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Public Transport Integration and Transit Alliances

Module 3f

Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities

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OVERVIEW OF THE SOURCEBOOK

Sustainable Transport: A Sourcebook for Policy-Makers in Developing Cities

What is the Sourcebook?

This *Sourcebook* on Sustainable Urban Transport addresses the key areas of a sustainable transport policy framework for a developing city. The *Sourcebook* consists of 32 modules mentioned on the following page. It is also complemented by a series of training documents and other material available from http://www.sutp.org.

Who is it for?

The *Sourcebook* is intended for policy-makers in developing cities and their advisors. This target audience is reflected in the content, which provides policy tools appropriate for application in a range of developing cities. The academic sector (*e.g.* universities) has also benefited from this material.

What are some of the key features?

The key features of the *Sourcebook* include:

- A practical orientation, focusing on best practices in planning and regulation and, where possible, successful experiences in developing cities.
- Contributors are leading experts in their fields.
- An attractive and easy-to-read, colour layout.
- Non-technical language (to the extent possible), with technical terms explained.
- Updates via the Internet.

How do I get a copy?

Electronic versions (pdf) of the modules are available at http://www.sutp.org. Due to the updating of all modules print versions of the English language edition are no longer available. A print version of the first 20 modules in Chinese language is sold throughout China by Communication Press and a compilation of selected modules is being sold by McMillan, India, in South Asia. Any questions regarding the use of the modules can be directed to sutp@sutp.org or transport@giz.de.

Comments or feedback?

We would welcome any of your comments or suggestions, on any aspect of the *Sourcebook*, by e-mail to sutp@sutp.org and transport@giz.de, or by surface mail to:

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Further modules and resources

Additional resources are being developed, and Urban Transport Photo CD-ROMs and DVD are available (some photos have been uploaded in http://www.sutp.org – photo section). You will also find relevant links, bibliographical references and more than 400 documents and presentations under http://www.sutp.org.

Modules and contributors

(i) *Sourcebook Overview and Cross-cutting Issues of Urban Transport* (GTZ)

Institutional and policy orientation

1a. *The Role of Transport in Urban Development Policy* (Enrique Peñalosa)
1b. *Urban Transport Institutions* (Richard Meakin)
1c. *Private Sector Participation in Urban Transport Infrastructure Provision* (Christopher Zegras, MIT)
1d. *Economic Instruments* (Manfred Breithaupt, GTZ)
1e. *Raising Public Awareness about Sustainable Urban Transport* (Karl Fjellstrom, Carlos F. Pardo, GTZ)
1f. *Financing Sustainable Urban Transport* (Ko Sakamoto, TRL)
1g. *Urban Freight in Developing Cities* (Bernhard O. Herzog)

Land use planning and demand management

2a. *Land Use Planning and Urban Transport* (Rudolf Petersen, Wuppertal Institute)
2b. *Mobility Management* (Todd Litman, VTPI)
2c. *Parking Management: A Contribution Towards Liveable Cities* (Tom Rye)

Transit, walking and cycling

3a. *Mass Transit Options* (Lloyd Wright, ITDP; Karl Fjellstrom, GTZ)
3b. *Bus Rapid Transit* (Lloyd Wright, ITDP)
3c. *Bus Regulation & Planning* (Richard Meakin)
3d. *Preserving and Expanding the Role of Non-motorised Transport* (Walter Hook, ITDP)
3e. *Car-Free Development* (Lloyd Wright, ITDP)
3f. *Public Transport Integration and Transit Alliances* (traffiQ *et al.*)

Vehicles and fuels

4a. *Cleaner Fuels and Vehicle Technologies* (Michael Walsh; Reinhard Kolke, Umweltbundesamt – UBA)
4b. *Inspection & Maintenance and Roadworthiness* (Reinhard Kolke, UBA)
4c. *Two- and Three-Wheelers* (Jitendra Shah, World Bank; N.V. Iyer, Bajaj Auto)
4d. *Natural Gas Vehicles* (MVV InnoTec)
4e. *Intelligent Transport Systems* (Phil Sayeg, TRA; Phil Charles, University of Queensland)
4f. *EcoDriving* (VTL; Manfred Breithaupt, Oliver Eberz, GTZ)

Environmental and health impacts

5a. *Air Quality Management* (Dietrich Schwela, World Health Organization)
5b. *Urban Road Safety* (Alan Ross, Krsto Lipovac, IRSC; John Fletcher, TRL; Jacqueline Lacroix, DVR; David Silcock, GRSP)
5c. *Noise and its Abatement* (Civic Exchange Hong Kong; GTZ; UBA)
5d. *The CDM in the Transport Sector* (Jürg M. Grütter)
5e. *Urban Transport and Climate Change* (Holger Dalkmann, Charlotte Brannigan, C4S; Benoit Lefevre, Angela Enriquez, WRI)
5f. *Adapting Urban Transport to Climate Change* (Urda Eichhorst, Wuppertal Institute)
5g. *Urban Transport and Health* (Carlos Dora, Jamie Hosking, Pierpaolo Mudu, Elaine Ruth Fletcher)
5h. *Urban Transport and Energy Efficiency* (Susanne Böhler, Hanna Hüging)

Resources

6. *Resources for Policy-makers* (GTZ)

Social and cross-cutting issues on urban transport

7a. *Gender and Urban Transport: Smart and Affordable* (Mika Kunieda; Aimée Gauthier)

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About the authors

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Module 3f

Public Transport Integration and Transit Alliances

TABLE OF CONTENTS

Introduction

In many cities, public transport is not attractive and quantity and quality are not keeping pace with population growth and social expectations. The shortage of reliable and affordable public mobility options is an obstacle to the sound economic development of cities and regions, as new jobs are often created far away from residential areas. This leaves many inhabitants without sufficient access to income opportunities, markets, education and thus are significantly excluded from appropriate participation in the society.

Where there is a lack of appropriate public transport services, mobility is largely provided by motorised two-wheelers, private cars and minibuses – or people have to walk inappropriate distances. An increasingly motorised population leads to heavily congested roads when no stringent countermeasures are taken. Building more and wider roads does not provide relief nor speed up travel time, because every infrastructure expansion induces additional traffic. Short-term gains in travel time are quickly eaten up in the midterm, as new capacities attract new traffic. Further, motorised individual transport comes with high direct and indirect (or external) costs, as high traffic volumes impact air quality, accident rates and noise levels, and lead to considerable time losses.

☞ For more information on induced traffic, please refer to the SUTP Technical Document #1: *Demystifying Induced Travel Demand*. Available at http://www.sutp.org

Figure 1: *An experiment to demonstrate space consumption of different transport modes in Frankfurt, Germany: 100 pedestrians could easily be carried by a single tram (at 50 % occupation), or by 70 private cars (assuming an average occupancy rate of 1.3 passengers per car).*

Box 1: The New Urban Agenda

In October 2016, governments agreed on the New Urban Agenda as the outcome document of the Habitat III cities conference in Quito, Ecuador. It provides a bold vision on urban development and covers among many issues the role of sustainable mobility.

In particular paragraph 114 covers important recommendations and commitments:

- 114. We will promote access for all to safe, age- and gender-responsive, affordable, accessible and sustainable urban mobility and land and sea transport systems, enabling meaningful participation in social and economic activities in cities and human settlements, by integrating transport and mobility plans into overall urban and territorial plans and promoting a wide range of transport and mobility options, in particular through supporting:
  - (a) A significant increase in accessible, safe, efficient, affordable and sustainable infrastructure for public transport, as well as non-motorised options such as walking and cycling, prioritising them over private motorised transportation;
  - (b) Equitable "transit-oriented development" that minimises the displacement, in particular, of the poor, and features affordable, mixed-income housing and a mix of jobs and services;
  - (c) Better and coordinated transport and land-use planning, which would lead to a reduction of travel and transport needs, enhancing connectivity between urban, peri-urban and rural areas, including waterways; and transport and mobility planning, particularly for small island developing States and coastal cities;
  - (d) Urban freight planning and logistics concepts that enable efficient access to products and services, minimising their impact on the environment and on the liveability of the city, and maximising their contribution to sustained, inclusive and sustainable economic growth.

