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SMART SEGMENTS FOR URBAN PUBLIC TRANSPORTATION: AN INTERNATIONAL SURVEY OF PRACTICES

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ABSTRACT

This paper endeavours to cover the following ground:

- 1) Glimpses at the historic background of urban mobility: the rise and decline of market-led public transport operators, the rise of market-led individual modes and the shift to public transport owned by the public sector (or operated on its behalf)
- 2) Market segments likely to make more use of public transport as it is, without any operating changes (individualised marketing).
- 3) Increasing public transport ridership as a whole by introducing user-friendly features or playing the network effect (integrated fare collection, contactless smart cards, improvement of passenger interfaces)
- 4) Carving the market niche of :access to airports
- 5) Coping with car-oriented shopping and leisure centres, fairgrounds and sports events
- 6) Tapping the hidden potential of urban waterways and collective use of taxis
- 7) Increasing the market for public transport through public transport-friendly land-use policies (transit oriented development).

The accounts of cases are based as much as possible on the experience of the UITP membership (authorities and public transport operators). The cases are all related to specific places. The gathering of material mainly relied on personal visits and interviews with actors involved, rather than on the analysis of market segments resulting from global trends. A previous version of this paper was presented at the Think-Up Workshop, Dresden, December 2000.

1. URBAN MOBILITY MARKETS OF YESTERDAY AND TODAY.

1.1. FROM THE EARLY URBAN TRANSPORT INITIATIVES TO THE MARKET-LED URBAN RAILWAYS AND TRAMWAYS.

Probably the first documented experience in fixed route urban public transport was the 1662 Parisian public coach company (MATHIEU 1995). It was a private venture based on an idea of Blaise Pascal. It consisted

Of a fleet of eight-seat coaches ("Carrosses à cinq sols") franchised by net cost contract to coach operators and covering the whole of central Paris with a frequency of quarter of an hour (five fixed routes - see ILLUSTRATION 1). Under the terms of the contract the operators were responsible for the service, the costs of investment and operation and the collection of fares (a flat fare). The owners paid a fixed daily amount by coach and recouped one third of the fares.

The service was correctly targeted at the middle and upper middle class, the routes were well designed and the contracts with operators proved adaptable. Nevertheless the system did not survive its inventor. Among other reasons the vehicles were too small to cope with the number of passengers waiting at stops.

To see the rise of urban public transport one would have to wait for the larger horse-drawn two-storey coaches and horse-drawn tramways.

The interurban road network was also largely private and operated under concession. Contractors were in charge of building and maintaining the road and collecting the tolls. In England alone around 1820 an estimated 20.000 miles of roads were operated under concession agreements.

Since the eighteen thirties the railway companies, starting with the interurban link between Liverpool and Manchester, gradually expanded all over the world and in addition to interurban services opened the suburban areas to the urban middle class. Private enterprise took the entire responsibility of route fixing, lands acquisition, track investment and operation and was therefore fully concerned with marketing and segmentation by classes of potential passengers.

Suburban land development became a key objective of transport operators: it combined the creation of property values and passenger markets.

Probably the most adventurous and successful combination of passenger transport and urban development was the planned extension of Cairo by the Belgian banker Edouard Empain. Empain bought a huge tract of plateau desert land some ten kilometres from the centre of the city and a tiny corridor through the desert, where he built a tramway line and utilities (water supply, sewage, etc.). He divided the desert land according to a simple, high density-low rise street grid and public services master plan and thus created a huge suburban passenger market between Cairo and the new settlement, which he called Heliopolis.

The success of the market-led Heliopolis transport and land use project later enabled Empain to play it again, on a larger scale, in Paris, where he financed the Metropolitan railway network. He again combined property development and production of electricity with investment in public transport. The project was entirely private. No elected officials attended the opening, in July 1900. The new Metro, helped by the Paris 1900 Exhibition, was an immediate market success, with more than 16 million passengers during the first five months of operation (GAILLARD, 1985 p. 102).

On a much smaller scale, the three-speed moving sidewalks of the Exhibition grounds proved a hugely successful hectometric (short distance) public transport market niche. They were perfectly safe for the user as he gently stepped from the lower-speed to the higher-speed sidewalk. Notwithstanding this proven success the multi-speed moving sidewalks were never replicated elsewhere, which may suggest some caution in believing that the replicability of best practices should be taken for granted.

1.2.THE RISE OF AUTOMOBILITY AND THE DAWN OF MARKET-LED PUBLIC TRANSPORT.

Electricity and the combustion engine were possibly the two most important transport-related technical innovations of the late nineteenth Century. The rôle of the telephone as a substitute to travel but even more so as an incentive to additional physical mobility has also been stressed (SOLA POOL, 1980).

1.2.1. ELECTRICITY PRODUCTION AND THE SUPPLY OF URBAN RAIL SERVICES

Industrial electricity production enabled the rise of new urban transport operators, backed by a modern industrial sector.

Steam-engine commuter trains had boosted the i interurban travel and the suburban travel into the countryside. Electric tramways allowed convenient short distance urban transport. In very large cities there was a gap between the two, which opened the mobility services market to the electric underground metropolitan railways. The first ones (London, New York, Paris, Budapest) appeared at the exact point in time when surface traffic had reached a peak of congestion and pollution caused mainly by horse-drawn carriages.

As neither steam engine vehicles nor horse-drawn carriages could conveniently be put under ground, the market was open to propositions for long underground tunnels built for electric railways, which meant the acceptance of daily underground mass travel by city dwellers, leaving the street to individual transport. Paradoxically, if it had happened a few years later the tunnels could have been built straight away for cars and their affluent solo drivers, leaving the streets to the city dwellers.

1.2.2. THE COMBUSTION ENGINE AND THE SUPPLY OF ROAD SERVICES

The invention of the combustion engine opened the market for new, glamorous, convenient and street-friendly (at least initially) individual vehicles.

The oil industry was quick in adapting to it. While at the turn of the century the oil industry was on the verge of collapse because electricity was replacing petroleum lamps (YERGIN, 1991, pp 78 sq.). The advent of the mass-produced automobile gave it new impetus.

The combined forces of the oil companies, the automobile industry and the road building industry created an even mightier lobby than the railway moguls at the peak of their strength. Roads entirely financed by taxpayers money replaced the user financed toll roads of the 19th century, designed, built and maintained by the private sector. The welfare state of automobility was to go much further.

The tramway companies had to pay for their track investments and maintenance and charge their passengers accordingly The automobile on the contrary used the space it consumed, both to run and to park, without any specific charge. Meanwhile the commercial speed of trams was jeopardised because they had no segregated right of way and automobile traffic clogged their tracks.

At that point the automobile industry did what was to be expected from it: it bought up the ailing tramway companies, put the trams out of service and replaced them with the buses they produced.

This happened all over America, and elsewhere. In many places the ailing tramway companies were taken over by government, becoming part of the public sector and subject to the management style of subsidised public services.

In Paris the transport authorities, under the influence of a well orchestrated media campaign, put out of service the entire fleet of tramways - more than 3000 - in five years, between 1932 and 1937. Many of them were brand new. In their place they put in a fleet of buses produced by the national automobile industry (GAILLARD, 1985).

This historic reminder helps to understand that the rise of automobility was the result of a coherent and broad-ranging multisector marketing strategy even more than it was the result of spontaneous individual preference.

In particular the "preference for space" results when space becomes available at less than full cost. This was indeed the case. Not only were the streets and roads made available free of charge but a wide range of market incentives were made available to buyers of individual detached homes. The most famous one was the US GI Act, after the last war, which offered vast home acquisition subsidies and generated the Levitt towns and thousands of suburbs.

The standard form of urban growth in the US became "leapfrogging". This means that land developers were buying up tracks of cheap agricultural land ever further from the built-up areas. However, instead of providing the connection to the city at their own cost as did Empain in Cairo, they only had to make sure the government-financed road programmes (under the Federal Highway Act and other schemes) ensured that connection. Thus the sale of plots and homes could be offered at a bargain price, with the help of the Federal and State subsidised home acquisition schemes.

