socially excluded to afford to use them. Unfortunately, this has had the unintended outcome that many such schemes may be alarmingly vulnerable should this financial crutch be removed. Furthermore, given the high levels of subsidy required, it is unlikely that such DRT schemes will ever be extensive enough to offer more than a marginal contribution to reducing car use and hence to mitigating congestion and environmental problems in the wider transport context.

It is true that there are exceptions to this high-tech, high cost approach to DRT, even in the UK. For example, the Black Taxibus has been operating in areas of Belfast since 1969, while in summer 2003 public transport operator Stagecoach introduced the Yellow Taxibus service linking Dunfermline with central Edinburgh. And, as of August 2004, the entrepreneur behind Easyjet, Stelios Haji-Ioannou, launched a DRT service connecting Milton Keynes, Bedford and Luton with Brent Cross Shopping Centre and transport interchange in north London. So far though, only the first of these has proved itself over a period of time, and even then only operates in an environment that could never really be described as being 'typical'.

However, elsewhere in the world there are many examples of DRT operations that have been established for many years that make a significant contribution to the transport systems

**The dolmuş service operates in urban areas across Turkey.**



they form a part of, without any need for public subsidy. These include the Jitneys of Atlantic City, USA; the Jeeps of Manila, Philippines; the Taxi Collectifs of Havana, Cuba; the Sherut of Tel Aviv, Israel; the Kombi shared taxis of Cape Town, South Africa; the Matatu shared minibus of Nairobi, Kenya; and the Marshrutka shared minibus of Moscow, Russia; to name but seven of a huge number of subtly different types of DRT operation across the world.

This article therefore aims to draw on the experiences of three slightly different schemes, to see if any lessons can be learnt that may be applicable in the UK context. These are, the Dolmus of Istanbul, Turkey; the Public Light Bus of Hong Kong; and the Taxi Train of Mauritius.

### Dolmus, Istanbul, Turkey

The dolmus (pronounced 'dolmush') is a form of hail-and-ride shared taxi or minibus service that operates in urban areas across Turkey. Vehicles typically operate on an owner-driver model and are licensed to run on specific routes (widely defined) by the local authority – in Istanbul this is the Department of Transportation Coordination of the Metropolitan Municipality (IMM) – for a profit. Despite this though, as with taxi drivers there appears to be some kind of cooperative relationship occurring on a route by route basis. It also tends to be the case that similar van makes/colours are employed on particular routes (eg Taksim-Besiktas are all yellow Ford Transit vans, while other routes may use light blue or beige minibuses). Strictly speaking, the number of licences is rationed for each corridor.

There are formal 'terminus stops' (where drivers generally wait until they are almost full) but elsewhere along a corridor Dolmus's stop where they are requested to do so. Fares are set by the IMM and are comparable to bus. The advantages that Dolmus's offer over the bus are that frequencies can be far higher in the peak, journeys tend to be quicker, there are usually seats (definitely seats on some vehicles but not always on others), and drivers will always accept cash whereas on the buses either a fixed fare or pre-bought tickets are often required. However there are also problems. One is that while the numbers of Dolmus and minibuses have been frozen for forty years or so, the number of trips has risen dramatically as Istanbul has continued to grow. As a result there is a significant level of illegal operation which has led to services being overcrowded and disputes



In Istanbul more than half of public transport trips (400m passengers a year) are carried by dolmus.

over fares. A second problem is that because the Dolmus picks up and drops off passengers almost anywhere there is a heightened risk of collisions and congestion caused by drivers veering sharply or stopping suddenly to maximise their revenue.

Overall, more than half of public transport trips (400 million passengers a year) in the city are carried by around 4,000 14-seat minibuses and 16,000-or-so Dolmus licensed shared taxis normally carry eight or nine passengers (Janes Information Group, 2004).

### Public Light Bus, Hong Kong, China

Public Light Buses (PLBs) are minibuses with not more than 16 seats, and were introduced in 1969 to regulate the illegal minibus trade that existed at that time. Altogether PLBs account for 15% of all public transport journeys in Hong Kong, a figure which compares favourably with that of taxis which operate 12% of all journeys. PLBs are operated either by individuals or by minibus companies under passenger service licences issued by the Hong

Kong Transport Department.

