booz&co.

The Benefits of Simplified and Integrated Ticketing in Public Transport

Passenger Transport Executive Group

United Kingdom, October 2009

Table Of Contents

1 Introduction

The Department for Transport (DfT) is currently developing a strategy for smart and integrated ticketing, with the final strategy expected to be published by the end of 2009.

As an input to the development of the strategy, the Passenger Transport Executive Group (PTEG) commissioned Booz & Company to complete a review of the benefits that have been realised in conjunction with the provision of simple, affordable and competitive integrated ticketing product schemes in major urban areas.

Our focus was directed at those integrated ticket products that support 'seamless' travel using multiple modes or services such as the long standing and highly popular London Travelcard. Accordingly, we did not specifically address the 'smart' element of the DfT strategy (i.e. given that our interest was tied to the benefits of integrated ticketing schemes irrespective of the fare media used to support these schemes).

The identified benefits of integrated fare products were drawn together in the following 10 categories:

- increased patronage;
- increases in recorded passenger satisfaction;
- evidence of resulting modal shift;
- increases in revenue;
- reductions in transaction and administrative costs;
- social benefits;
- reductions in fraud;
- wider contribution to city life and identity;
- acquisition of accurate data on passenger behaviour enabling better capacity and network planning; and
- faster boarding times enabling buses to run more reliably, faster and frequently.

The review was completed primarily by way of desktop analysis, although this was supplemented by direct contact to some individual agencies and industry associations including the European Metropolitan Transport Authorities (EMTA) and International Public Transport Association (UITP).

The results of our research are presented in Sections 2 through 8 respectively. A number of important qualifications and caveats need to be borne in mind when considering the evidence presented.

Firstly, while the merits of simple integrated ticketing products are often heavily promoted on the basis of the postulated benefits summarised above, the *ex post* reporting of the benefits actually realised is often not captured and/or reported in the public domain.

Secondly, the available evidence varies in quantity and quality. Specifically, the vast majority of reported results in the public domain pertains to the market impact (i.e. patronage and/or farebox revenue). From a quality perspective, there are very few studies available that have attempted to isolate the impact of the introduction of integrated ticket products per se. This is a particular issue with respect to any assessment of the market impact of simple integrated ticketing schemes where a range of endogenous (e.g. fare and service levels) and exogenous forces (e.g. economic growth) impact on the overall demand for public transport services. In many examples reported in the literature, it is unclear what role factors other than the introduction of simple integrated ticket products alone had on observed market outcomes.

Thirdly, to ensure that the findings reached could be as robust as possible, reference was made to research and analysis sourced from the early 1980s through to the most recent examples of integrated ticketing products. As such, the analysis captures schemes implemented on paper, magnetic stripe and contactless smart card fare media.

In this context, while the research focuses on the introduction of integrated ticketing products, it is important to acknowledge that a number of highly successful integrated ticket products from a customer perspective have in fact been withdrawn over time.

The most significant United Kingdom examples pertain to the period immediately following bus deregulation in the mid-1980s. The highly popular West Midlands PTE Travelcard was one such casualty of bus deregulation. This Travelcard was first introduced in 1972 and was extended two years later to support travel by all modes throughout the county. By 1978 it is reported that about 3 in every 10 (i.e. 29%) adult fare paying trips were being made on Travelcard[1]. However, post-deregulation, with the largest West Midlands bus operator reported to hold an 85% market share of total bus passengers in 1988[2], there was no incentive to participate with the smaller bus operators in a Travelcard scheme and the product was withdrawn. This represents only one example of simple integrated ticket products that were withdrawn following bus deregulation in the United Kingdom. Moreover, there is also evidence to suggest that the much stronger market performance of bus services in London compared to major conurbations outside the capital post bus deregulation reflected (in part) the retention and popularity of the London Travelcard product.

1 *White (1981).*

2 *Tyson (1990).*

2 Case Studies for Increased Patronage

Increased Patronage (17 studies reviewed)

The most commonly reported benefit associated with the introduction of simple, integrated fare systems is associated with increased patronage. In many cases, studies have indicated substantial increases in patronage, in the range of 6% to 20% - with particular modes experiencing increases to the order of 40%.

2.1 EUROPE

2.1.1 London, United Kingdom

London (population around 7 million) public transport services includes bus, light rail and tube services managed by Transport for London (TfL) and heavy rail services operated by National Rail Train Operating Companies (TOCs).

The Travelcard product has provided seamless travel in London since 1983 across London public transport services. This includes services managed by TfL and virtually all services operated in London by National Rail TOCs. The core features of the product are as follows:

- It is supported by a concentric ring fare structure (i.e. 6 zones) with the fare paid determined by the Travelcard 'zonal coverage'; and
- It is a time-based product sold in daily (i.e. all day and off-peak), weekly and annual forms.