These mechanisms were widely replicated all over the industrialised world and beyond. In Europe several countries introduced tax deductibility for vehicle-kilometres travelled from home to work. In terms of transport markets this low density form of urban development excluded public transport from most of the market in favour of the automobile. More importantly it ensured a maximisation of kilometres travelled and of fuel consumption.

As a result of this deeply unequal competition, the public transport services gradually gave way to reliance (or dependence?) on the automobile, public transport being treated as a universal service, affordable by all but less attractive, like second class mail.

This trend is still in full bloom. It explains why in the OCDE countries during the last fifteen years (1980 to 1995) the vehicle-kilometres travelled increased by 65% while the car ownership increased by 50% and the population by 13%. There are four times more new cars than new babies. Vehicle-kilometres travelled have increased five times faster than the population.

2. IDENTIFYING NEW MARKET SEGMENTS FOR THE PUBLIC TRANSPORT SERVICES AS THEY ARE: SOME EXPERIENCES

2.1. CITIZENS' VS OFFICIALS' ATTITUDES TOWARDS CAR AND PUBLIC TRANSPORT.

Automobility goes beyond mobility. The automobile, in a way like the individual detached home, reflects a change in social values sometimes referred to as "Me culture" or "mass individualism" (GAUCHET, 1985).

In line with Locke's philosophy, the emphasis is put on individual values rather than social values and on the rights of the individuals, rather than on their duties. Gender complementarity gives way to equal access. Producers of consumer goods or services and their marketing advisers have multiplied the socio-cultural typologies and market segmentation. In particular the automobile industry has diversified its products to suit individual tastes, status aspirations and quest for recognition as well as convenience and comfort. Only by having these social values in mind can public transport authorities and operators hope to get more customers than the captive users.

Against this background the UITP initiated in 1991 a survey on the attitudes of Europeans about urban mobility (not about public transport). In collaboration with the EC (Directorates of Transport, of Energy and of Environment) 20 questions were added to the Eurobarometer. The Eurobarometer is a Europe-wide half-yearly opinion survey consisting of 1000 face to face interviews per country. Simultaneously Socialdata (Munich) interviewed a sample of 157 elected transport officials on the same items.

The findings indicated that notwithstanding the fact that 65% of the sample were car users the negative effects of congestion, of accidents and of pollution were clearly perceived by the citizens. They also perceived the need for measures to reduce traffic and to give priority on streets to public and non-motorised transport (UITP/SOCIALDATA, 1993 - ILLUSTRATIONS 2, 3 & 4).

By contrast elected officials were strongly underestimating public opinion, expecting the citizens to prefer car oriented policies. While 84% of the citizens were in favour of giving a priority to public transport the officials, independently from their own opinion, thought that only 49% were in favour of public transport priority (ILLUSTRATION 5). The reasons for the officials' overestimation of the opinions in favour of the car seem to be that officials themselves all have access to the car, that they actually use it for their political activity and that they read the media, usually favourable to the car, with particular attention

2.2. FROM ATTITUDES TO BEHAVIOUR: THE CASE FOR INDIVIDUALIZED MARKETING

How is it possible to take advantage of the largely positive attitude of most citizens in favour of public transport to influence their behaviour in favour of actually using them?

In order to answer this question the UITP and Social Data again joined forces, this time to realise a collective individualised marketing experiment, aimed at infrequent users (UITP/SOCIAL DATA 1998). Initial findings in 115 German cities indicated that in addition of the 16% current users, about twice as many users (34%) could be captured (ILLUSTRATION 6), as they had no rational reasons for not using it. These reasons were in particular a lack of knowledge about the services, their speed and their cost (ILLUSTRATION 7). The experiment, called "Switching to Public Transport", involved some forty authorities and operators. It focused on the following segments:

- location segments: areas of the city with good supply of public transport
- population segments: preselection by outside agency telephone interviews aimed at identifying infrequent users in the selected areas

- mode of contact by the authority/operator: target groups approached by individual interviews at their homes (ILLUSTRATION 8)
- type of motivation: offer of an information package and a free pass of up to one month as an incentive to use it
- mode of control: no further direct contact but telephone interview by outside agency after one year to evaluate the change of travel behaviour.

In total 12.000 people participated in the experiment.

On average the individualised marketing experiment raised the share of public transport by 4%, from 17 to 21%. Before the marketing action each targeted person made on average 164 trips with public transport per year. After the marketing action this had increased to 196. In cases where the experiment had been done in earlier years, like in Kassel, the increase has proven to be lasting.

The overall revenue increase after one year proved far above the average total costs of the action, including staff, home visits, information material, presents and the cost of interviews by the appointed agency. Over five years, and without any new contact with the same individuals nor change in the service the revenue increase could be reasonably estimated at three and a half times the total cost (UITP/SOCALDATA, 1998, p.26)

The findings can be summarised as follows:

- significant increase in patronage, at a cost amortised in less than one year
- increase of patronage mainly in off-peak-hours, putting no additional strain on the operator
- in case of system improvements or line extension the increase of patronage is twice as high as without individualised marketing which draws the attention of the infrequent user to the quality improvement
- improvement of image among the targeted persons (often amazed at this unexpected attention to the customer). This improvement can be made known to the media and to the public officials involved in decisions about transport
- positive effect within the operating company: better staff identification with the company. Involving volunteer staff in the home interviews can further boost this.

While recommending the replication of this successful segmentation exercise, the following points should be kept in mind:

- Convincing infrequent users of public transport to make a higher use of it is much easier than to convert regular car users (in particular if they have easy access to parking) or people who do not want to be seen in public transport.
- However this is only valid for areas well-served by public transport and should not be a substitute for network improvement
- Home visits to every household are a useful testing method but are not necessary in case of a large-scale application. Other forms of individualised marketing can be achieved, in particular by a careful updating of address lists: the Basel operator for example has developed a successful individualised marketing by writing a personal letter to all people who changed address or personal status, informing them about the service and offering passes by mail instead of queuing at sales points.

More importantly, individualised marketing requires a change of both attitude and behaviour of the public transport authorities and operators towards market share increase rather than minimum public service to the captives. The forty participants to the "Switching" experiment were examples of this. The many operators who remained to be convinced ranged from union-led no-

change public operators to private operators with short franchises or no share in the ridership revenues. In some cases the tendering authority itself took in charge the individualised marketing of public transport.

The market segmentation of "Switching to Public Transport" was deliberately by passenger profile (those ready to be convinced), rather than by age group, income level, trip length, type of destination, etc.

2.3. PRE-TRIP MULTI-OPERATOR INFORMATION: A TOOL TO GAIN DIFFICULT MARKET SEGMENTS FOR PUBLIC TRANSPORT

Pre-trip information for urban and suburban transport is understood here as information made easily available by telephone from home or from a portable phone. It is a tool targeted mainly at non-regular users.

Multi-operator pre-trip information should not be confused with two other commonly used information tools:

- the availability of timetables on Internet. This should be done in any case. Operators however often ignore the actual degree of access to the net by their potential users. They also tend to underestimate the time needed by newcomers to find within the amount of information available on the operator's site the information they actually need right now, including the intermodal connections. A user-friendly website is also quite different from a user-friendly timetable.

- real-time information at stops about waiting times or about the location of the next vehicle to come. This information is intended for the passenger who has already opted for public transport. Real time information is indeed essential for the operator's image because passengers negatively perceive the waiting time. Introducing waiting time information at all stops should be part of the user service priority improvements, as well as a tool for fleet management.

2.3.1. A PRE-TRIP INFORMATION BEST PRACTICE: THE DUTCH COUNTRY-WIDE MULTIMODAL TELEPHONE INFORMATION CENTER

UITP regularly surveys the call centres operated by or for its members. Each survey indicated the Dutch countrywide multimodal call centre (called OVR) as a model in terms of targeted, value added information service. Its prime target is the occasional user, unfamiliar with the public transport system, in particular with the connections.