Download: http://habitat3.org/wp-content/uploads/NUA-English.pdf

To change this trend, the service quality and the integration of all modes of public transport must be improved – to the point where the service is perceived as an attractive alternative to private motorised transport. This requires overcoming a number of barriers to the use of public transport, including:

- Overcrowded vehicles, inadequate services;
- Outdated or not customer oriented bus route network;
- Long headways and lack of punctuality;
- Long travel times, as a result of uncoordinated routes and lacking prioritisation of public transport in heavily occupied corridors and at intersections;
- Difficult access to stops (first and last mile connectivity), long distances between transfer stops, safety problems in the area around stops;
- Uncoordinated timetables, lack of connections at transfer stops;
- Contradictory or insufficient information for passengers;
- Every change of mode often means buying a new ticket (or at least a surcharge), resulting in expensive fares and pricing which is perceived as unfair;
- Dirty vehicles, poor safety standards;
- Emissions caused by large numbers of technically obsolete buses polluting the air, particularly in the inner cities;
- Inappropriate regulation and supervision of transport operators;
- Predatory competition between transport operators at the expense of passengers;
- Stigmatised image of public transport (only for the poor);
- Cultural or religious obstacles.

The only way to reverse the trend of shrinking public transport ridership is to dramatically increase the attractiveness of public transport – and along with it of walking and cycling to improve access to stations and stops.

A key move towards creating such an attractive quality public transport system is striving for a much better integration of public transport means itself (with the dimensions physical infrastructure, fares and timetables) as well as its integration with active transport (walking and cycling).

Transit Alliances are a powerful tool to reach these goals. Transit Alliances in many cities and regions worldwide have proven that they are able to realise these objectives.

Transit alliances can be understood as an umbrella for public transport in the form of a legal entity, administrative unit or association – which aims to integrate all public transport modes and services in a city, metropolitan area or wider region into one attractive and easy-to-use system with major benefits for users.

Approaches to establishing such an organisation can differ widely. There are factors which depend on the country's political and cultural background, on existing technical and administrative structures, on prevailing legislation and the available financial resources and distributive structures, etc. In Germany, where the idea of transit alliances emerged in the 1960s, many variants exist today. While it is inappropriate to 'export' a specific model to other countries, certain milestones or features that play a role in effective integrated transport services will be outlined in this publication.

- What characterises integrated public transport?
- How do transit alliances coordinate and plan public transport services?
- What are the benefits for customers, transport operators and authorities?
- What are major challenges for setting up a transit alliance?

This document aims to provide decision-makers and planners with sound knowledge on the approach of integrated public transport.

Section 1 provides an overview of characteristics of integrated public transport systems from the perspective of public transport users.

Section 2 introduces different organisational options for advancing the integration of public transport and presents major responsibilities of a transit alliance. Further, well-proven instruments and best practice examples are presented.

Figure 2: *Interchange station between tram, bus, commuter rail (S-Bahn) and regional trains in Berlin.*
© Sven Ledwoch 2012

Section 3 focusses on the process of initiating a transit alliance and explores challenges like spatial expansion, stakeholder inclusion and financing issues. The checklist for establishing a transit alliance in the Appendix complements the information presented in this Sourcebook module.

☞ To learn more about the evolution and particularities of transit alliances in Germany,please also see SUTP Technical Document #4: *Transport Alliances* – Promoting Cooperation and Integration to offer a more attractive and efficient Public Transport (GIZ, VDV 2010).
Available at http://www.sutp.org

Box 2: Rethinking mobility concepts — the failure of the car-oriented city

In the 1950s and 1960s the concept of the car-friendly city became popular (*e.g.* in Los Angeles, Houston, and Seattle in the US, and in Cologne, Kassel, and Osnabrück in Germany). However, it became evident that the space required for automobile transport cannot be made available, particularly in heavily urbanised areas, and cities were bogged down in endless traffic jams. As a result, concepts were rethought starting during the late 1970s, and many cities started to improve public transport systems, trying to force cars back out of the inner cities. This can be supported by providing better facilities for walking and cycling, a congestion charge system for cars (*e.g.* Stockholm, London, Oslo, Singapore), by increasing charges or regulation for stationary traffic (*e.g.* Tokyo, Amsterdam, London, New York), regulating inner city access by decommissioning roads and controlling traffic lights (*e.g.* Cologne), and by preventing through traffic by demarcating pedestrian zones (*e.g.* Munich, Vienna, Bremen).

Dusk in Dakar, Senegal, 2017. @ A. Wagner

1 Characteristics of Integrated Public Transport Systems

In many cities, public transport is provided by private sector transport operators, which sometimes consist of only a single driver and his vehicle. The (commercial) interests of the transport operators are naturally focused on adequately profitable routes – and not on providing a decent quality of service to the user. Hence, it is obvious that access to public transport, and a reasonable quality for the general public, is hard to maintain without sensitive regulation and proper coordination. To stress this point even more, an orientation towards the needs of citizens is crucial for the success of public transit systems.

This chapter shall help to understand the costumers' needs and expectations to public transport – a fundamental requirement for achieving a high quality of service. Core elements of public transport integration, which will be investigated in the following subchapters, are:

- Costumer Orientation
- Transfer Stations
- Integrated Fares and Ticketing
- Integrated Passenger Information
- Coordinated Timetables and real-time Information

1.1 Starting with the user perspective

High ridership and cost recovery alone do not define the success of a public transport system, when quality is not measured. The coverage of an entire region with certain quality standards would be a more ambitious definition of success. Creating comparative advantages for using public transport compared to the private motorised vehicle (*e.g.* public transport users don't suffer from traffic jams, when given priority over individual transport), can help to attract even those who could otherwise use a car. Therefore, the aim of public authorities should be to eliminate barriers and change mind-sets about using public transport.

From the user perspective, the following factors are crucial in the decision to choose public transport as the preferred mode or not:

- ***Convenience*** – including reliability, punctuality and the availability of services (area covered, operating times, walking distance to the next stop, headway, suitable interchanges, etc.);
- ***Easy access*** – including the access to physical facilities and understanding public transit systems (ease of

Figure 3: *What do citizens want? Source: M. Breithaupt*

use), simple and integrated tariff systems, automatic ticketing;

- ***Comfort*** – *e.g.* at level boarding, suitable interior design, air-conditioning and heating. People don't like to travel in over-crowed vehicles or to wait at dirty stations;
- ***Affordability*** – public transport services shall be affordable to everyone, yet offers can be tailor-cut to different user groups (*e.g.* premium client programs, 1st/2nd class vehicle sections);
- ***Competitive travel times*** – including short waiting and transfer times;
- ***Safety and security*** – includes both operational and road safety, as well as safety concerning crime and terrorism.

Ideally using a public transport network should be as easy as navigating a road network by car. To offer a similar convenience in public transport compared to individual motorised transport, public transport must be designed as a well-integrated system, where each mode of transport plays a specific role. Metro, light rail or Bus Rapid Transit (BRT) systems can serve as a fast, high-capacity mode, with connecting bus, minibus or cable car services acting as local feeders. Interchanges should be as convenient and safe for the user as possible. All stations should be easily accessible by foot, by bicycle and other means of transport – for everyone, including people with disabilities, elderly, families, etc.