PLBs are composed of two types, those with red roofs (RMBs) and those with green roofs (GMBs). Of these, the RMBs provide non-scheduled services that are purely 'demand responsive' ie they operate flexibly subject to the market demand, and the Transport Department has no control over routes or fares. Thus, when demand is high in peak periods, or when rail or other bus services are not working properly, or even when there is bad weather, fares charged will be higher than at other times. RMBs are also allowed to operate anywhere within their existing service areas but not in new towns or new housing developments in Hong Kong. There are also local stopping restrictions on RMBs to relieve traffic problems caused by their aggressive manner of stopping and waiting for passengers at kerbside and at road junctions.

Overall, the size of the PLB fleet has been frozen at 4,350 since 1976 by an order of the Hong Kong Executive Council. The limitation order has been extended from time to time since then

In Hong Kong the Public Light Bus fleet is largely unregulated, with fares set only by what the market will bear and routes relatively unrestricted.







**Above and below right: The taxi-trains of Mauritius operate on a largely interurban network rather than on corridors in very large cities.**

through resolutions passed by the Legislative Council, and was last extended in June 2001 for five years up to June 2006.

Interestingly the Government's established policy is now to encourage the provision of scheduled PLB service in the form of GMBs to supplement the higher capacity rail and bus-based public transport modes. GMBs were first introduced in 1972 through the conversion of RMBs. They operate scheduled services on fixed routes at fares approved and regulated by the Transport Department.

Thus, as of October 2003, there were 1732 RMBs (down from 1835 a year earlier) and 2618 GMBs (up from 2515). Meanwhile the daily patronage of RMBs was around 500,000 in 2003 and for GMBs about 1.2m. In October 2002 there were 71 GMB routes on Hong Kong Island, 76 in Kowloon and 193 in the New Territories. Unfortunately there are no data relating to the operating costs of PLBs

Augmenting franchised buses and PLB fleets are about 9800 buses, minibuses and coaches used mainly on contract for carrying tourists, factory workers, school children and commuters.

In summary, the Hong Kong RMB case is fascinating because it illustrates that even in perhaps the most attractive city in the world in which to operate high capacity rail and bus based public transport systems (very many well off people owning very few cars, living and working in very high densities along radial corridors etc.) there are still significant markets to be served (profitably) by DRT. Here, the key element seems to be that PLB drivers use their (combined) local knowledge to match the predicted demand with ex-

actly the right number of seats (as the more accurately they do this the higher the fare they can charge and the more money they will make).

#### 'Taxi-train' shared taxis, Mauritius, Indian Ocean

The final example, the taxi-trains of the Indian Ocean island of Mauritius, is slightly different from the previous two in that the taxi-trains operate on a largely interurban network instead of on corridors in very large cities. The service therefore tends to operate with taxi vehicles carrying up to four passengers rather than the larger capacity minibuses of Istanbul and Hong Kong.

Once again the mode was introduced as a result of a public policy decision rather than as a market response to a perceived gap in the transport market by commercial operators, this time to try and help address the problem of a severe shortage in the supply of public transport. And, once again the owner-drivers are not provided with

any subsidies to operate as a taxi-train, although they are offered an 80% rebate by Customs and Excise on the purchase taxes of their vehicles (a substantial incentive given that this can be set as high as 200% of the value of the vehicle), and they pay only half the annual road tax.

In brief, Section 103 of the Road Traffic Act 1962 first permitted licensed taxis to operate as so-called 'taxi-trains', which are effectively supplementary buses that are able to stop and pick up passengers along a particular route and charge separate fares of each passenger. While initially these taxi-trains were unable to collect passengers within 60 metres of a bus stop, the public transport situation became so chaotic during the mid-1970s, with many passengers waiting for inordinately long periods for a bus, that the 60-metre rule was rescinded. Interestingly, the separate fares charged are set at the same level as for a bus operating the same route, despite the rather quicker and more comfortable ride offered by the taxi-train. Understandably, there are many people who prefer to wait for a taxi-train, even if a bus to the same destination arrives in the meantime.