The service consists of an easy to remember national number served by a large staff (400 computer equipped telephone operators!) ready to give information on any trip within the country. All public transport operators in the country collectively own the OVR. The marketing information remains property of the participant operators.

This service costs an average of 1\$ per call, shared between OVR and the Telephone operator(s). The yearly number of calls exceeds 7 million. Most of the calls are followed by a trip. 80% of these trips are diverted from cars (a market segment difficult to conquer) and 15% from cycles.

A parallel internet service, free of charge, now handles 8 million additional requests per year.

The OVR was initially subsidised but presently (2001) its yearly operating cost (some five million \$) is mostly financed by the participating operators from the additional fare income resulting from the service. In addition there are of course obvious social benefits.

2.3.2. THE REPLICABILITY POTENTIAL OF THE DUTCH MODEL

The well-established OVR best practice is clearly a case for replicability. Success however requires finely tuned product marketing:

- The data collection model and the collection itself require co-operation from each operator
- Updating and actual use of data must respect absolute neutrality between operators; e.g. the choice among them in recommending trip chains. In the case of OVR the trip recommendation is made on the basis of the minimum total trip time between A and B
- In the future, data collection should be increasingly in real time, taking into account any disruptions known at the time of the call
- Training the telephone operators is essential to avoid them recommending sub-optimal trip chains, e.g. imposing an interchange on an itinerary which could be handled without interchange and walking a few blocks
- The staff should know the system "from anywhere to anywhere" but also be able to answer both in the local language and in English, in order to lure the expatriates.
- The sharing of common information costs among operators is as delicate as the sharing of income from common passes. This difficulty will probably increase after the introduction of open competition among operators. Each one may be eager to develop his own information service and telling the caller about its own services rather than proposing an optimal user choice (as shown by the information practices of airlines in the US). This can however be avoided if the tendering authority imposes to operators the participation to a common information service
- In any case the complete separation of the call centre function from the transport operator function is preferable. It allows an undivided loyalty of the call centre management to its operation and its development
- The area covered by the call centre should be kept manageable. The OVR staff works from six offices but the calls are diverted according to demand. In case of a country-wide system covering a very large area the calls will normally be passed from the operator receiving the call to the operator of the destination place and return, which may considerably lengthen the call. Linking call centres can be a solution, even beyond national borders, but requires a high degree of technical co-ordination.

A UK experience along the same lines as OVR is the Southern Vectis XEPHOS service. This countrywide integrated service called "JourneyCall" relies on the information about 12.000 destinations gathered from the Great Britain Bus Timetable (GBBTT). In 1999 it received 300.000 calls (SHELLEY, 2000).

A logical development from multimodal public transport information is intermodal information targeted directly at the car user sitting in his car amid congestion. The huge investments in traffic data collection for car navigation aids and the commitment of the automobile industry to intelligent transport systems have resulted in an estimated 10% market niche for navigation aids (in new cars). However they cannot protect the driver from road congestion. Indeed the traffic is increasing much faster than the progress made in road use efficiency.

The market potential therefore obviously exists for a telephone or visual driver information service about park and ride locations, their vacancy level, the train services available and an

accurate timetable information. Some road traffic authorities, such as the Sirius traffic system operator in France have attempted to implement such a service. However the market share which was to be gained by the rail transport operators does not seem to have been attractive enough to motivate them in providing the kind of data needed, in particular real time information about delays.

3. IMPROVING RIDERSHIP AS A WHOLE BY ACTUALLY IMPROVING EXISTING SERVICES OR EXPANDING THE NETWORK

3.1. INCREASING THE USER-COMMODITY OF EXISTING SERVICES BY OFFERING INTEGRATED FARE COLLECTION.

Besides the perceived lack of information about existing routes and services and about connections the main deterrent for unfamiliar users is the need for fare calculation. It adds to the generalised perceived cost of public transport. An easy answer to the problem is flat fares. However this proves a recipe for huge financial losses as well as for bias against short distance riders. The challenge therefore is to combine maximum tariff flexibility of competing services and maximum simplicity of use for the customer.

The specific situation of public transport in Hong Kong and Singapore requires operators to work without subsidies. This has boosted their commercial creativity and made them realise that common payment systems were the common interest of all operators, even if they were competing with each other on their services and had different fare policies. It has also proved best practice in increasing passenger satisfaction and passenger revenues.

3.1.1 HONG KONG: CREATIVE STAR AND THE OCTOPUS CARD

The present integrated ticketing system of Hong Kong (introduced in September 1997 and used in 2001 by more than eight million people) was developed in common by all the operators with the support of the authorities. It consists of a stored value contactless smart card called Octopus. This card is accepted and rechargeable at stops of each of the networks participating in the Hong Kong public transport system. The remaining value is not indicated on the card but readers are readily available.

The card is debited at the entrance of the system of an amount equivalent to a full trip, i.e. to the end of the line. At the exit the passenger is entitled to a credit corresponding to the number of stops he did not use.

To develop and manage the ticketing system the operators agreed on entrusting an independent body called Creative Star, with this matter. Each operator is free to set his fares (peak and off-peak) and any fidelity (loyalty) schemes he wants. As an example the commuter rail advertises special discount rates for people entering the system just before the morning peak. The allocation of proceeds from the card among operators is determined by each one's total record of trips: entry debits minus exit credits (if any). The system works as well in trams as in metros and ferries.

In trams the stored value card replaced the existing personal passes with unlimited use. For these customers a personal Octopus card with photo is provided. It has a stored value corresponding to a reasonable maximum use. This card is insured against loss. As the trams have open access,

teams of inspectors equipped with card readers do the control. The passenger check in and check out card readers are put outside of the trams for passenger convenience.

The Octopus card has not replaced the single use ticket (ILLUSTRATION 9). The user has to determine the number of zones he wants to buy, with the inconvenience of having to determine the correct fare and push on the right buttons. In future single or limited use, non-rechargeable paper contactless smart cards will be available on the mass transit market (at a cost of less than 0.10 \$ according to their French manufacturer).

The Hong Kong Octopus card is by far the best-proven success in system-wide user-friendly multioperator passes. The suppliers of service are handling the complex issue of marketing the best fare at each time of day. Public service market segments cover the entire population, not withstanding the high-income level and high car ownership. The success of the Octopus card with tourists is equally impressive. The eight million cards in use far exceed the population (six and a half million)

In terms of operating practices it pioneers the concept and practice of a value added operator, independent from the transport operators but working on their behalf (in a way similar to the Dutch information service (see 2.3.1.)

Technically however Octopus takes the place of the magnetic card which required a real-time central recording of transactions to detect fraudulent cards. The high safety smart cards presently available do no longer technically require this costly investment. This opens the way to a new generation of decentralised smart card systems like the Singapore one (LACONTE, 2000/3). The latest development in line with the Octopus model is the SUICA card introduced by Japan Railways East in November 2001 on 3.100 gates both for its Tokyo urban services and for its commuter services.

3.1.2. SINGAPORE: THE ENHANCED INTEGRATED FARE SYSTEM

The Singapore contactless stored value smart card differs from the Hong Kong one. It allows not only paying for transport-related services but also for many other purchases (e-purse). Moreover the check-in check-out, debit-credit function extends to buses also. The entrance validator is placed next to the driver, the exit validator near the rear exit.

The Singapore card was developed by the Government (Land Transport Authority) It was introduced in February 2000 and made available to all operators. The card can be recharged with cash or from a bank account through a cash dispenser.

The Singapore transport policy is to limit automobile traffic to a sub-congestion level through price mechanisms (auction of "certificates of entitlement", taxation on car ownership, user charges on roads and parking) and to maximise the market for mobility by public and non motorised transport and by taxis. To ensure a maximum competition within the market of public transport, franchises for groups of lines are attributed to multimodal operators (rail and buses). All of them participate in the " enhanced integrated fare system" (TAN HUP FOI, 2000).