Figure 4: *Tram Station in Karlsruhe.*

Figure 5: *Inconvenient access to Kandy railway station, Sri Lanka.* ©Mathias Merforth 2014

Figure 6: *Well-integrated light rail system in the city centre of Strasbourg, France.* © Robin Hickman 2014

Anchoring costumer-orientation in marketing and service planning

Creating high-class public transport systems takes time. Initially, it is important to concentrate on the core business – offering reliable and frequent services at a reasonable and affordable quality standard. A continuous process of improvements will increase the attractiveness of public transport services, and ridership as a result. Such a process includes the permanent monitoring of public transport operators' performance. The transit alliance defines the required service within a network or route, and the operators shall be assigned to provide the specified transport service at an agreed budget per annum. Automatic passenger counting and regular surveys of customer satisfaction can facilitate the coordination of quality management and improvement processes.

A marketing strategy can help to correct the image of public transport, and might include, for example, the regular communication of service improvements, promotion campaigns and service guarantees. Thereby barriers in mind – such as the perception that public transport would be only for the poor – can be overcome gradually. Transit alliances and individual operators alike should put high efforts in responding to the demand of public transport users and constantly evaluating options for improving their services.

1.2 Transfer stations

There are many examples of an uncoordinated approach to the building of stations where the transfer between different routes is lengthy and rather inconvenient. This applies even more to transfers between different modes. Lengthy transfers waste travel time, and cut into passenger convenience. Mistakes in this area are virtually impossible to correct after construction has been completed, often leaving mass rapid transit (MRT) systems underutilised and inefficient.

To optimise travel time, and for the comfort of passengers, it is crucial to keep transfer times as short as possible. The stations should be planned accordingly; ideally, passengers should only have to walk a few steps from one vehicle to another at the same platform level. At the same time, the appeal of public transport systems

Figure 7: *Intermodal station in Freiburg (train, tram, bicycle and bus).* © Stefan Belka 2010

Figure 8: *High demand for bike parking at a railway station in Utrecht, Netherlands.*
© Carlosfelipe Pardo 2007

depends largely on the perception of their comfort. Stations should be easily accessible and provide adequate protection in all climatic conditions.

1.3 Integrated fares and ticketing

Due to varying jurisdictions, responsibilities and regulations, a number of different transport companies are usually active in an area, each setting and collecting their own fares. In continental Europe, structures have been created in recent decades that have helped simplify and harmonise fares. Tariff alliances have been created for this purpose whereby a single ticket can be used for all forms of transport within a defined area. This provides convenience and significant savings on fares and travel time to passengers who previously had to buy several tickets. Such a practice has shown to cause no decrease in revenue over the long term. The decrease in fare revenue was more than offset in most cases by the increase in the number of passengers.

Integrated fares and ticketing means that it is no longer necessary to buy a ticket for each means of transport used. One ticket now covers the entire journey. Besides making it more convenient for passengers, it enables the transport operators involved to optimise their processes. Conversely, this system requires the creation of administrative structures (transit regulatory authorities and alliances) that develop and monitor the rules for distributing the fare box revenue.

There are numerous options for developing a ticketing system. In continental Europe, transit organisations have successfully switched over to selling weekly, monthly or annual season tickets to customers. There are as well tickets for students and often also for seniors. This reduces processing time and effort, and customers get a discount compared to single tickets, along with an incentive to make as many trips as possible by public transport.

Figure 9: *Single ticket with time stamp for municipal trams, buses and trolley buses in Kiev.* © Mathias Merforth 2012

Figure 10: *Smart card for public transport in Beijing.* © Daniel Bongardt 2011

Another approach is to move from traditional tickets to smart cards or other forms of electronic tickets. A system like this is not necessarily tied to a tariff alliance. Smart cards can handle complicated variable pricing systems (*e.g.* bulk discount, time card function, peak/off-peak distinction) and can also be used for cashless payments outside the transport sector. However, such systems require considerable start-up investment (particularly in large networks) and the related passenger education. They also do not address the problem of having to pay several times or paying a surcharge when changing modes.

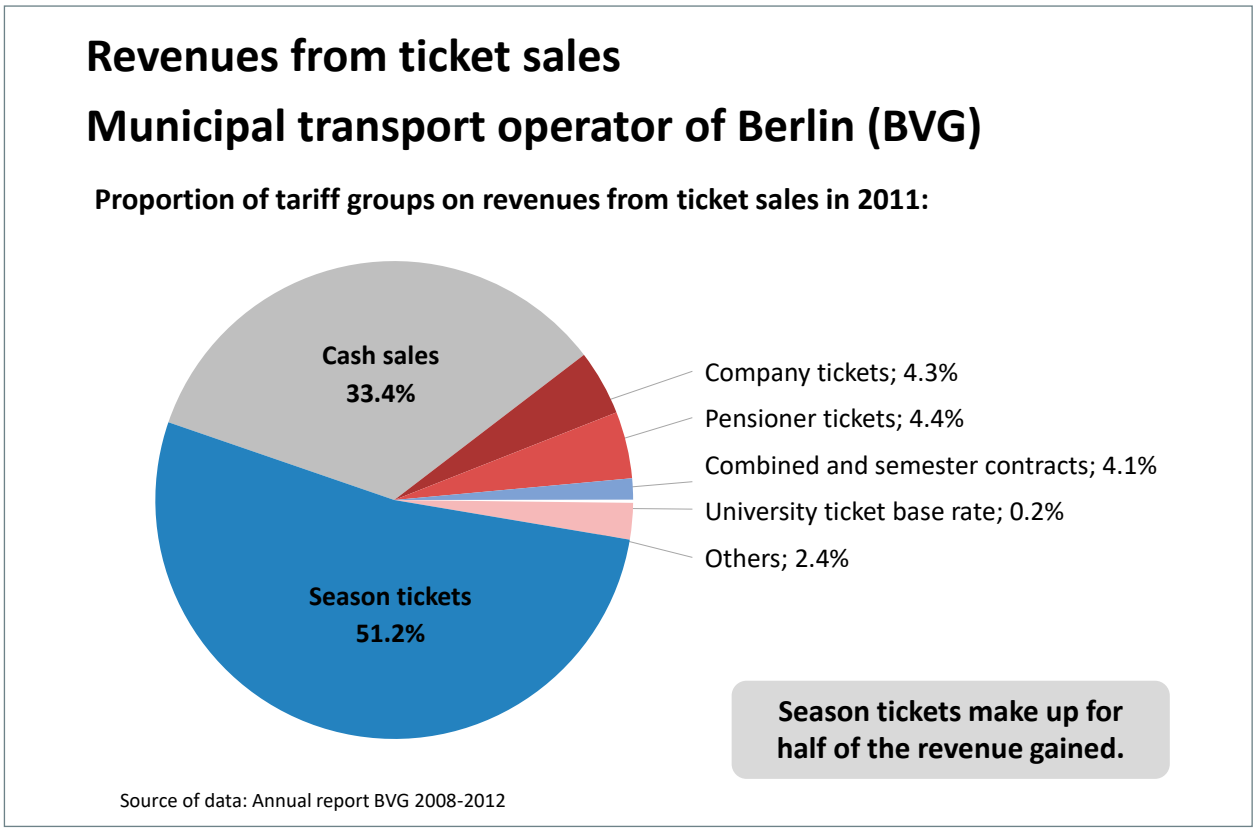


Figure 11: *Like in Berlin season tickets make up often half of the farebox revenues.* Source: Annual Reports from BVG

1.4 Integrated passenger information

The convenience of using an integrated transport system depends to a large extent on how potential passengers are informed about the services. This includes information like timetables, tariff information, route maps and maps of the surrounding area at stations and stops.

Digital information became increasingly important to transit service. Transit alliances in Europe offer timetable information via internet and smart phone app, not only covering stops, but also allowing searches between individual addresses.