With the taxi train the crucial point seems to be that the service is an additional option for the taxi driver – almost a job of last resort that can be employed when there are no 'conventional' (and lucrative) tourist fares in the offing. Also, as with the Dolmus, the route franchises are fairly widely defined to allow flexibility, but tight enough to maintain the semblance that the service is 'local'. This means the likely demand at various times of the day/week is likely to be served with roughly the right number of vehicles and that the driver is often known at least to the more regular users which engenders a feeling that the service is 'safe'.



Overall, it is not known how many or what type of trips are made using taxi-trains in Mauritius, or what type of people are using the mode. Around 5300 taxis are registered nationwide.

## LESSONS

In conclusion there a number of key themes that emerge from the cases examined. Firstly, each of the systems is operated and used in a consistent manner across the region it serves. Thus, only one 'system' needs to be learnt to use any RMB in Hong Kong (unlike with DRT in the UK where every system seems to be subtly different from its neighbour).

Second, service quality is higher with the DRT vehicles being more comfortable than the bus, and journeys often being individually tailored to meet the needs of the customers on board. Moreover, journey times are often less than a bus due to a reduced waiting time (RMBs, Dolmus and taxi-trains are generally more frequent than the bus) and reduced in vehicle time (smaller vehicles are more manoeuvrable on congested streets and stop less often, for a shorter period).

Finally, each of the services operates commercially at a profit in high volume markets where they provide additional capacity to the existing public transport network in places and/or at times when bus or rail based systems would not be viable. This is despite both the RMB and the taxi-train being introduced for public policy reasons.

Of course there are also some differences. Relating to fares, while the Mauritius and Istanbul DRT systems charge regulated fares only very slightly higher than the buses they compete with, in Hong Kong the fares are set only by what the market will bear. Similarly with the routes – the Mauritius and Istanbul cases are effectively limited (though fairly loosely set), whereas the RMBs of Hong Kong are rather less restricted and can almost go where the demand is.

And there are a few ways that each of these services could be improved. In particular, none of the three DRT modes is geared towards attracting occasional users<sup>2</sup> (a situation that is also sadly true in UK DRT systems). There is also clearly a need for dangerous driving habits to be discouraged.

Overall though, the three systems described almost provide a taxi-level of service but for almost a bus level of fare – a niche that in Britain remains largely unexploited.

As for transferring such experiences,



with the exception of the Yellow Taxibus and Easybus schemes referred to earlier, the UK DRT market is still relatively immature.

This is the case largely because of the high degree of technical and operational experimentation and innovation stimulated by significant levels of Government funding through the Rural and Urban Bus Challenge grants. Unfortunately, while this investment has demonstrated that DRT is a viable mode in a technical sense, on an operational level the resultant focus on the marginal, small scale, high tech, high cost, low fare end of the market means that many current UK schemes are financially vulnerable. In short, these schemes reside beyond (sometimes way beyond) what would be considered an acceptable level of subsidy measured on a 'per passenger trip' or 'per passenger trip kilometre' basis for a conventional bus service.

Of course, some of the current style of UK DRT systems will become increasingly financially viable as they begin to grow, and/or as DRT technology begins to offer a value-for-money replacement for some über-expensive social-service, dial-a-ride or patient transport services. But really perhaps the greatest scope is at the more commercial end of the spectrum, where either a more mainstream low tech, low cost, low fare approach, or the niche high quality, premium fare model (eg like airport shuttles found across the USA, or employer shuttles eg at Vodafone in Newbury, Berkshire) may be the real way to mainstream DRT systems.

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1. Brake et al (2004) defines DRT as being 'an intermediate form of public transport, somewhere between a regular service route that uses small low floor buses and variably routed, highly personalised transport services offered by taxis'.

2. Indeed, even finding the most basic information about how to use the Dolmus, RMB or taxi train is almost impossible for the casual user and not especially easy for a seasoned public transport researcher despite some prior knowledge of what was to be expected.

The launch of the Yellow Taxibus service linking Dumferline with central Edinburgh is a recent addition to the UK's innovative DRT solutions.

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