The market impact of the Travelcard has been extensively studied and reported. Arguably, the most significant study was undertaken by Fairhurst (1993). Importantly, this analysis sought to isolate the impact of fares integration by removing the estimated market impact of fare level changes associated with the introduction of Travelcard. The estimated market impact of fares integration alone was as follows:

- Tube patronage increased by 10% between 1983 and 1992;
- Tube passenger miles increased by 33% between 1983 and 1992;
- Bus patronage increased by 16% between 1983 and 1992; and
- Bus passenger miles increased by 20% between 1983 and 1992.[3]

3 Transportation Research Board – National Research Council, 2004, Transit Cooperative Research Program Report 95: Transit Pricing and Fares – Traveler Response to Transportation System Changes.

Another important simplification initiative in London was the introduction of bus flat fares in 2000 (i.e. replacing distance-based bus fares based on the six concentric rings). It has been argued that the transition to flat fares resulted in new journeys being made purely because the fare structure was easier to understand (i.e. the so-called 'simplification effect'). GMPTE (2009) reported that the 'simplification effect' was estimated to increase tube and bus patronage by 3-4% in the long run.[4]

White (2009) also considered the major contributors to public transport patronage growth in London and estimated that 32% of the patronage growth achieved between 1999/00 and 2005/06 could be tied to fares reform (i.e. including both price and non-price effects).

Specifically, White suggested some of the potential reasons for the growth in patronage include:

- Ease of interchange with the extensive use of tickets such as Travelcards and Oyster 'pre-pay' reducing or eliminating the financial penalty imposed by interchange, enabling users to select the most appropriate route through the network; and
- Simplified fares (with almost complete elimination of cash payment on buses) facilitated by the 'pre-pay' version of the Oyster smartcard resulted in reduced dwell times and improved travel times.[5]

2.1.2 Brighton & Hove, United Kingdom

Brighton and Hove (population 250,000) public transport includes local bus services and extensive rail services to London mainline stations and beyond.

In 1999 the bus operator in Brighton and Hove trialled a flat fare policy on all it's services that switched fares from a distance based graduated fare scale, to a widely advertised £1 flat fare for all journeys. The £1 flat fare for all journeys trial continued until May 2003 and the effects of the trial scheme was an estimated increase in patronage by between 3 to 8.5% capturing both price and simplification effects.[6]

2.1.3 Harrow Area (North-West London), United Kingdom

Harrow (population 214,000) is serviced by local bus services, Metropolitan Line tube services and National Rail services.

A flat fare scheme was trialled on bus services in the Harrow area in 1980. As a result, farebox revenue increased by approximately 14%. More specifically, this

4 *GMPTE, 2009, 'How do other cities approach fare structure?'.*

5 *White, Peter, 2009. Factors Behind Recent Patronage Trends in Britain and their Implications for Future Policy. Thredbo International Conference Series on Competition and Ownership in Land Passenger Transport.*

6 *GMPTE, 2009, 'How do other cities approach fares structure?'.*

could be attributed largely to the 7% increase in passenger miles travelled rather than the number of passenger journeys which fell by 8%.[7]

2.1.4 West Midlands, United Kingdom

West Midlands (population 260,000) is supported by a public transport network comprising of bus, train and metro services.

One of the first major examples of integrated ticketing in the West Midlands was the Travelcard scheme introduced in 1972. As a result of the integrated ticketing implementation the impact on patronage was:

- A 7% increase in journeys conducted by 1981.

2.1.5 Freiburg, Germany

Freiburg has a population of 216,000, with VAG Freiburg operating a network consisting of tram and bus services. The network carries an average of 200,000 passengers a day.

Fitzroy and Smith (1998) investigated the causes of the dramatic increase in both tram and bus use since the early 1980s. Although traffic restraint measures and improvements in the quality of the public transport services were considered significant factors, it was concluded that the main explanation lay in the introduction of low cost 'environmental' travel cards, with patronage doubling between 1983 to 1995. The surge in public transport usage occurred despite the fact that the number of private motor vehicles rose twice as fast as population.

The key features of these travel cards were:

- Unlimited use at no financial cost once trips above a certain threshold are conducted;
- Interpersonal transferability; and
- Wide regional validity

Overall public transport ridership increased from 27.7 to 65.9 million trips per year, in the period from 1983 to 1995,.in response to both fare simplification and fare level effects resulting in

- An average annual growth in patronage of 7.5%.[8]

[7] *LT Planning Department – London Transport, 1993, Fares and Ticketing Policy in London: from Travelcards to Smartcards.*

[8] *FitzRoy, Felix & Smith, Ian, 1998. "Public transport demand in Freiburg: why did patronage double in a decade?," Transport Policy, Elsevier, vol. 5(3), pages 163-173, June.*

2.1.6 Madrid, Spain

The city of Madrid (population 3.2 million) has a public transport system structured around a metro, buses, and suburban rail services.

A Transport Consortium was formed in Madrid to review the fare structure, incorporating certain coordination, standardisation and universal application of public transport. The introduction of a new fare structure was considered to be a decisive instrument in maximising the economic and social performance of the resources employed. The full acceptance on the part of users has made the initiative a key instrument in enhancing and promoting the use of public transport in the region.