☞ See for example the timetable service of RMV (Frankfurt) at http://www.rmv.de/en

Figure 12: *Will they find the required information?*
© Carlos Pardo 2007

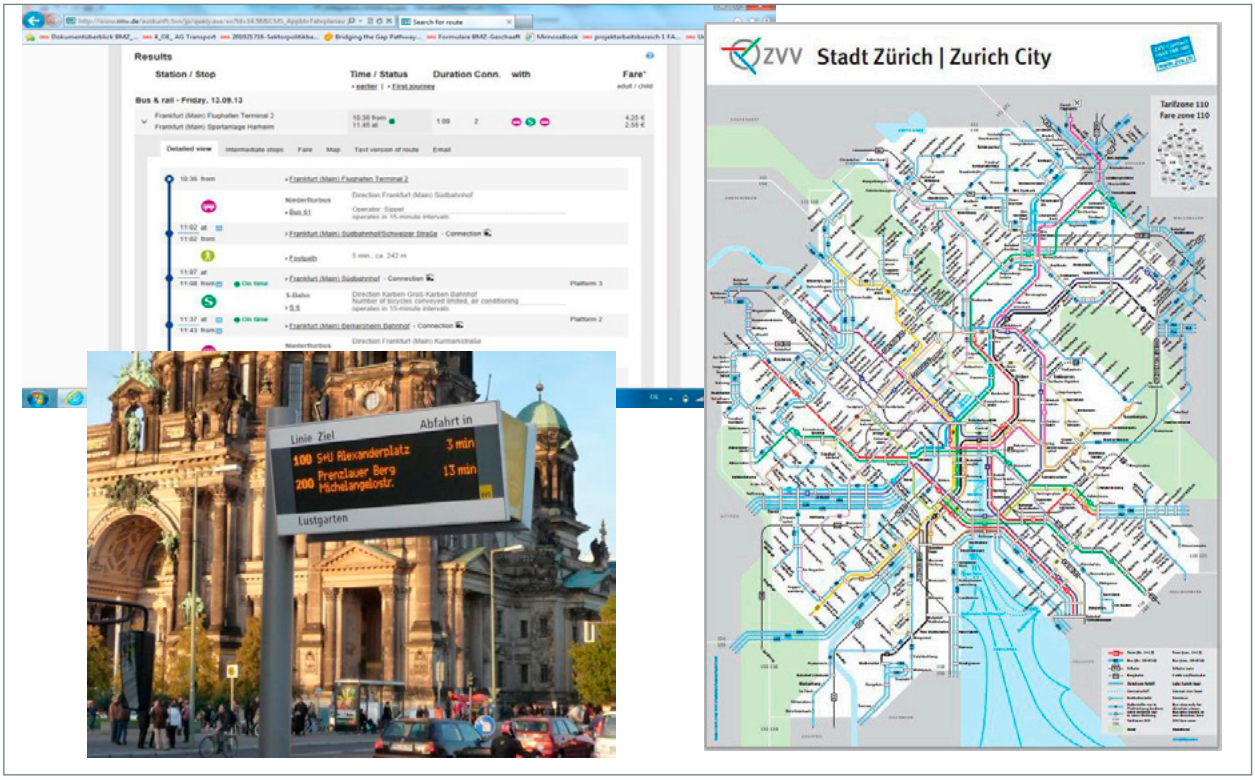


Figure 13: *Passenger information as integrated service. © Manfred Breithaupt 2009, ZVV 2015*

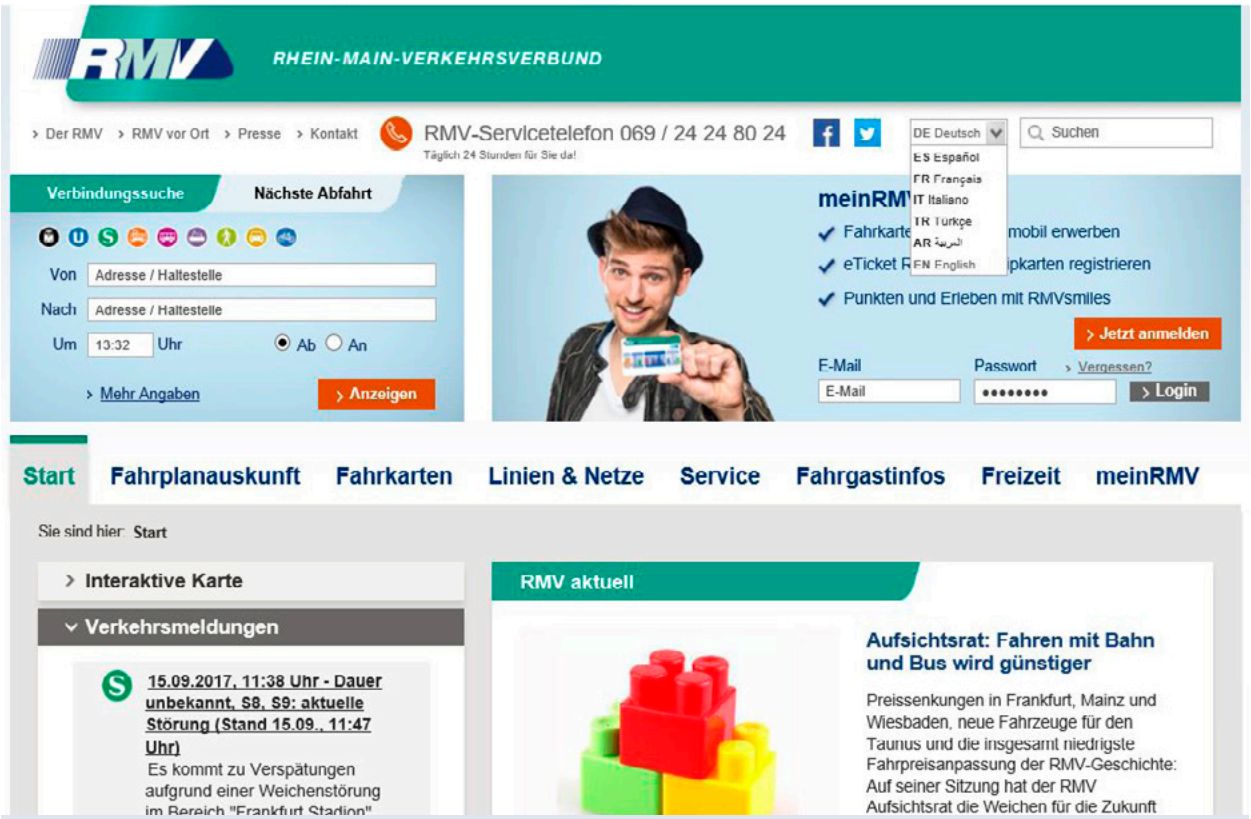


Figure 14: *Welcome page of the RMV Transit Alliance.* Source: *http://www.rmv.de/en*

1.5 Coordinated timetables and real-time information

Timetables are particularly important if services are infrequent, which is more likely in off-peak periods and less-populated areas. In such cases, timetables between modes must be coordinated. Real-time information via electronic tableaux and mobile applications inform passengers about the next departures, interchange possibilities and approaching vehicles. Intelligent Transport Systems (ITS) have become an integral part of modern public transport networks.

Traffic control centres supervise the public transport operations and provide the required data. They are often delegated to a local transport administration or located at a public transport operator. By communicating with individual public transport vehicles as necessary, connections at transfer stations can be assured, especially when delays would lead to a loss of connection. In this way, steady and smooth transport services can be guaranteed also during off-peak times and in regions with fewer services.

Fixed-interval schedules are convenient to public transport users, as departure times are easy to remember, (see also Box 3). Here too, transit alliances are responsible for coordination.

Box 3: Fixed-interval schedules

In a number of ***Central European*** countries (led by Switzerland, the Netherlands and Germany), transport systems with fixed-interval schedules have been established. Fixed interval schedules are particularly important in suburban and rural areas with limited service frequency. In suburbs and rural areas, the services run on fixed departure times (*e.g.* every ten or 30 minutes). These times do not change during the day. Passengers no longer need to worry about departure times, as they know that their bus or train will always depart at a specific time, *e.g.* every ten minutes (06, 16, 26, 36, 46, 56). Ideally, scheduled nodes are planned, *i.e.* transfer rail stations where suitable connections in all directions with short waiting times are offered. A system like this involves substantial costs, as often connections have to be offered, which on their own are not economically feasible. However, several countries and regions have shown that many *non-captive passengers* can be attracted as customers even in developed countries, thus increasing overall revenue.