3.2. NEW RAIL SERVICES AND IMPROVED INTERFACES: THE EFFECTS ON DEMAND.

This item includes cases illustrating the potential of new tramway networks, the high speed - low speed interface, heavy rail - light rail interface and their effects on demand.

Improving interfaces improves demand by all market segments. However, the growing segment of mobile older people is particularly sensitive to comfort and ease of use, more so than to time gains. Older people often choose taxis for that reason. As an example a return trip by the Paris metro, with one interchange on each trip sometimes requires the same total effort as climbing the stairs of an eight-storey building. Escalators were put in a number of stations but they are not generalised.

3.2.1. NEW URBAN RAIL NETWORKS AS AN OPPORTUNITY FOR THE PUBLIC TRANSPORT: SYSTEM: THE CASE OF THE MANCHESTER METROLINK

The interest of the Manchester case goes beyond the new rail system. Very soon after deregulation, when on-street competition was introduced the Manchester authorities started measures to integrate supply by designing the Travelcard. The Travelcard is an unlimited-use pass accepted by all operators (rail and bus) within the Manchester area.

The originality of the Travelcard lies in how the passenger revenue is allocated to the different operators. The share of each one by the actual daily use (demand) as revealed by a permanent sample survey rather than by the supply (seat kilometres) as in the traditional German "Verbund".

The permanent sample survey is covering all the operators and performed by an independent team according to a stochastic model accepted by all parties. While relatively expensive (around 2% of passenger income) it has been a remarkable success in terms of user attractivity and marketing. It has allowed identifying the passenger profiles by asking them three simple questions: point of entry, point of exit and fare category of the passenger (child, adult, and concession). The results have allowed a neutral assessment of the daily evolution of patronage level to the benefit of each operator. In addition they have allowed an independent assessment of the number of subsidised concession riders.

The integration of a new partner (Metrolink), with its own tariff structure, has proved to be perfectly compatible with the Travelcard.

The market niche specifically generated by the new Metrolink tram -train was a direct result of its interoperability concept (LACONTE, 2000/1).

In 1989 the public transport authorities decided to link two underused commuter lines, one ending north and other ending south of the centre. This new north-south line was to be operated by a tramway, which would run on streets between the two stations and use old BR track for the rest.

To implement this idea the authorities launched a European call for consortia ready to design, build, and operate the new network during 15 years. The winning consortium committed itself to:

- take the full industrial risk of the investment while providing itself 5% of the total cost (ca 200 million \$) and to
- take the full commercial risk of operation (no subsidy). The system opened in 1992.

The niche effect was obtained through several operating innovations, among others:

- The fares structure was extremely simple ("kiss" principle)

- The timetable was equally simple: one tram every 6 minutes (later every 5 minutes) from 7 AM to 7 PM, 12 minutes at other times
- A 50% rebate was introduced at non peak hours, targeted at the housewives shopping and leisure trips, in particular mobile older people
- The operating staff was hired according to service criteria (no previous transport experience was wanted) and trained to fill all the operating jobs.

In 1995, after 3 years of operation the annual operating profit was 5 million \$. The system length has been doubled since and a third extension is at the planning stage. The part of the investment not financed by the private consortium could be financed by the new parking levy on work-place parking provided by employers (see below at 7).

3.2.2. HIGH SPEED & LOW SPEED, HEAVY & LIGHT RAIL INTERFACE

- HIGH SPEED AND LOW SPEED INTERFACE: A POTENTIAL TO BE TAPPED

High Speed Rail lines have meant a renaissance for passenger rail on interurban stretches that can be linked in less than three hours. As an example the Paris-Brussels train service (300 km in 1 hour 25 min. today and 1 hour 10 min. from 2001) has already now a more than 50% market share. Business travellers make up for 53% of traffic. From 2001 all AF flights on that connection will be suppressed and replaced by direct trains from Brussels to Paris Roissy, with airline service.

Conversely high-speed trains should soon link the centre of Paris to Brussels Airport, making Brussels effectively the third Paris Airport. High speed trains are also beginning to be used by commuters, e.g. from Vendôme in the Loire area to Paris (42 min.), or the Philadelphia-New York stretch of the Acela Express, the new Amtrak high-speed line linking Boston and Washington, opened in December 2000.

High-speed train arrival stations unquestionably open a market niche for urban and suburban public transport. The taxi stands and parking exits at arrival stations often do not have enough capacity to cope with the mass of incoming passengers. Passenger interfaces between these stations and the local rail network should therefore be a priority investment area. Timetable information to main urban and suburban destinations, convenient ticketing facilities, unmissable signposting checked by random tests ("mystery riders") are some of the tools readily available but perhaps too rarely used.

Moreover from the point of view of sustainable urban mobility the fact that several high speed rail stations have recently been built in exurban areas poorly served by public transport reflects a monomodal and non urban rail attitude. It eliminates the opportunity of intermodality rather than taking advantage of it for niche development. It increases car dependence in the areas concerned

Although few connectivity best practices are yet to be mentioned (ILLUSTRATION 10: the Atocha Station in Madrid), several ambitious interchanges are in the making: Paris-Nord, Antwerp-Central, several recent German stations (in particular the Promenaden Hauptbahnhof Leipzig and the Dortmunder Hauptbahnhof) and the Amtrak interchange stations along the Acela Express.

- HEAVY AND LIGHT RAIL: THE KARLSRUHE BI-CURRENT TRAM-TRAIN

Among the various passenger rail interfaces the most important one seems to be "interoperability" between heavy and light rail (DEGAND, 2000). It means that the vehicle moves from one track to another rather than the passenger having to move from one train to another.

To attract new passengers track sharing, i.e. high and low speed trains, heavy and light rail sharing the same electrified tracks has demonstrated its attractiveness in the case of the Karlsruhe urban and suburban tram-train network. It started in 1995, three years after Manchester. The operator succeeded in convincing DB, the mainline operator to let heavy rail and light rail vehicles use the same tracks. The same vehicles are safely running alternatively on the central city streets and on traditional railway track (in Manchester the track was completely taken over from British Rail).

For the passenger, remaining on the same train for the whole trip takes away the negative perception of having to change mode and wait twice.

- THE TRACK ISSUE

Replication of this best practice in many other cities with large track supply should create a promising niche for public transport. This would however require bridging the culture of traditional railway operating staff and the culture of urban rail operators. It would mean putting more emphasis on active security (avoiding collisions) than on passive security (resistance to collisions) and adapt safety standards accordingly. A 600 kN resistance to compression is often suggested as a compromise standard (CHAINED, 2000). This much less than the minimum heavy rail standard.

The Karlsruhe experience presents a realistic case for encouraging an organisation in charge of both track and operations to safely open it up to a third party. In Karlsruhe it happened by persuasion. In Japan it happened by regulation.

Track opening to third parties should not be confused with total separation of track from operations. A useful comparison could be made between on the one hand the reportedly successful Japan Railways privatisation with regional split-up and on the other hand the somewhat less successful British Rail privatisation with national split-up between a monopoly track owner and the various franchised operators.

The regulatory obligation for a main operator to accept third parties on its track is compatible with service development and new investments in track. By contrast the UK Railtrack experience confirms the suggestion that a monopolistic track owner has all interest to create scarcity in order to maximise his position, rather than expand. If track-only monopolies were to be generalised in Europe one may wonder who may have a market-led interest in developing new rail links. This view is not in contradiction with the view expressed about pre-trip passenger information (see above 2.3.). In pre-trip information, neutrality is the key and it is best achieved by a complete separation of functions.

Of course establishing the principle of third party access is not sufficient. The devil lies in the details. A case in point is the short-lived LOVERS RAIL experience in Holland. Lovers Rail was given third party access to operate services in the Amsterdam area. The rules of competition not being sufficiently constraining all possibilities were open to NS, the main operator, to make the experiment unsuccessful (ranging from procurement difficulties with NS suppliers to exclusion of the new service from timetables and signposting in the NS-controlled stations).