This new structure was characterised by the following measures:

- Replacement of kilometre-based fares and zonal fares;
- Introduction of the concept of the travel pass;
- Simplification of transport tickets;
- Standardisation of the fare rates charged by different modes; and
- Establishment of a series of price levels in accordance with the public companies attached to the Consortium

The new structure as described above, impacted the travelling habits of patrons revealing patronage increased as passengers used the transport system more frequently.[9]

2.1.7 Sevilla, Spain

Sevilla is a province in the capital of Andalusia in Spain with a local population estimated at 700,000. The province is supported by bus and train public transport networks. As at 2001, the average annual number of public transport journeys conducted per capita was 360 journeys.

In 2002, the local Government introduced fare integration to improve public transport use. This meant that one ticket would now be valid in all regional and city buses. Prior to the fare integration introduction, regional bus patronage was decreasing. However the implementation of the fare integration policies resulted in:

- Patronage increasing slightly by 3% from 2002 to 2005 (i.e. 12.8 million to 13.2 million); and
- Moreover; the number of journeys conducted involving a transfer was reported as growing on a yearly basis by 2.9%.

9 CTM, 2003, UITP Pricing WG - 1st Meeting, 24-03-2003, p.13, Regional Transport Committee. Cristobal-Pint, 2005, UITP Public Transport Management.

It should be noted that since individual bus company tickets are cheaper than integrated tickets in Sevilla, the majority of travellers still use those tickets.[10]

2.1.8 Paris, France

Metropolitan Paris (population 11.7 million) has a public transport system comprising bus, metro, tramway and light rail services, which is co-ordinated by the Syndicat des transports d'Ile-de-France.

In mid 1975 the 'Orange Card' was introduced in the Paris region. The card offered integrated ticketing through a non-transferrable, monthly (or yearly) season ticket which can be used on different transport modes including bus, the metro and suburban train, and various operator networks (i.e. RER, SNCF, APTR). The introduction of 'Orange Card' had a significant effect on patronage although the impacts on bus and Metro services was disproportionate. The implementation of the 'Orange card':

- Increased Patronage on buses by 36% (i.e. up from 745,000 to 1,010,000 passengers per day).

This increase in ridership can be attributed to multiple factors including transfer of passengers from the Metro to bus, a switch from walking to bus services, a switch from car use to bus use and an increase in the number of journeys conducted (particularly in off-peak periods). The increase in patronage on Metro and various network operators was less significant with:

- Patronage on Metro increasing by 1%;
- Ridership increasing by 5% on RER;
- A 5% rise in patronage on suburban buses; and
- A 1% increase in the SNCF ridership.[11]

2.1.9 Zurich, Switzerland

The ZVV (Zürcher Verkehrsverbund) is the public transportation network system in Zurich (population 360,000). The primary modes of transport include the S-Bahn (local trains), trams, and buses (both diesel and electric, also called trolley buses).

Prior to the introduction of integrated ticketing, Zurich was characterised by an exceptionally high level of public transport use. Schedules were co-ordinated on a voluntary basis with each operator having their own fares.

---

10 *Kennisplatform Verkeer en Vervoer', 2007*

11 *As per Booz Allen Hamilton Report, 2000, 'Integrated Fare System for South East Queensland'.*

After the formation of the Zurcher Verkenrsverbund (ZVV), a comprehensive integrated fare and ticketing system was introduced. This involved the full co-ordination of services and the development of a single fare system based on zonal fares. The combination of these two factors had a significant impact on patronage:

- Overall patronage increased by an average of 12% in the first 2 years of operation.

This overall increase in patronage was separated for feeder buses and heavy rail and details that:

- Ridership on bus increased by 53% and on heavy rail which increased by 30%[12]

2.1.10 Flanders, Belgium

Flanders is a region around Brussels encompassing parts of Belgium, France and the Netherlands with a population of 6 million. The region provides train, tram, bus and trolley public transport services.

The implementation of the Vlaams Ruraal Netwerk (VRN) in 2007 was accompanied by the introduction of simplified and integrated ticketing approach. The new fare policy included the implementation of a simplified fare system with only four ticket types and a flat fares structure which could be used across all modes, routes and operators. While some of the positive impact of the simplified and integrated ticketing implementation could be attributed to the proactive marketing campaigns, the overall impact of the fare policy resulted in:

- Patronage across all modes increased by 200% in 2007.[13]

2.1.11 Cologne-Bonn, Germany

The Cologne-Bonn region (population 3.1 million) offers public transport on bus, tram and metro modes.

The transport association Rhein-Sieg (VRS) supports the Cologne/Bonn region, as well as seven other rural and urban districts including Rhein-Erft, Euskirchen, Rhein-Sieg, Rheinisch-Bergisch, Oberbergisch, Leverkusen and Monheim. Since its foundation in 1987 the VRS has offered uniform tickets, tariffs and coordinated services on its rail and tram services. Every day more than 1.4 million passengers travel within the VRS region. A new fare system was introduced in 2004 which linked the fare systems between different provinces, allowing travel from every station in Germany to the top of Noradrenalin Crestfallen. The changes to the fare system

12 *Laube, 1995, As per Booz Allen Hamilton Report, 2000, 'Integrated Fare System for South East Queensland'.*

13 *Kennisplatform Verkeer en Vervoer', 2007.*

included an integrated fare based on 'province level', transparent and simplified fares including a flat fare system within cities.