Figure 15: *Traffic control centre in Seoul.* © Jeroen Buis 2009

Figure 16: *Electronic schedule board at the entrance of a Helsinki's railway station informs passengers about next departures.* © Dominik Schmid, 2011

1.6 Different levels of integration

The integration of public transport systems includes multiple aspects not only in regard to the features outlined above, but also considering the regional extent and different modes of transport. Figure 19 provides a rough evaluation of the level of public transport integration in selected agglomerations.

The figure shows that systems in newly industrialised countries first aim to facilitate the use of public transport by setting up an electronic ticketing system. This is typically limited to city or metropolitan area boundaries, while the integration of public transport systems in many European agglomerations (and regions) goes further.

Please note that the list is neither exhaustive nor representative. The illustration is one possible way to rank a particular public transport system in terms of integration.

Figure 17: *Smart card for public transport and public bike sharing in Guangzhou, China.*
© Mohamad N. Prayudyanto 2010

Figure 18: *Bike sharing station next to a Metro station in Rio de Janeiro.* © Manfred Breithaupt 2017

Box 4: Stages of public transport integration - the way towards transit alliances

Integrated public transport systems may take various organisational forms. The form ultimately depends on a number of factors including the geographical structure of the area and the degree of interconnection between the individual sub-systems. In practice, the historical and political environment also plays a significant role.

In its most basic form – partial operator cooperation – there is coordination only in certain sub-areas, for example with regard to transport connections, a combined timetable, or tickets which may be used on any form of public transport within the given network.

Creating a combined fare system, *i.e.* applying a common fare valid across a transport area served by multiple operators, entails a higher level of integration and a more closely meshed alliance. Such an agreement will include arrangements governing common fares, common conditions of carriage, and distribution of revenues generated by common fares.

Moving up the scale of integration, a combined transport system is characterised by an alliance which goes further than an agreement on the application of a common fare, and involves service level cooperation (coordinated organisation of the network and timetable specifically). However, no responsibilities are transferred to a dedicated organisation under this model, and the authority for all business decisions remains the prerogative of each partner involved.

Transit alliances are the most comprehensive form of cooperation in public transport. They are governed by the most extensive contractual agreements and entail the highest degree of cooperation and integration. Key responsibilities are devolved to an alliance entity, including establishing and amending the combined fare system, organising the network, and compiling a timetable for all public transport within the alliance area. As a rule, the alliance entity is independent in legal terms. However, even within this strong mechanism for cooperation, the individual transport operators retain their status as legally independent companies.

☞ Source: SUTP Technical Document #4: *Transport Alliances* – Promoting Cooperation and Integration to offer a more attractive and efficient Public Transport (GIZ, VDV 2010).
Available at http://www.sutp.org

Towards fully integrated Public Transport, simplified evaluation of public transit systems in selected agglomerations

	Features of integrated public transport				
	Transfer stations	Integrated fares and ticketing	Integrated passenger information	Coordinated timteables	Common marketing/ corporate design
	Coordinated approach to planning transfer stations for quick and comfortable interchanges.	One Ticket covers the entire journey on several modes of transport. Regular users benefit from reduced fares for monthly tickets, etc.	Users have wide access to unified intermodal service information at stations, via internet, phone and service points.	Harmonised timetables assure connections and reduce waiting times. Centrally organised traffic control/ management centres supervise operations and deliver real-time information.	Common Public Transport marketing. Harmonised designs of transit facilities.
Mexico City					
Sao Paolo		○			○
Hong Kong	○		○		
Singapore			○	○	
IETT Istanbul		○	○		○
STIF Paris	○	○	●	○	●
Warsaw ZTM	○	●	●	○	●
Transport for London	●	●	●	○	●
Rhine-Main Transit Alliance	●	●	●	●	○
Zürich Region Transit Alliance	●	●	●	●	●

Simplified evaluation	●	comprehensively; area/transport mode covered
	○	partially; area/transport mode to some extent covered

[1] - Long-distance train tickets allow the use of local public transport (city-ticket option for connections to/from more than 120 German towns). Some IC (Inter City) connections can be used by paying an extra fee on monthly/annual tickets. Some student tickets include special agreements in certain regions.

[2] - Tickets for the alliance area can be purchased via mobile phone app through the general ticket system of the Swiss Railways.

	Area covered			Transport modes covered							
Electronic payment	City	Suburbs	Wider Region	Bus, Shared Taxi/Micro Bus (local)	Lightrail/Tram, BRT (local)	Metro/Rail (local)	Ferry, Funicular, further (local)	Bus (regional)	Rail (regional)	Rail (long-distance)	
Smart card and other e-ticketing systems can simplify the payment of public transport services. Integration with further services possible (*e.g.* payment for parking, shopping).											
●	●				●	●					http://www.metro.cdmx.gob.mx/tramites-y-servicios/servicios/tarjeta-recargable
●	●	○		○	●	●					http://www.sptrans.com.br/bilhete_unico
●	●	●	●	○	●	●	●				http://www.hong-kong-travel.org/Hong-Kong-Transportation
●	●	●		●	●	●					http://www.transitlink.com.sg
●	●	●		○	●	●	●				http://www.iett.istanbul/en
●	●	●		●	●	●	●	●	○		https://www.iledefrance-mobilites.fr
	●	●		●	●	●			○		http://www.ztm.waw.pl/index.php?l=2
●	●	●	○	●	●	●	●		○		http://www.tfl.gov.uk
○	●	●	●	●	●	●	●	●	●	[1]	http://www.rmv.de/en
[2]	●	●	●	●	●	●	●	●	●	●	http://www.zvv.ch/zvv/en/home.html

Figure 19: *Simplified evaluation of public transport systems in selected agglomerations.*

2 Transit Alliances as Organisers of Integrated Planning

To achieve best possible results in the fields outlined in Chapter 1, it is important to have an organisation to plan and coordinate public transport in a city or wider region. There are a number of different ways that such an organisation can be set up, which are largely influenced by the historical evolution of the transport system, the legislative and administrative environment and political requirements.

Transit alliances with integrated planning and tariff agreements are widespread, and are present in regions and urban areas in several European nations (*e.g.* Germany, Austria, Switzerland, the Netherlands, Denmark, Sweden, United Kingdom and France). Due to their multiple benefits, other regions of the world are increasingly interested in setting up integrated transit authorities and alliances.

2.1 Organisational options for integrated public transport

No integrated public transport system is equal to another in structure, responsibilities, geographical area and other aspects. Integration can be advanced under different institutional settings, each with particular advantages and disadvantages. Ultimately, the structure of an alliance is the result of a political process involving many stakeholders.

2.1.1 Transport Administrations & Mergers (Option 1)

In the 20th century, transport management in many major Western cities was handled by departments at municipal levels. These administrations handled planning and coordination tasks and provided transport services. The legal form is largely defined by the regulations for public sector organisations. This structure can still be found today in many major cities, for example in New York. A particularity of such a structure is that politicians can directly influence administration and transport services. A major disadvantage is that, in large public sector organisations, cost effectiveness often takes a back seat, as the organisation may develop a life of its own that is beyond effective political control. Also, public transport services are mainly provided by public transport agencies (*e.g.* a publicly-owned enterprise or a division of a local administration) with private transport operators being less frequently involved.

A special case is the so-called merger, in which practically all transport operators within a city are merged into one single firm. Transport services are directly operated by the merger or by subsidiaries that lose their identity altogether. Such a monopolistic structure exists in Paris, where the state-owned operator RATP (Régie autonome des transports Parisiens) provides all public transport services in Paris and the closer surroundings[1].