Interesting comparisons could be made with the US passenger services operated on tracks owned by freight operators. In Australia, QUEENSLAND has decided to keep vertically integrated rail services but opening up the track to outside freight operators.

3.3. HIGH CAPACITY BUSWAYS NETWORKS.

Paradoxically the most extreme example of public-transport-friendly city comes from Curitiba (Brazil), a bus-only city of 1.7 million inhabitants. In addition Curitiba happens to be the center of the national automobile industry and has one of the highest automobile ownership rates of Brazil.

The Curitiba Busway concept was developed 25 years ago by Architect Jaime Lerner, three times Mayor and presently (2001) Governor of the State of Parana. It is of extreme simplicity: in order to make buses competitive with the car all large thoroughfares have a double lane reserved for buses (busway). Access and egress is through a tubular pass, i.e. a waiting corridor where all ticketing and waiting of paid-up passengers takes place. Multiple doors open at each stop and make the process even faster. The commercial speed is 32 km/hour, similar to a metro. Patronage includes all levels of society and links all parts of the city, including the airport. Development along the busways is encouraged (see 7.1).

The unchallenged success of Curitiba led to its replication in Brazil and other countries. The most ambitious is unquestionably Bogota, Columbia, a city of 7 million inhabitants. Under the leadership of Mayor Enrique Penalosa engaged from 1995 in a plan called "Transmilenio" providing 41 km of busways, in addition to 300km cycle ways and extensive traffic calming measures. Part of the system has four lanes, allowing express buses to take over the other ones.

In China the Curitiba/Bogota model was introduced from 1999 in the City of Kunming (3 million inhabitants), as a result of a Sino-Chinese cooperation project led by the City of Zürich. A first line has been the starting point for a complete busways network. More space has also been provided for bicycles and a project for improved regional railways has been approved (2001). New Delhi approved in January 2002 a 20 km busway along the same model.

To sum up the busway offers for a minimal investment cost a form of mass transit allowing a commercial speed above 30 km/hour and a capacity of up to 15.000 passengers/hour, in the case of a central busway with ticketing outside the vehicles and priority at junctions. A widespread replication could be expected, wherever a continuous set of wide boulevards is available. As the implementation can be achieved in some 18 months, i.e. in less than a normal Mayor's term of office the political credits can be capitalised before the following election.

4. NEW SERVICES FOR NEW MARKET NICHES: ACCESS TO AIRPORTS

Public transport access to airports is a niche market, not only for passengers wishing to avoid traffic congestion around airports and parking costs but also for the airport and airlines staff. This market segment can of course only be tapped if the service is competitive with the car and with taxis. A dedicated organisation (www.iaro.com) is joining the railways joining airports.

Hereafter are a few "best practices" (Hong Kong, London, Amsterdam, Zurich, Copenhagen-Malmö, Roissy Allobus):

4.1. HONG KONG: AIRPORT EXPRESS

The Hong Kong airport rail link is a case where optimal use has been made of an exceptional opportunity.

For decades the Kai Tak Airport, close to the centre had been considered as a safety hazard. The decision to move it to Lantau opened an exceptional opportunity for the MTR, in charge of the airport railway, to enter a totally new transport market. It forms part of an overall Hong Kong's Railway Development Strategy (MAK CHAI-KWONG 1988).

The originality of the MTR approach has been to consider that its mission was not simply to operate an airport rail link but to provide a full door-to-door service, in competition with cars and taxis. This has been achieved. On arrival the first thing the passenger sees is the train platform and the ticket counter. The ticket includes a special shuttle bus ride from the Hong Kong and Kowloon terminals to the final destinations (mostly hotels) and is much cheaper than a taxi. The service has proven very profitable for the operator. Its daily patronage (2000) is 29.000.

4.2. LONDON: HEATHROW EXPRESS

London Heathrow has a direct Underground connection with Central London. However, because of the number of stops, the trip takes nearly hour. It was therefore felt that there was a market niche for a new fast, non-stop and comfortable train connection to Central London. So favourable were these perspectives that the BAA Rail Strategy Group took the initiative to create such a link, called Heathrow Express, without any government subsidy (neither for investment nor for operation).

The European tender was launched in 1994 and line opened in 1998. The trip takes 15 minutes and intervals are also 15 minutes. It costs about three times more than the Underground and three times less than the taxi and happily occupies the niche.

A project similar in its concept has been launched in 1995 to serve the Stockholm ARLANDA Airport link. A private consortium (A-Train AB) obtained concession to finance (without subsidy), build and operate for 45 years the 40-km link, which opened in 1999.

The Paris Airport Authority together with the French railways also plans a no-subsidy line linking the Roissy Airport with Gare de l'Est non-stop every 15 minutes, to be called CDG EXPRESS.

4.3. AMSTERDAM: SCHIPHOL THALYS CONNECTION

Like London Heathrow and several other large continental airports Schiphol has an aggressive rail access strategy for capturing the niche market of passengers and staff. In addition it has an innovative international high speed rail strategy, targeted mainly at the Belgian passenger market. By 2005 its six tracks should be accessible in 40 minutes from central Antwerp, making it the first choice airport for that city, by comparison to the Brussels airport.

Moreover as the non-stop high speed link between Paris-Roissy, central Brussels and Schiphol does not serve Brussels airport, Schiphol should also be a strong competitor, together with Roissy, for the passenger traffic originating from Brussels.

It may be worth mentioning that the link will no longer be operated in co-operation between national railways but by an international consortium determined by European tender. One may therefore expect aggressive niche market competition between long distance high-speed rail access and local rail.

4.4. ZURICH: INTEGRATION OF THE AIRPORT IN THE NATIONAL RAIL NETWORK

In addition to the London and Amsterdam features Zurich Airport has developed, together with the Federal railways, a unique baggage collection system in the railway stations of 20 Swiss cities, which further enhances the market for rail access to the airport. The Kloten railway station is fully integrated into the national rail transportation system. Its traffic has more than doubled in the last 20 years, in parallel with passenger traffic.

4.5. THE COPENHAGEN-KASTRUP-MALMÖ LINK

The opening in July 2000 of the Oresund Bridge and tunnel intended for both road and rail traffic has been a particular challenge to public transport operators. It is too early to assess the market share of public transport (the official estimation is 4.8 million passengers in 2005) but in the first months of operation patronage was wildly above expectations, notwithstanding the press favouring the road bridge.

Several elements play in favour of the rail link, which serves Copenhagen, Kastrup Airport and Malmö:

- the intrinsic commodity of the link (35 minutes, with a frequency of 20 minutes, day and night service)
- the simultaneous introduction of the new flexible high speed X-2000 train linking Stockholm and Copenhagen through Kastrup, which becomes the central point of traffic for the whole region
- the joint ticketing and fare integration between air and rail adopted by all airlines serving Kastrup
- the rail-friendly urban development policy pursued in both cities. The Orestad automatic metro should provide a further rail link between the city and the airport (see below in 7.2.)

4.6. ROISSY ALLOBUS

This network consists in a dial-a-bus fixed route service specially targeted at airport staff living in the Roissy area and operated under the name of Allobus. It is reportedly (GROS, 2000) a successful downmarket niche operation, with several unusual characteristics:

- Much of the Roissy airport staff has to work at times when normal public transport gives poor service and many of them cannot afford the cost of buying a car and parking it. Allobus adapts its vehicles to the fluctuating traffic demand
- The areas served by the service are largely low housing standard neighbourhoods perceived as less safe. Allobus has hired drivers from these areas and taken in charge their training
- The service is considered important by both the airport management and the airlines. They contribute to its operation
- While normal buses in the same area are subject to vandalism and aggression as they are seen to represent the institutions, the Allobus drivers are reportedly well adopted in the area.