- The integrated and fares system has seen over one third of inhabitants travel by public transport more than once per week.[14]

2.1.12 Dresden, Germany

Dresden (population 500,000) has a transport association, Verkehrsverbund Oberedbe – DVB, which operates services on bus and tram networks. The public transport system in Dresden carries an estimated 140 million passengers each year who conduct 142 million passenger journeys each year.

Since 1998, Dresden has had a fully integrated public transport system which utilises a smart card ticketing medium and spans all public transport including rail, trams, bus, ferries, cable car and a mountain lift. The simplified fare system consists of a zonal fare structure with three ticket types (i.e. single trips, day cards and subscriptions). The impact of fares integration from 1998 to 2008 has been resulted in:

- Regular clients who use monthly or yearly tickets increasing by 11%.[15]

2.1.13 Vienna, Austria

The city of Vienna (population) has a public transport system comprising of train, tram and bus services. The network carries over 857 million passengers per annum. Vienna's public transport is part of the Verkehrsverbund Ost-Region (VOR) that is included in the Transport Association for Austria's eastern regions.

While cooperation in the region is on a voluntary basis, a holistic fare system does not exist. However a zonal ticket known as the Vienna Zone (100), which covers the full zone or core zone of Vienna virtually results in a flat fare for most travellers in Vienna.

When travelling in one direction in Zone 100 within one hour, it is possible to transfer from the subway/underground (U-Bahn) to tram (Strassenbahn) or bus (Autobus) or local train without buying another ticket. When travelling from Vienna to outlying regions within the VOR area, the fare depends on the number of zones you travel through.

- The Zone (100) ticket has resulted in an increase in the number of travellers from 2006 to 2008.[16]

---

14 *Kennisplatform Verkeer en Vervoer', 2007.*

15 *Kennisplatform Verkeer en Vervoer', 2007*

16 *Kennisplatform Verkeer en Vervoer', 2007*

2.2 NORTH AMERICA

2.2.1 New York, United States of America

The Metropolitan Transportation Authority (MTA) provides public transport to the city of New York (population 8.4 million). MTA subways, buses, and railroads provide 2.6 billion trips each year to New Yorkers.

The MTA introduced the MetroCard in 1993, and by 2003, tokens were no longer in use. As part of the second phase of the MetroCard Program, MTA operators introduced integrated fares in 1998 to complement the implementation of the MetroCard in 1996. The resulting impact was:

- A 40% increase in bus patronage and a 17% increase on rail;
- A 20% increase in bus ridership on weekends;
- A 6.6% growth in unlinked subway trips on weekdays and a 11.5% increase on unlinked subway trips on weekends between 1996 and 1998.[17]

2.2.2 Washington DC, United States of America

The Washington Metropolitan Area Transit Authority (WMATA) operates the Washington DC's (population 600,000) rapid transit system, Metrorail and Metrobus. The subway and bus systems serve both the District of Columbia and the immediate Maryland and Virginia suburbs.

In 1999 a new fare structure was introduced into Washington DC and the State of Maryland (including Baltimore) to address the complexity and lack of integration of fares on the metrorail and metrobus services. The impact of the fares policy change was an increase in ridership by over 22 million in 2000 on rail and bus services.[18]

2.2.3 Los Angeles, United States of America

In Los Angeles County (population 10 million), there are 18 independent transit providers that operate a combination of fixed route bus, rail, and demand response services.

Fare coordination was initiated in Los Angeles County in 1980, when a countywide inter-operator transfer policy was implemented in response to State legislation mandating transfers among operators in the same county and as well as coordination of services and fares. Despite differences in base fares, every operator was required to accept valid transfers from other operators as a one-way base fare.

---

17 *Booz Allen Hamilton, The Impact of Fares and Ticketing Integration on patronage International Case Studies*

18 *Booz Allen Hamilton, 2003, Report to Regional Transportation Authority – Fare Coordination Assessment.*

Interoperator transfers accounted for less than 0.5% of total regional rides prior to the growth of fares and service integration. As service and fares integration grew the number of passengers making multi-operator trips increased.

- By 1994 the number of multi-operator trips had increased by 2% (i.e. 11 million boardings per year).[19]

2.3 AUSTRALIA

2.3.1 South East Queensland, Australia

The South East Queensland (SEQ) region extends from the Gold Coast to the Sunshine Coast and west beyond Ipswich. Rail, bus and ferry services are provided by 18 operators.