2.1.2 Transport Operator Associations (Option 2)

Many transit alliances were initially formed as associations of individual transport operators within a region. Depending on national legislation, a transport operator association can be structured as a legal association or a joint venture. These associations cooperate voluntarily or by regulatory practice on common fares, the coordination of transport services and marketing. Forming associations with joint ticketing and marketing was in the finally in the interest of the operators in several German regions since they were observing the chances to attract more customers. Regardless of the specific organisational form, these measures made it possible to expand the market share of public transport in many cities – despite the increasing use of private cars. For example, the MVV transit alliance (Munich region) was initially formed as transport operators association and has tripled the number of passengers over the 40 years since it was established.

[1] However, the commuter rail RER is operated by RATP in partial cooperation with the French state railway company (SNCF). The official public transport regulatory authority for Paris (STIF) concluded long-term contracts with RATP and SNCF. Despite its supervisory function and patronage of the navigo pass system, STIF coordinates investment programmes. Metro and rail services in Paris will be subject to tender in 2039, tram services in 2029 and bus services in 2024. Hence, RATP has a secured monopoly for the provision of public transport services in Paris metropolitan area.

The operators involved in a transport operator association retain their own individual interests, which regularly lead to conflicts, most frequently over the division of jointly earned revenue between the individual operators. The problems created by such conflicts are one reason for the apparent trend in most cities today towards public transport regulatory authorities. Another important reason is the required transparency on public transport, as substantial public funds are allocated to these public services.

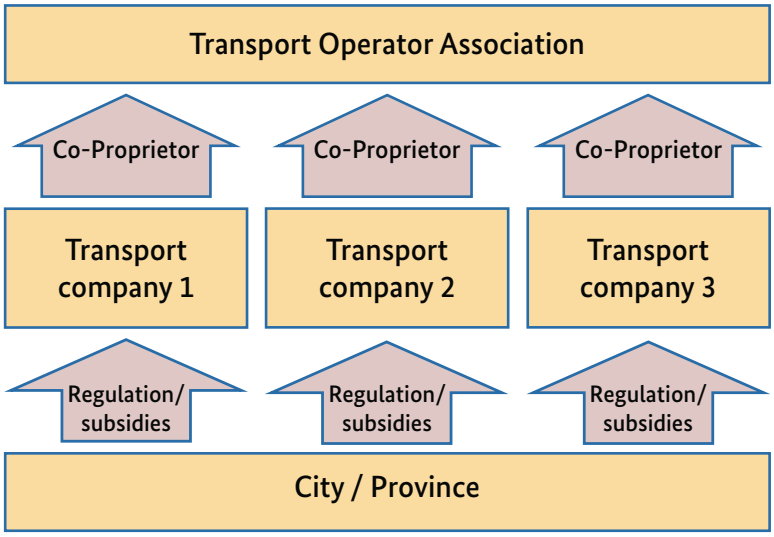


Figure 20: *Transport operator associations*

The by large largest share of public transport investments in German cities are contributed by federal and state governments. Public transport financing remains an immense challenge for developing cities, since a formalised public transport investment strategy and structured allocation process is (mostly) not available. At the same time, many emerging economies have already set-up large-scale investment funds and according regulation.

☞ For details on financing sustainable urban transport, please see SUTP Module 1f, *Financing Urban Transport*: http://www.sutp.org

2.1.3 *Public Transport Regulatory Authorities (Option 3)*

The main alternative to a transport operator association is a public transport regulatory authority, which is supervised by local or regional governments (cities, local authorities, provinces, etc.). There are a number of advantages in establishing a public transport regulatory authority that is working independently, but remains under public control.

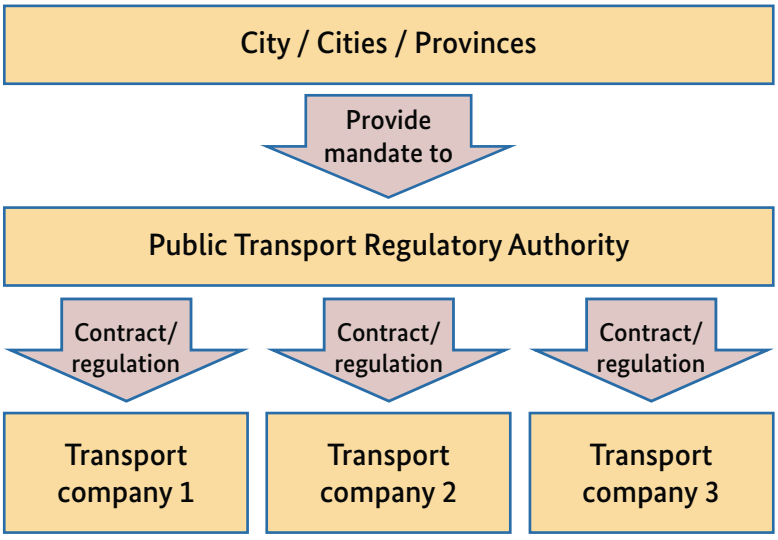


Figure 21: *Public transport regulatory authorities*

First, the functions of land-use, urban and regional planning can be more closely integrated with transport planning. Second, this model can be used to implement the principal-provider principle, under which the regulatory authority plans transport services and manages contracts with the transport operators (Example: traffiQ in Frankfurt, Germany).

Frankfurt was one of the first cities in Germany to tender all the bus services in the city through a Europe wide

public and open tender. Tendering has taken place over a few years, in five packages of approximately the same service volume per contractor. As a result of tendering bus services and the involvement of private bidders, the annual cost of providing the services has been reduced by 20–25 %. The performance standard is excellent and customer satisfaction is high.

Since the mid-1980s, the European Union has issued a number of directives regarding the required deregulation in the public sector, which also deal with tenders for public transport services [2].

2.1.4 *Transit Alliances (Option 4)*

As outlined earlier, transit alliances function as an umbrella organisation for public transport in the form of a legal entity, administrative unit or association. An alliance organisation aims to integrate public transport services within a wider geographic region for the benefit of transit users. Therefore it is often superior to public transport regulatory authorities, transport administrations and mergers. Responsibilities of the alliance entity generally include, but are not limited to, tariff integration and fare revenue allocation, service planning and marketing activities. Transit alliances often directly negotiate contracts with transport operators. In Germany, they are typically involved in modernisation processes of (regional) rail infrastructure and perform a moderating role between municipalities, federal states and the German railways. Transit alliances work towards the defined regional transport policy goals and act in the best interest of public transport users.

Box 5: 'Principal – provider' principle

The ***principal – provider*** principle has become widespread in recent years, particularly in OECD member states. Key element is a clear organisational separation between the principal and providers. The principal plans transport services, taking into account urban planning and transport policy goals, and contracts with transport operators (***providers***) to provide these services. The principle requires that the regulatory authority or transit entity has the legal and financial capacity to contract with transport operators. Generally, the providers are under contract and receive a share of the fare revenue (possibly topped up by state subsidies). In most cases they receive a payment per contracted vehicle kilometre, so that the risk remains with the principal. They are mostly awarded following an open tender process. Ideally, such contracts include quality criteria and penalties for poor performance.