5. THE MARKET NICHE OF ACCESS TO SHOPPING AND LEISURE CENTERS, FAIRGROUNDS AND SPORTS EVENTS

5.1. SHOPPING AND LEISURE CENTERS: A CHALLENGING MARKET

The shopping centres are a difficult niche for public transport because their very objective is to lure the car user, taking advantage of the expanded road network (see above 1.2.2.). An additional handicap for public transport is the bulk of the purchases. Bulk goes into the boot of a car better than in into a bus or tram. Sometimes the car is even used to move inside the shopping centre, when it is an assembling of "big box stores", each one with its own parking. Moreover they may fear that being linked to commuter transit their parking space will be used as park and ride. Wherever they are served by mass transit they try to open their doors and their parking at times unsuitable for home-to-work commuters.

However the larger the shopping centre becomes the more there is room for a variety of access modes, particularly if it is a mall, which invites to pedestrian movement and can be served by public transport at the edges:

- THE OBERHAUSEN-CENTRO CONNECTION

A case in point is the German City of Oberhausen. The City gave permission for a 70.000 sq.m. Regional shopping and leisure centre called CentrO, which opened in 1996. The local tram and bus operator STOAG decided to take up the challenge and to build a strong link between the existing city centre and the CentrO, admittedly at the taxpayer's expense. As a result the patronage reportedly not only improved on that link but increased by 50% on the entire network between 1995 and 1999 (HOEFS, 2000).

Another case is the Glattzentrum, a 50.000 sq.m. Shopping centre near Zurich. It started with one bus line, has presently three and will be served by the new Stadtbahn Zürich-Nord (SCHEIDEGGER, 2000)

The quality of access by public transport to shopping centre is however best achieved by decisions taken at the planning stage rather than by adapting to the situation afterwards. This will be the subject of the next case.

- THE EURODISNEYLAND RAIL CONNECTION

Walt Disney's decision in 1997 to choose the Marne-la-Vallée site for its European theme park was the result of three years of negotiation with the French authorities, mainly about the amount of infrastructure to be provided by the public sector. The RATP, operator of the commuter rail line to Marne-la-Vallée (RER), was part of the signed agreement. The total public investment amounted to ca 150 million \$ (BERTHET, 2000). Simultaneously 11.500 parking places are awaiting the visitors of the theme park, at some 10 \$ per day. It may be remembered that in Orlando, Florida the parking revenues had been a key reason for the rejection by Walt Disney of a rail connection to the theme park.

By contrast, in the case of Eurodisneyland the collaboration with public transport, which goes as far as to include common marketing plans in favour of public transport access and the sale of tickets at RATP counters, resulted in a 40% modal share for the RER. This share is however very largely due to the fact that most of the employees are using it. Week end use proved disappointing (fewer services).

As a whole Eurodineyland is an example of large planned unit development where the RER and the theme park have been the attracting element of a multifaceted urban development. It includes a 90.000 square meter shopping centre, a second theme park (to be opened in 2002), 30.000 sq. m. of offices and 2000 housing units.

- BY CONTRAST: THE BLUEWATER PARK BUS CONNECTION

The Bluewater Park in Kent, near Dartford is the last major "out of town" shopping centre to be built in the UK (see below in 7). It has 160.000 sq.m. Its 112.000 car parking places are mainly for customers, while staff are encouraged to use public transport.

Although there is no direct rail link, public transport is well-publicised (public transport voucher scheme) and the public transport market share has peaked at around 20%. The successful target market niches have been, besides the staff, those who seek entertainment and leisure activities rather than the shoppers (FRANCIS, 2000).

5.2. FAIRGROUNDS, SPORTS EVENTS AND SERVICES FOR TOURISTS.

- THE SYDNEY OLYMPICS

"For once this city seems ruled by people instead of cars. Let's learn from the experience" was the headlines of the Sydney Morning Herald of 23 September 2000 summarising what has been considered as an outstanding best practice in attracting people to events by public transport.

The concept of the Sydney Olympics accessibility scheme was to:

- make use of the available State Rail Authority budgets for permanent improvements in the CityRail network in general and to the accessibility of the Olympics from any point including the airport
- allocate limited available parking space according to market mechanisms (pre-booking and payment)
- avoid congestion caused by drivers seeking a parking place through intensive media campaigns warning that no more places would be available than the ones made available by pre-booking.

In order to allay any apprehensions the system was put to test on the occasion of events taking place the year before the Olympics. This preparation process was documented by Ph. Bovy, its main driving force on behalf of the International Olympics Committee (BOVY, 1999). He presented a full ex-post evaluation at the 2001 UITP Congress in London.

- THE PARIS "MONDIAL" AND OTHER EXAMPLES

The Paris football World Cup of 1998 has also been considered as a best practice in public transport development. The accessibility strategy was to make sure that the provision of public

transport (commuter rail, metro and bus) would be sufficiently diversified and flexible to limit crowds at any given point in time and avoiding congestion by vehicles entering or leaving the parking lots. This success story involved the Paris Transport Authority STP and all the operators (DOBIAS, 1999).

By contrast the LISBON Expo '98 was seeking to provide as many parking places as could possibly be requested (22.000), while simultaneously providing public transport access. The high cost and poor post-Expo results of this option have been documented (NUNES DA SILVA, 1999).

More generally the market of tourist interurban trips generates an interesting market niche for local transport. However it can be tapped only by an optimal information of the incoming tourists about the services available. Successful examples include the LT ALL-ZONE VISITOR'S PASS sold at London Heathrow, the Restaurant-Tram circuit line of Zurich and the double-decker open-roof BUS TURISTICO lines of Barcelona's TMB. As a rule the tourist market is better reached through general tourist information and maps than through the usual operator diagrams made available on request at their ticket booths.

6. THE MODAL MARKET NICHE OF URBAN WATERWAYS AND COLLECTIVE TAXIS.

6.1. URBAN WATERWAYS: THE CASES OF LONDON RIVERBUS AND COPENHAGEN HARBOUR BUS

6.1.1. THE LONDON RIVERBUS

The London Riverbus was a private initiative, operated from 1988 until 1993 and offering a fast, all-weather and reliable service from the western suburbs to East Docklands, with a limited number of stops and gave a first-class peak and non-peak hour access from Embankment to City Airport. The service provided therefore a popular addition to London's transport infrastructure (annual ridership up to 750,000 notwithstanding the relatively high price of the ride and the lack of fare integration and even collaboration with London Transport). It invested in a critical mass of large new vessels and, more importantly, in access piers and comfortable ramps and interfaces with the embankments (tidal range of 7 m). Real time passenger information was provided (CASSIDY & WHITE 1993).

The service was financed jointly by passenger income and riverside companies with a small subsidy from some local authorities. It increased its financial performance annually and was considered to become eventually viable without subsidy. It would have been the ideal river connection to the Millennium dome development, competing with the London Transport Jubilee Line.

In 1992 however Canary Wharf, one of its sponsors, went into a period of financial troubles and suspended the payment of its share. Riverbus asked for a bridge loan from the Government to fill the gap. After consultation, supposedly with some instances that did not mind seeing Riverbus disappear, the loan was refused. The operator was declared bankrupt and the service withdrawn in August 1993. The entire fleet was sold off. The piers and ticketing offices were neglected. In addition the event was used by opponents of passenger waterway transport on the Thames to discredit the whole concept.

Meanwhile Canary Wharf soon recovered. Central riverside London became one of the top tourist destinations in Europe. The Millennium was approaching. The Government this time took the initiative within Thames 2000. London Transport was asked to revive the service through a new LT subsidiary called London River Services (ELLIS 1997).

The latest developments have been a matching grant allowing the reopening of the service and the establishment of additional piers. The tendering of the new service by London River Services resulted in the appointment of White Horse Fast Ferries as non-subsidised operator. It remains to be seen if putting former opponents in charge of the service has converted them to the virtues of waterway passenger transport.