In mid 2004, TransLink introduced full fares and ticketing integration, improved service co-ordination and range of marketing communications. The full fares and ticketing integration resulted in the implementation of a new zonal fare structure and a range of fully integrated fare products delivered through existing fare collection equipment. This significantly impacted the demand for public transport services with:

- An increase of 9.7% in total public transport journeys in 2004/05 (i.e. trips increased from 123.9 million to 135.9 million; and
- Sustained growth continued in 2005/06, with total public transport journeys increasing by a further 11.6% (i.e. from 135.9 to 151.7 million trips).

An analysis conducted by Booz Allen Hamilton in 2000, further isolated the impact of changes to fare levels to show the impact in SEQ to be:

- *A* patronage increase of around 3.5% could be attributed to the 'integration effect alone in 2005/06.[20]

[19] *Carter and Pollen, 1994, As per Booz Allen Hamilton Report, 2000, 'Integrated Fare System for South East Queensland'.*

[20] *Streeting and Barlow, 2005, Understanding Key Drivers of Public Transport Patronage Growth – Recent South East Queensland Experience.*

3 Case Studies for Increased Revenue

***Increased Revenue** (2 studies reviewed)*

There is limited evidence to support that the introduction of simple integrated fares has increased revenues for transport operators. For those case studies that identified an increase in revenue, the increase varies widely from a 1% to a 12.6% increase in total revenues.

3.1 NORTH AMERICA

3.1.1 The State of Maryland, USA

A fares simplification initiative through the elimination of zones and transfers, as well as a multi-modal 'day pass' was introduced by the Mass Transit Administration in 1996 in the State of Maryland (population 5.6 million). Increased revenues resulted from the fares simplification. This included:

- An overall 12.6% increase in fares in the 6 month period following the fares simplification.

The growth in revenue could be attributed to an increase in revenue across all modes showing evidence of:

- A 11.5% increase in bus revenue;
- A 18.6% increase in Metro revenue; and
- A 13.2% increase in light rail revenues.[21]

3.1.2 Connecticut Transit, USA

Hartford, New Haven and Stamford are serviced by three Connecticut Transit operators. In June of 1998, a 'New Fare Deal' was introduced that eliminated local fare zones, created a uniform fare structure for the three operators and implemented some new ticket types. As a result of the fares policy:

- Total revenue increased by approximately 1% in 1998 and 2% in 1999. [22]

---

21 *MEEG, 'Fares Structures Evidence on Performance'* www.konsult.leeds.ac.uk/private/level2/instruments/instrument044/12_044c.htm. *2009.*

22 *MEEG, 'Fares Structures Evidence on Performance'* www.konsult.leeds.ac.uk/private/level2/instruments/instrument044/12_044c.htm. *2009.*

4 Case Studies to Support Modal Shift

***Modal Shift** (1 study reviewed)*

Although there is limited quantitative evidence to support a link between modal shift and fare integration, some research suggests increases in public transport usage.

4.1 EUROPE

4.1.1 Freiburg, Germany

FitzRoy et al (1998) identified that the introduction of a cheap travel pass confirmed a marked growth in share of trips by public transport detailing that:

- In 1982, an 11% increase in the share of public transport used to conduct trips was identified; and
- In 1992, the modal share of public transport had increased to 18% of total journeys conducted.[23]

[23] *FitzRoy, Felix & Smith, Ian, 1998. "Public transport demand in Freiburg: why did patronage double in a decade?," Transport Policy, Elsevier, vol. 5(3), pages 163-173.*

5 Case Studies for Increased Passenger Satisfaction

***Increased Passenger Satisfaction** (4 studies reviewed)*

Passengers opinions have suggested satisfaction from fare integrated schemes due to resulting fare savings and increased convenience

5.1 EUROPE

5.1.1 Madrid, Spain

While no quantitative information was gathered to explicitly measure the positive impact of fares integration, qualitative research demonstrated:

- Improved convenience with ticket purchase and public transport usage;
- General higher satisfaction with the services; and
- Savings in ticket purchase price.[24]

5.1.2 London, United Kingdom

With the fare changes associated with the implementation of the Travelcard, there were improvements with passenger satisfaction. In particular, even though clerical staff servicing ticketing booths were reduced during the implementation of the Travelcard:

- Queuing times at the booking offices also fell from 0.9 to 0.7 minutes.[25]

5.1.3 Tyne and Wear, United Kingdom

Tyne and Wear is a metropolitan county in North-East of England with population of 1 million. Tyne and Wear has a public transport network which includes metro, light rail, bus, ferry and limited rail services. Each year approximately 40 million Metro journeys and 135 million journeys on the bus network are conducted.

---

24 *CTM, (2003) UITP, 2003, Pricing WG - 1st Meeting, 24-03-2003, p.13, Regional Transport Committee*

25 *Transportation Research Board – National Research Council, 2004, Transit Cooperative Research Program Report 95: Transit Pricing and Fares – Traveler Response to Transportation System Changes.*

Tyne and Wear currently has a complex fare system with a large range of ticket types, with different tickets offered by different operators, with some multi-modal tickets provided by Network Ticketing Limited.