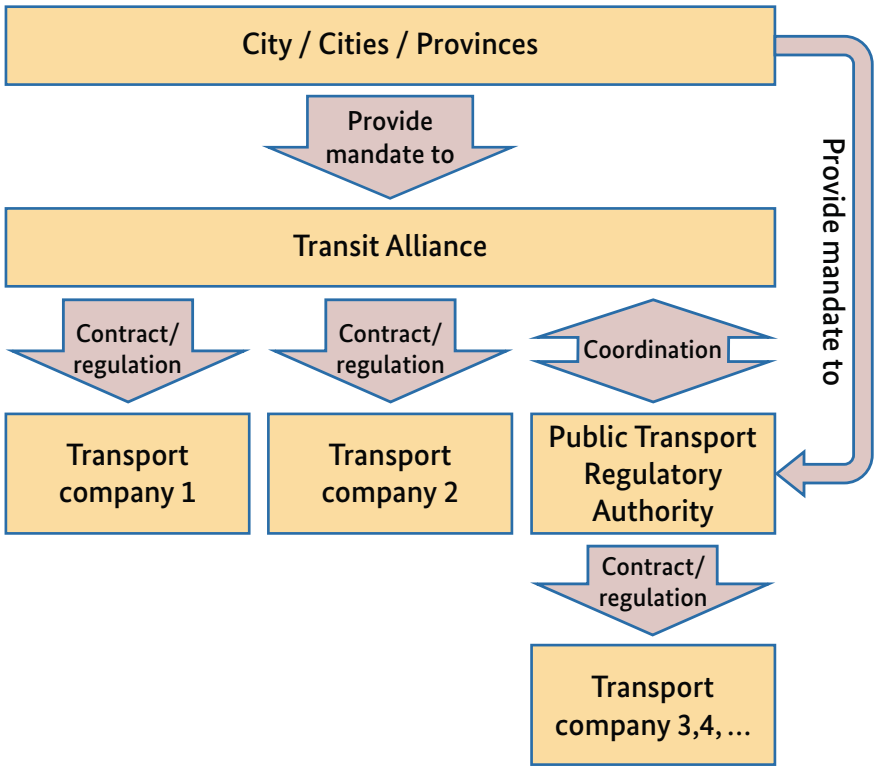


Figure 22: *Transit alliances*

[2] For details, see:
Council Directive 92/50/EEC of 18 June 1992 on public service contracts;
Council Directive 93/38/EEC of 14 June 1993 on — the procurement procedures of entities operating in the water, energy, transport and telecommunications sectors;
Regulation (EC) No 1370/2007 of the European Parliament and of the Council of 23 October 2007 on public passenger transport services by rail and by road.

To name an ***example***: In Frankfurt am Main, the Rhine-Main Transit Alliance (RMV) and the local public transport regulatory authority (traffiQ) have similar responsibilities in terms of service planning. But while RMV organises the provision of regional train (suburban rail, further regional trains) and regional bus services all over the alliance area, traffiQ organises metro, tram and local bus services within the city of Frankfurt. Passengers often don't take any notice of their split responsibilities, because RMV and traffiQ coordinate their timetables and services. The tariff system, passenger information and transfer stations are integrated, too. Further, local schedules are integrated in the national passenger information system of the German Railways (DB, see also http://www.bahn.com).

Figure 23 shows different types of transit organisations of selected agglomerations. Organisations located further to the right generally provide better convenience and service quality to the transit user. The illustration complements Figure 19, where a rough evaluation of the level of integration of the selected examples is given. At present most cities outside of Europe and some US cities have not yet been able to integrate their urban public transport services and transport means. Even Hong Kong and Singapore have not yet achieved a complete and full integration, where the purchase of a single ticket allows a ride (in all cases) from A to B without paying a new or at least a surcharge. Most advanced in this context, when it comes to developing and emerging cities is Santiago de Chile, also Sao Paulo has tried hard over the last years.

Please note that stated categories frequently overlap. As stated above, different organisational types, *e.g.* mergers or regulatory authorities may be subordinated or exist next to a transit alliance. In any case, close coordination of different entities is a pre-condition for a well-functioning integrated public transport system.

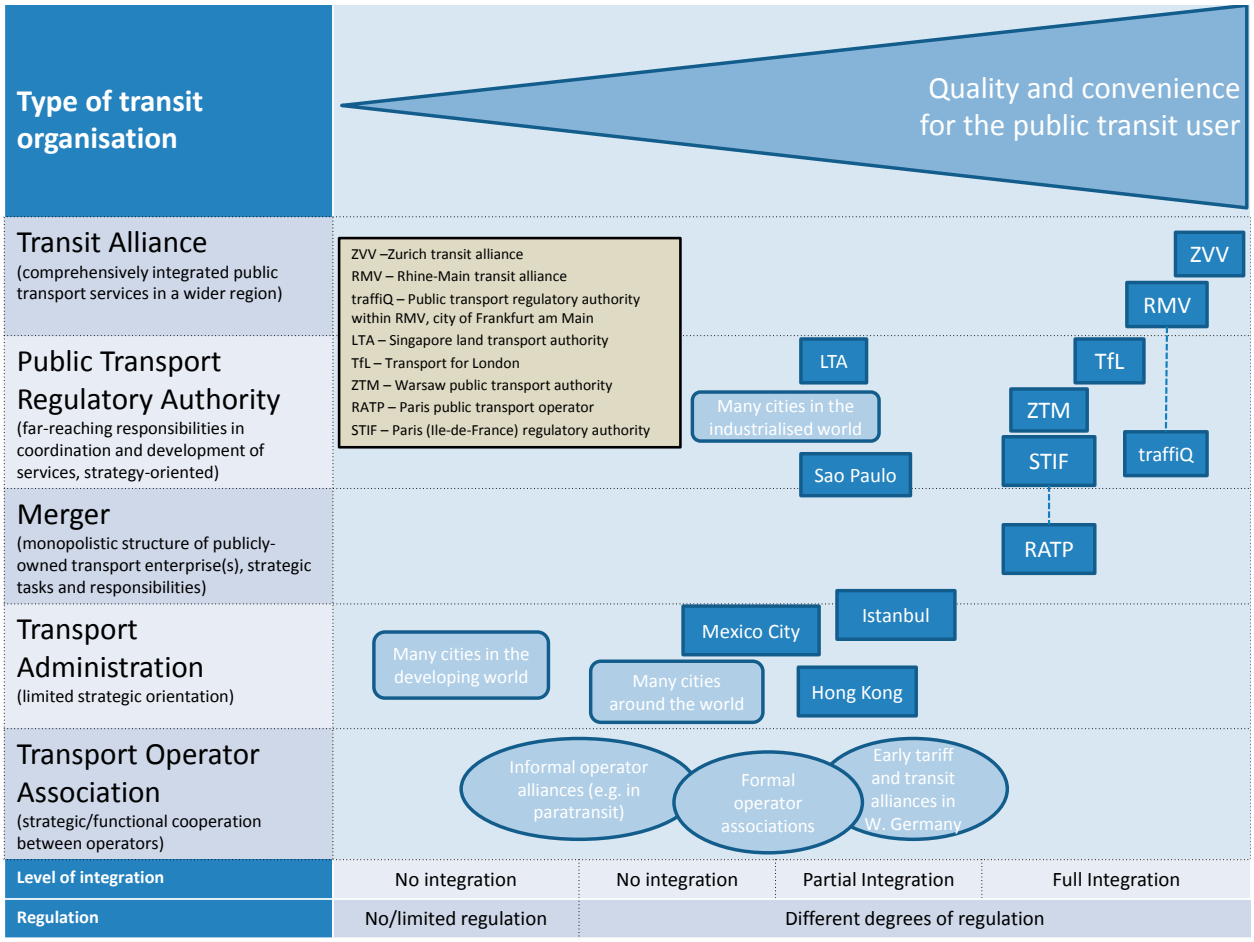


Figure 23: *Type of transit organisation and level of integration of public transport systems in selected agglomerations.*

Figure 24 shows all the regions in Germany being covered by regional transit alliances. Over 90 % of the geographical area of Germany is covered by transit alliances.