The lesson of the Riverbus saga is that that the niche for market-led, self supporting (or nearly self-supporting) waterways regular service definitely exists in large cities built along rivers (London, Paris, Cairo, Bangkok...). However the motivation of both the authority and the operator, the quality of the interface with embankments and the integration of the service (not the fares) in the overall public transport network and in its ticketing system seem to be critical conditions for success. An example of this will follow.

6.1.2. THE COPENHAGEN HARBOURBUS

The harbourbus is an initiative of the Copenhagen regional transport authority responsible for all public transport modes running in the metropolitan area, including commuter rail. The new service was franchised like all the others (to the private UK operator Arriva). It opened in August 2000 and provides a regular service with six stops from 6 AM to 7 PM., with a 30 minutes interval. It accepts the normal tickets and cards (zone 1 tariff) and accepts bicycles. It is a subsidised service, which seems to have been well accepted by both regular users and tourists. In view of the success a doubling of the service is being planned.

To sum up the urban waterways as a niche of public transport would be worth an in-depth cost-benefit analysis, based on water cities world wide, including large cities in the developing world, such as Abidjan or Bangkok. The limited number of stops, the comfort of access from the riverbanks and the easy connection with other modes of transport seem prerequisites for commercial success.

6.2. TAXIS AND CAR-SHARING AS PART OF THE URBAN TRANSPORT CHAIN.

The more the city becomes a dispersed conurbation, the more it becomes difficult to serve it by public transport. An adaptive market-led response is the introduction of smaller vehicles and operates them with the maximum help of modern telecommunications. These smaller vehicles can be individual cars adapted to multiple use (as taxi or car sharing) or can be minivans used as collective taxis.

The challenge to the organisation of the taxi profession is that it is made up of individual operators working either as independent entrepreneurs or as employees of an entrepreneur fleet owner. Both tend to look at their short-term oligopolistic interest rather at the development of the taxi services as part of the chain of public transport.

Conversely authorities in charge of the sector, usually not the ones in charge of public transport, see it as private enterprise, to be taxed accordingly (sometimes a real milk cow), without concern for its potential input to the public transport chain, which are not their concern. The successful London taxi system suggests that the attribution of operating licenses should be based on objective criteria ensuring the quality of service and not the limitation of supply (as in Paris). A good indicator of insufficient supply is the price of the operating licenses on the parallel market, as well as the number of taxi trips per inhabitant.

6.2.1. SINGAPORE: A CASE OF FULL INTEGRATION + MAXIMISATION OF TAXI MARKET SHARE

The world's highest patronage level per inhabitant is reportedly Singapore. It has two price classes. All taxis are located by satellite (GPS) and centrally monitored. In case of emergency the driver gets help immediately. The taxi closest (in estimated time) to the point of collection automatically gets the trip. The customer is informed of the location of his taxi at the moment of his call and can easily estimate the waiting time. In addition the taxi stands are extremely numerous and permanently attended. The organisation of taxis is subject to the same authority as public transport (Land Transport Authority). The maintenance of vehicles is regularly checked. The complaints of passenger are taken into account for the renewal of licenses. There is no limitation in numbers. All these features combine to ensure a maximisation of the potential segment of taxi users.

Other cases of high patronage per inhabitant are Madrid, Athens and London (if one includes the minicabs).

A recent general technical development is the introduction on the market of a taximeter (manufactured in Spain) that allows the sharing of cost among passengers with different destinations. The driver, if the customer agrees, may decide to take additional customers towards the same area. The taximeter calculates the share of each passenger. The total hourly revenues of the driver are higher. The cost for each passenger is lower.

6.2.2. ZURICH: THE CASE OF THE "ZÜRI MOBIL" CAR SHARING SYSTEM

As part of its policy of market segment maximisation the local public transport operator VZB/ZURI-LINIE has signed an agreement with Mobility, the world's largest car sharing operator. Car rental is charged per hour. Identified Zuri-Linie pass holders have access to the service with a minimum of formalities.

250 cars are permanently available. Cars can be reserved by telephone or Internet. The car is opened with the customer's smart card, activated by the reservation. The customer pays only the time of use and the kilometres travelled. Detailed invoicing enables the customer to compare the cost of Züri-mobil with public transport, taxi and personal car use. Car ownership appears generally justified if more than 12.000 kilometres are travelled per year. The Züri mobil is a tool for smart travel mode choice. The overall effect seems to be favorable to public transport patronage (SCHAEFFER, 2000). However, as compared to taxis, car-sharing does not solve the problem of high urban land consumption generated by the parking of vehicles. It just increases the turnover.

6.2.3. THE DUTCH "TREIN- TAXI"

The "Trein taxis" are taxis available in some hundred Dutch railway stations to incoming train users in possession of their ticket. The taxi takes the passenger to his final destination for a fixed price (ca 2 \$) but has the right to take two additional passengers, to be dropped on the way. A maximum of 3 stops is therefore to be expected by the passenger.

6.2.4. THE US SUPERSHUTTLE

The Supershuttle, which is available in a certain number of US cities (e.g. San Francisco and Phoenix) is called by telephone several hours in advance and picks up the customer at home to take him to the Airport. Two other passengers are taken en route, which adds to the total trip time. The price is around 7 \$. This dial-a-ride service is only available for trips to airports. By contrast paratransit (imposed by the "Americans with Disabilities Act" to serve the handicapped in addition to the special equipment for wheelchair access in buses) can serve any destination

7. INCREASING THE PUBLIC TRANSPORT MARKET THROUGH PUBLIC TRANSPORT-FRIENDLY LAND-USE:

Having reported a number of attempts by operators to grab a few potential new customers one has to admit that the segments of patronage readily available are small, simply because of the unequal competition with the car for the use of public space (ILLUSTRATIONS 11 - 13). Public transport operators can recover small market segments; large segments can only be recovered by a public transport-friendly land-use policy.

The city itself should be developed along lines compatible with an effective use of public and non-motorised transport, i.e. mixed use allowing people to reduce their automobile dependence and linear patterns of urban extensions (see ILLUSTRATION 14).

In the UK, in line with its greenhouse gases emissions reduction policy, the Government has decided that 60 % of all new urban development until 2010 should take place inside existing urban areas ("brownfield sites") instead of Greenfield locations, which would lead to further urban sprawl. In addition its Planning Policy Guideline 13 forbids all development not adjacent to existing urbanised areas. In the future exurban large shopping centres like Bluewater Park (see above in 5.1.) should no longer be authorised

The UK Government also reviewed its road building programme, following the 1995 Report of its Standing Advisory Committee on Trunk Roads Assessment (SACTRA, 1994). This report concluded that the additional traffic generated by new roads often exceeded the additional capacity they provide. Finally it introduced a legislation enabling local authorities to levy a yearly charge of ca 250 \$ on workplace parking provided by employers. This workplace parking charge is to be used for transport improvements. Among others it will help finance the third phase of the Manchester train-tram Metrolink scheme (see above at 3.2.1.)

In the same broad policy range as the UK Planning Policy Guideline 13 and the brownfield building provision we find the Portland (Oregon) on-going policy of urban containment. All urban development has to remain within the borders of the urbanised perimeter set by the 1973 State legislation. This has proven successful in attracting higher density activities and housing

within the City. It also enabled the City to introduce a new tramway system and reduce its automobile dependence (NEWMAN, 1999).

A few cases illustrate the concept: Curitiba (Brazil), Zurich, Copenhagen, Ghent and some smaller cities such as Freiburg-im-Breisgau, Dalian (China) or Louvain-la-Neuve (Belgium).

7.1. THE BUSWAY TRANSFER OF DEVELOPMENT RIGHTS IN CURITIBA (BRAZIL)

Another land-use feature is worth mentioning: in order to increase development along the corridors served by the bus routes, the City has sold development rights to real estate investors ready to build there. These development rights were transferred from peripheral land, for example dilapidated industrial land, gravel pits, wetlands, etc. The City acquired large chunks of land in order to transform these areas into city public parks and recreation grounds, while also increasing the density of land occupation along the development corridors. Because of the complexity of its administration the transfer of development rights remains a subject of debate, although it seems to have worked well in the case of Curitiba.