The Tyne and Wear Passenger Transport Executive, known as Nexus has reported that the planned investment in the Metro network, which includes the ticketing and gating project is an opportunity to introduce a universal multi-modal ticketing scheme through a smart card medium. The use of smart cards is believed to support simplified and integrated ticketing by capping the price of daily travel and ensuring the cheapest fare is provided. Anecdotal evidence provided by Nexus identifies key benefits from the proposed simplified and integrated ticketing that supports increasing passenger satisfaction in the areas of:

- Effective multimodal travel system that simplifies the best value tickets;
- Simplified fare structures which removes the ambiguity in purchasing the cheapest possible fare for a given journey

Nexus acknowledges that simplifying and integrating the fare structure could be achieved without simultaneously introducing a smart card, but it is anticipated that the smart card will further promote the benefits from simplified fare structures.[26]

5.2 NORTH AMERICA

5.2.1 The State of Maryland, USA

MTA's fare simplification introduced in 1996 was an initiative that eliminated zones and transfers as well as implementing a multi-modal day pass. In addition to increased revenues, the fares policies resulted in other benefits to consumers including:

- Reduced confusion regarding fare payment through eliminating fare zones and transfers
- Improved convenience of fare payment;
- Reduction in travel costs through removal of fare zones and transfers; and
- Improved flexibility in multi-modal travel.[27]

[26] *Nexus, Current, Visionary multi-modal solution for smart ticketing in Tyne & Wear*

[27] *Transportation Research Board – National Research Council, 2004, Transit Cooperative Research Program Report 94: Fare Policies, Structures and Technologies (Update).*

6 Case Studies to Support Faster Boarding Times

Faster Boarding Times (2 studies reviewed)

Some evidences suggests that integration across modes has decreased boarding times for passengers and hence reduced the overall passenger in-vehicle time.

6.1 EUROPE

6.1.1 London, United Kingdom

In addition to benefits of simplified fares associated with increased ridership, White (2009) also discusses the benefits of simplified bus fares on reduced boarding times and overall travel times. White ('Transit' 20 April 2007, p2) states that across the network as a whole only 3% of passengers now pay cash. Even outside the London central area, the proportion of cash fare payment is now very low at around 5%.

Boarding times per passenger in 2004 were about:

- 2 seconds on suburban routes and under 1 second on the articulated routes (with parallel boarding through all three doorways) (Lizon 2004, pp58/59).

This process has been accelerated by the 'pre-pay' version of the Oyster smartcard, enabling occasional users to travel at markedly lower prices than full cash fares. In other parts of Britain where a substantial proportion of cash fares is still found:

- Average boarding times are in the order of 5-8 seconds.

The effect on a morning peak run picking up, say, 60 passengers with a saving of 5 seconds per passenger, is a total time saving of 300 seconds (6 minutes), i.e. of the same order as the effects of bus priorities.

- Assuming a total in-vehicle time of 60 minutes for the one-way journey, this is a reduction of 10%.[28]

[28] *Transportation Research Board – National Research Council, 2004, Transit Cooperative Research Program Report 95: Transit Pricing and Fares – Traveler Response to Transportation System Changes.*

6.2 NORTH AMERICA

6.2.1 The State of Maryland, USA

In addition to the revenue benefits and improved passenger satisfaction with public transport services from the fares simplification initiative introduced in 1996, there is evidence to support faster boarding times. The eliminated zones and transfers as well as implementing a multi-modal day pass resulted in:

- Faster boarding times in afternoon and evening peaks.[29]

[29] *Transportation Research Board – National Research Council, 2004, Transit Cooperative Research Program Report 94: Fare Policies, Structures and Technologies (Update).*

7 Case Studies for Reduction in Fraud

***Reduction in Fraud** (1 study reviewed)*

There is evidence to suggest that reduced fare evasion has resulted from fare integration.

7.1 EUROPE

7.1.1 London, United Kingdom

The introduction of the Travelcard product had a profound effect on fare evasion:

- A 7% decline in total revenue lost to fare evasion activities from 1980 to 1992 (i.e. from 10.5% in 1980 lost revenue to 3.5% lost revenue in 1992); and
- The proportion of total revenue lost to passenger fraud also declined from 6% to 3% from 1982 to 1983.[30]

[30] *LT Planning Department – London Transport, 1993, Fares and Ticketing Policy in London: from Travelcards to Smartcards.*

8 Case Studies for Reduction in Transaction and Administration Costs

Reduction in Transaction and Administration Costs (1 study reviewed)

There is an indication that fare integration across modes has lead to a reduction in costs associated with back office operations.

8.1 EUROPE

8.1.1 London, United Kingdom

With the implementation of the Travelcard that allowed for multi-modal integrated transport, there were reductions in operating costs for both bus and Underground services. The general ticketing administration costs fell for London Underground.[31]

31 *Transportation Research Board – National Research Council, 2004, Transit Cooperative Research Program Report 95: Transit Pricing and Fares – Traveler Response to Transportation System Changes.*

9 Conclusions

This literature review has identified case studies from major urban areas across Europe, North America and Australia that have qualified and quantified the benefits of simple, affordable and competitive integrated ticketing schemes implemented between the early 1980's to 2008.

While many examples of the benefits of integrated fare products have been identified, the most commonly reported benefit was associated with increased patronage. While positive benefits were reported across all areas, the case studies reviewed only provide robust evidence to support increased patronage from integrated ticketing.

Simplified and integrating ticketing schemes is supported by the following key findings:

- Substantial increases in patronage, in the range of 6% to 20%, with some transport modes experiencing increases to the order of 40%;
- Limited evidence to support increased revenues, with the reported increase varying widely from a 1% to a 12.6% increase in total revenue;
- Limited quantitative evidence to support a link between modal shift and fare integration, with some case studies suggesting an overall increase in public transport usage;
- There is some evidence to suggest improved satisfaction from fare integration primary due to increased convenience and fare savings;
- There is limited evidence of faster boarding times as a result of integrating ticketing, with some transport modes experiencing in order of a 10% reduction in passenger in-vehicle time;
- There is limited evidence to suggest that integrating ticketing in isolation has reduced fare evasion. Rather the reduction in fraud has usually been associated with integrated fares as well as a change in fare medium;
- There is only anecdotal evidence to support a reduction in transaction and administration costs from simplified and integrated ticketing.

10 References

Booz Allen Hamilton, 2000, Integrated Fare System for South East Queensland.

Booz Allen Hamilton, 2003, Report to Regional Transportation Authority – Fare Coordination Assessment.

Booz Allen Hamilton, The Impact of Fares and Ticketing Integration on Patronage – International Case Studies.

Cristobal-Pinto, Carlos, (2005), UITP 3rd Training Programme, Public Transport Management, Barcelona 14-16 February, Madrid Public Transport Authority

CTM. (2003) UITP, 2003, Pricing WG - 1st Meeting, 24-03-2003, p.13, Regional Transport Committee

FitzRoy, Felix & Smith, Ian, 1998. "Public transport demand in Freiburg: why did patronage double in a decade?," Transport Policy, Elsevier, vol. 5(3), pages 163-173, June.

GMPTE, 2009, 'How do other cities approach fares structure?'.

Kennisplatform Verkeer en Vervoer', 2007, Open-baar-vervoertarieven in Europa.

London Regional Transport, 1999, MTA MetroCard: A Review.

LT Planning Department – London Transport, 1993, Fares and Ticketing Policy in London: from Travelcards to Smartcards.

MEEG, 'Fares Structures Evidence on Performance' www.konsult.leeds.ac.uk/private/level2/instruments/instrument044/12_044c.htm. 2009.

Nexus, Current, Visionary multi-modal solution for smart ticketing in Tyne & Wear.

Sreeting and Barlow, 2005, Understanding Key Drivers of Public Transport Patronage Growth – Recent South East Queensland Experience.

Transport for London, 2009, Customer Research Report Update: Fares & Ticketing.

Transportation Research Board –National Research Council, 1996, Transit Cooperative Research Program Report 10: Fare Policies, Structures, and Technologies.

Transportation Research Board – National Research Council, 2004, Transit Cooperative Research Program Report 94: Fare Policies, Structures and Technologies (Update).

Transportation Research Board – National Research Council, 2004, Transit Cooperative Research Program Report 95: Transit Pricing and Fares – Traveler Response to Transportation System Changes.

Tyson, 1990, Effects of deregulation on service co-ordination in the metropolitan areas.

White, 1981, Travelcard Tickets in Urban Public Transport.

Appendix A: Summary of Patronage Impacts

Table A1 below summarises the changes in patronage that have resulted from fare integration and/or simplification. Only the results of research which detailed study time frames and quantified the changes in patronage are reported.

Table A1 – Patronage increases from fare integration

Location	Year of Fare Change	Impact on Patronage	Passenger Distance (miles)
EUROPE			
London, UK	1983 - 1992	10% increase on Tube 16% increase on Bus	33% increase on Tube 20% increase in Bus
London, UK	1999/2000 and 2005/2006	32% increase (across all modes)	NA
Brighton and Hove, UK	2002	3-8.5% increase in bus	NA
Harrow Region, UK	1980	8% decrease in bus	7% increase in bus
West Midlands, UK	1972- 1981	7% increase (across all modes)	NA
Freiburg, Germany	1984 – 1999	50% increase 7.5% per annum	NA
Sevilla, Spain	2002 – 2005	3% increase on bus	NA
Paris, France	1975	36% increase in bus	NA
Zurich, Switzerland	2 years period (dates unknown)	12% increase (across all modes) 53% increase on bus 30% increase on rail	NA
Cologne-Bonn, Germany	2004	Over 1/3 of population use public transport more than once per week	NA
Flanders, Belgium	2007	200% increase (across all modes)	NA
Dresden, Germany	1998 – 2008	11% increase on monthly & yearly tickets	NA
Vienna, Austria	2006 – 2008	Increase in the number of travellers using public transport	NA
NORTH AMERICA			
New York, USA	1998	40% increase in bus 17% increase in rail	NA

Location	Year of Fare Change	Impact on Patronage	Passenger Distance (miles)
Washington DC, USA	1999	22 million increase in rail and bus services	NA
AUSTRALIA			
South East Queensland, Australia	2004 – 2005	2004/2005 – 9.7% increase (across all modes) 2005/2006 – 11.6% increase (across all modes)	

Table A2 below summarises the increased revenue findings that have resulted from fare integration.