7.2. THE ZURICH BLUE ZONE

In 1985, after a survey of the number of public parking spaces occupied by non Zurich commuting drivers (non voters) the City authorities decided to introduce a blue zone. This blue zone is covering the entire Zurich electoral district. Residents are allowed unlimited parking in their area. All others are allowed free parking for 90 minutes. This measure instantly created a new market for public transport.

In addition, it increased the value of the city-owned parking concessions and encouraged suburbanites to return to the central city, pay their taxes and invest in housing rehabilitation. Drug exchange areas, such as the notorious "Needle Park" next to the central Station were re-gentrified. Shopkeepers were soon to realise that 90 minutes parking time was sufficient for shopping if on-street parking was easy to find. Increased demand for commuter public transport triggered additional commuter rail services within the Zurich transport community (the "Verbund"). Last but not least it proved a lasting electoral success.

By contrast, in central BRUSSELS most of on-street parking is occupied from early morning by commuters, leaving no other option to the shoppers as to use expensive short-term spaces in concession parking lots, or to shop in the periphery. The electorate (change of majority at the October 2000 election) did not seem to approve this laissez-faire policy.

Additional Zurich features include an efficient right-of-way in favour of trams and buses (coupled with a shortening of the traffic light cycle). This means giving a little more urban space to public transport and a little less to individual transport, but much more mobility to the citizen.

7.3. THE COPENHAGEN CENTRAL TRAFFIC SCHEME AND PRIVILEGED EXTENSION CORRIDORS (FINGER PLAN)

Copenhagen implemented its pedestrian street scheme according to a ten-year programme. In parallel with traffic reduction the transport co-ordinating authority has steadily provided additional bus services (exclusively by competitive tendering), an alternative network of reserved

bike lanes, a bike rental system and more recently the Harbourbus (see above 6.3.2.). On the other hand parking is restricted and restrictions enforced. From July 2000 a 120 minutes maximum parking time was introduced in a large part of the city, along the Zurich model.

More importantly the infrastructure defining urban growth has been designed along higher density corridors (finger plan). These corridors are served by frequent public transport and concentrate the commercial and cultural services. The attraction of the Airport and the cross straight tunnel and bridge have triggered the Orestad project (ILLUSTRATION 15). The project combines property development and the construction of an automatic metro. The sale of public land around the stations has helped finance the new infrastructure (see above 4.5.).

7.4. THE GHENT CENTRAL STREETS RESERVED FOR PEDESTRIANS AND TRAMS

The City of Ghent (ca half a million inhabitants) has developed over the years a gradual reduction of car traffic in the historic and commercial centre while keeping the trams, which has made them more successful. Shopping in the centre by elderly people has been increased by a 65+ free pass. Traffic-restraint policies have been adopted by the voters who supported the out-going majority for another six years last October.

Similar policies have been pursued in the historic cities of Bruges and Leuven (Louvain), both of ca 100.000 inhabitants, boosting bus patronage. In Leuven, a historic university town, bicycle is the largest mode of transport used by the students. In Hasselt (also ca 100.000 inhabitants) buses serving the centre were made free for everyone. In each case electoral success confirmed the experience.

7.5. THE FREIBURG-IM-BREISGAU VAUBAN QUARTER.

The city of Freiburg in Germany has a long-standing record of public transport- and bicycle-friendly land use, an excellent tramway system and a large "bike and ride" multi-storey garage next to the main train and tramway station. In 1985, Freiburg started developing a car-free new quarter on the site of former French occupation army barracks. High-density-low rise energy-thrifty apartment buildings for the middle class have proven a successful investment. Traditionally apartments and parking spaces are sold together in German cities.

7.6. THE OLD TOWN OF DALI (CHINA)

The Dali historic city is made of parallel streets where most activity takes place, while side streets are residential. The City has decided to pedestrianize most of the historic city, attracting both residents and visitors (the modern Chinese automobile-oriented development is found outside the old town). This non-motorised transport-friendly planning is very exceptional in China. Another case is Pingyao.

7.7. THE LOUVAIN-LA-NEUVE NEW UNIVERSITY TOWN (BELGIUM)

The Louvain-la-Neuve new university town was developed from 1968 onwards, on a thousand-hectare tract of land acquired by the French-speaking Catholic University of Louvain (UCL). The

UCL chose to settle there after it had to move out from the Flemish City of Louvain, in which it had been established in 1425. Only the Flemish-speaking University was to remain in Louvain (Leuven).

The University, owner of the land and new town developer, wanted to recreate the urban density of the historic city it had to leave. This objective was achieved through a high-density low-rise master plan.

This urban form was in itself pedestrian-friendly. Parking was put under the streets and buildings and at the edge. In 1976 the opening of a new underground railway station underlined the privileged public transport policy of the new town (LACONTE, 2000/1 and ILLUSTRATIONS 16 - 18.)

8. CONCLUSION

Public transport was born with the ascent of the modern city, in the 19th Century. Market-led entrepreneurs developed rail tracks and services, both between cities and within cities and their suburbs. Since the early part of the 20th Century a new mode of transport gradually became king of the highway and king of the street. Public transport was taken over by public authorities as a service to those who had no car (the captive ridership). Meanwhile the use of the car has shown its limits. Households without children and singles are potentially attracted to apartments located in higher density urban environments. This opens new possibilities for public transport, albeit in selected market segments.

This paper endeavoured to explore which market segments could be gained with least difficulty, hence the title "Smart segments for public transport". The findings may be summarised as follows:

- The easiest of all market segments is the one gained by achieving awareness of potential customers that the service is there. This applies to no functional passenger category in particular. The suggestion is to concentrate marketing on individuals located in areas well served by public transport. Inducing occasional riders to use the system more often is easier than to convince the total non-users. As part of the UITP action "Switching to Public Transport" 40 authorities and operators have made a successful experiment of individual marketing.
- A more difficult market is the potential user who wants to know the timetables for a multioperator trip. The Dutch pre-trip telephone information system suggests that this segment can be successfully gained if some conditions are fulfilled.
- For those who have already chosen to take public transport at-stop information about the location of coming vehicles is reassuring and likely to ensure customer fidelity.
- A market that can easily be gained is the potential customer deterred by the complexity of tariffs, particularly if he has to use more than one system. This is particularly true for the tourist. A customer-friendly multioperator contactless debit card usable even for a single trip seems to be the approach of the future. The Hong Kong and Singapore smart cards are best practices both from the point of view of the customer and of the operator.

- Reluctance of the passenger to break-up his trip into different modes suggests to use all possible means to allow vehicles to move from one track to another, rather than to force the customer to move from one vehicle to another. The Karlsruhe train-tram is therefore a clear best practice but its replication will be fraught with obstacles.

- New urban rail systems are most successful if they develop a network effect, as people who have to move from one vehicle to another prefer to remain within the rail mode. The Manchester Tramlink expanded network for example achieves this. In addition it has fully tapped the non-peak market segment.

- Among niche markets the access to airports is a promising one. Different cases show ways to maximise it.

- Access to leisure centres is an easier niche than access to shopping centres. Eurodisneyland is a case in point.

- Access to mass events can best be achieved by public transport if some conditions are fulfilled as in the case of the Sydney Olympics and the Paris Mondial.

- Urban waterways have a potential in congested water cities. The London Riverbus is a case in point even though it was discontinued. The Copenhagen Harbourbus is a promising experience.

- Taxis and car sharing could be an important part of the public transport chain, as illustrated by the Singapore taxis case and the Zurich car sharing case.

However, the best chance for public transport to gain or regain market shares is in the land-use field. The public transport authorities and operators usually have little say on land-use planning but should be aware that successes have been achieved by co-operation between authorities and operators and by appropriate urban rail lobbying. In the case of Zurich a little more space was given to public transport and a little less to individual transport, but much more mobility choice to all citizens.

Transport operators can gain small market segments; city authorities can gain large ones.

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