Table A2 – Revenue increases from fare integration

Location	Year of Fare Change	Impact on Revenue
NORTH AMERICA		
The State Of Maryland, USA	1996	11.6% increase in Bus revenue 18.6% increase in Metro revenue 13.2% increase in light rail revenue
Connecticut Transit, USA	1998	1% increase in revenue in 1998 as well as a 2% increase in revenue in 1999

Table A3 below summarises the modal shift findings that have resulted from fare integration.

Table A3 – Modal Shift from fare integration

Location	Year of Fare Change	Modal Shift Impact
EUROPE		
Freiburg, Germany	1982 and 1992	1982 – 11% increase in mode share of public transport 1992 0 18% increase in mode share of public Transport

Table A4 below summarises the modal shift findings that have resulted from fare integration.

Table A4 – Increased Passenger Satisfaction from fare integration

Location	Year of Fare Change	Passenger Satisfaction
EUROPE		
Madrid, Spain	2003	• Increased convenience of fare payment and using public transport • Monetary savings on tickets purchased • Higher satisfaction with overall services
London, United Kingdom	1983	• Queuing times at ticketing booths declined
Tyne & Wear, United Kingdom	Current	• Effective multimodal travel system that simplifies the best value tickets; • Simplified fare structures which removes the ambiguity in purchasing the cheapest possible fare for a given journey
NORTH AMERICA		
The State of Maryland, USA	1996	• Improved convenience of fare payment • Reduced confusion in fare payment • Reduction in travel costs • Improved flexibility in public transport usage across modes

Table A5 below summarises the modal shift findings that have resulted from fare integration.

Table A5 – Faster Boarding Times from fare integration

Location	Year of Fare Change	Impact on Boarding Times
EUROPE		
London, United Kingdom	1983	Suburban routes: 2 second boarding time Articulated routes: 1 second boarding times
NORTH AMERICA		
The State of Maryland, USA	1996	Faster boarding times in afternoon and evening peak periods

Note: Improvements in boarding times for London reflect the reduction in cash paying passengers

Table A6 below summarises the modal shift findings that have resulted from fare integration.

Table A6– Reduction in Fraud from fare integration

Location	Year of Fare Change	Reduction in Fraud
EUROPE		
London, United Kingdom	1980 - 1992	A 7% decline in total revenue lost to fare evasion activities from 1980 to 1992

Table A7 below summarises the reduction in transaction and administration costs findings that have resulted from fare integration.

Table A7– Reduction in Transaction and Administration Costs from fare integration

Location	Year of Fare Change	Reduction in Administration Costs
EUROPE		
London, United Kingdom	1983	General ticketing administration costs declined

Appendix B: Summary of Benefit Attributes

As detailed in Table B1, the benefits identified in each case study have been attributed to a combination of simplified fare changes, the introduction of integrated fares, a change in actual fare levels and improved fare mediums. A detailed breakdown of the applicable ticketing type improvements for each case study are listed below:

Table B1 – Benefit Attributes per Case Study

Location	Simplified Fares	Integrated Fares	Change in Fare Level	Improved Fare Medium
EUROPE				
London	4	4	4	4
Brighton & Hove	4		4	
Harrow Area (North-West London)	4			
West Midlands	4	4		4
Freiburg	4	4		
Madrid	4	4		4
Sevilla		4		
Paris		4		4
Zurich	4	4		
Flanders	4	4		
Cologne-Bonn	4	4		
Dresden	4	4		4
Vienna	4	4		
Tyne & Wear	4	4		4
NORTH AMERICA				
New York		4		4
Washington DC		4		
Los Angeles		4		4
The State of Maryland	4	4		
Connecticut Transit	4	4		
AUSTRALIA				
South East Queensland	4	4	4	4

A summary of the benefits identified in each case study is listed in Table B2 below:

Table B2 - Summary of Benefits per Case Study

Location	Increased Patronage	Increased Revenue	Improved Passenger Satisfaction	Faster Boarding Times	Reduction in Fraud	Modal Shift	Reduced Admin Costs
EUROPE							
London	4		4	4	4		4
Brighton & Hove	4						
Harrow Area (North-West London)	4						
West Midlands	4						
Freiburg	4					4	
Madrid	4		4				
Sevilla	4						
Paris	4						
Zurich	4						
Flanders	4						
Cologne-Bonn	4						
Dresden	4						
Vienna	4						
Tyne & Wear			4				
NORTH AMERICA							
New York	4						
Washington DC	4						
Los Angeles	4						
The State of Maryland		4	4	4			
Connecticut Transit		4					
AUSTRALIA							
South East Queensland	4						