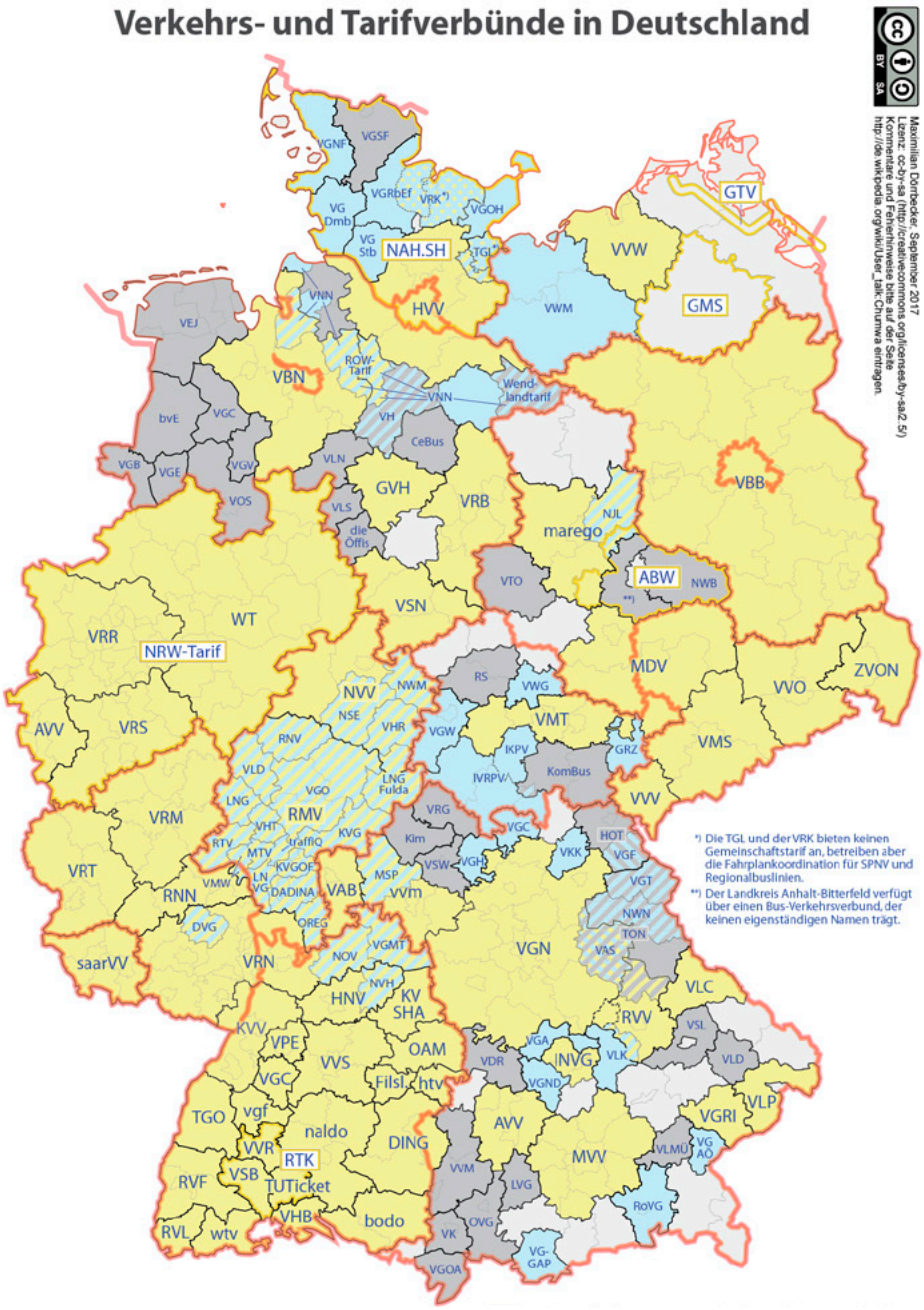


Figure 24: *Transit and fare alliances in Germany. Coloured areas are all part of transit alliances.*
Source: Wikicommons, Maximilian Dörrbecker 2017, https://upload.wikimedia.org/wikipedia/commons/f/f3/Karte_der_Verkehrsverb%C3%BCnde_und_Tarifverb%C3%BCnde_in_Deutschland.png

2.2 Tasks of a Transit Alliance

The particular responsibilities and tasks of transit alliances are the focus of this section, including the interrelations between public transport organisation, land-use and general transport planning.

2.2.1 Task 1: Transport Service and Network Planning

Planning urban and regional development is inevitably associated with planning the relevant transport corridors, routes and services. The development of areas for office, residential or commercial use requires planning the development of transport.

For information on technical options of public transport systems, corresponding performance indicators and cost estimates, please refer to SUTP Module 3a – *Mass Transit Options*. Available at http://www.sutp.org

The need for proper data

Knowledge of functional relationships and travel patterns is the basis of all transport service and network planning. The starting point for the analysis is generally a basic database of residential structures, destinations and population density.

Data on mobility must be collected next. Surveys are generally carried out on roads and on public transport, where travellers are asked about their travel patterns. This yields a database of demand as a function of the need for transport (travel to work, education, shopping, leisure, etc.), by route and by transport mode (on foot, car, bus, etc.). This data is used to evaluate existing transport networks.

However, for planning purposes it is not sufficient to consider only current data — forecasts of future trends must also be taken into account. The demand for mobility in cities is influenced by a number of factors:

- Land-use structure & policy (mixed land use will allow for more mobility needs to be realised in close surroundings, thus requiring less or shorter trips by motorised modes);
- Demographics;
- Economic growth (commuters, commercial traffic);
- Age structure (different mobility needs of students, workers, pensioners);
- Growing prosperity — with growing income people will strive for more convenient transport options. Growing prosperity is also accompanied by increased leisure-related mobility (*e.g.* shopping, cinema, vacations).

Complex models can give shape to possible developments, although set-up and maintenance involves considerable costs.

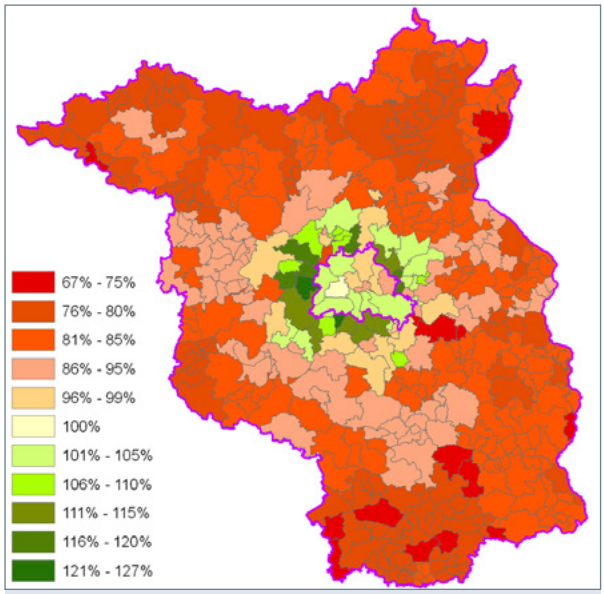


Figure 25: *Demographics in Berlin/Brandenburg until 2025.* Source: PTV, TCI (2009), p. 11

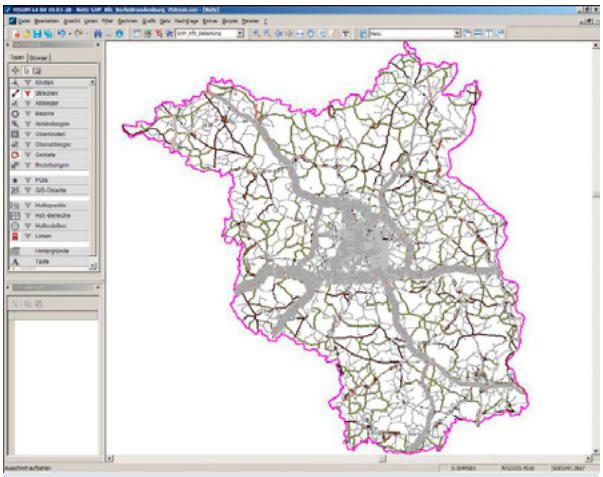


Figure 26: *Car traffic demand forecast Berlin/ Brandenburg 2025.* Source: PTV, TCI (2009), p. 74

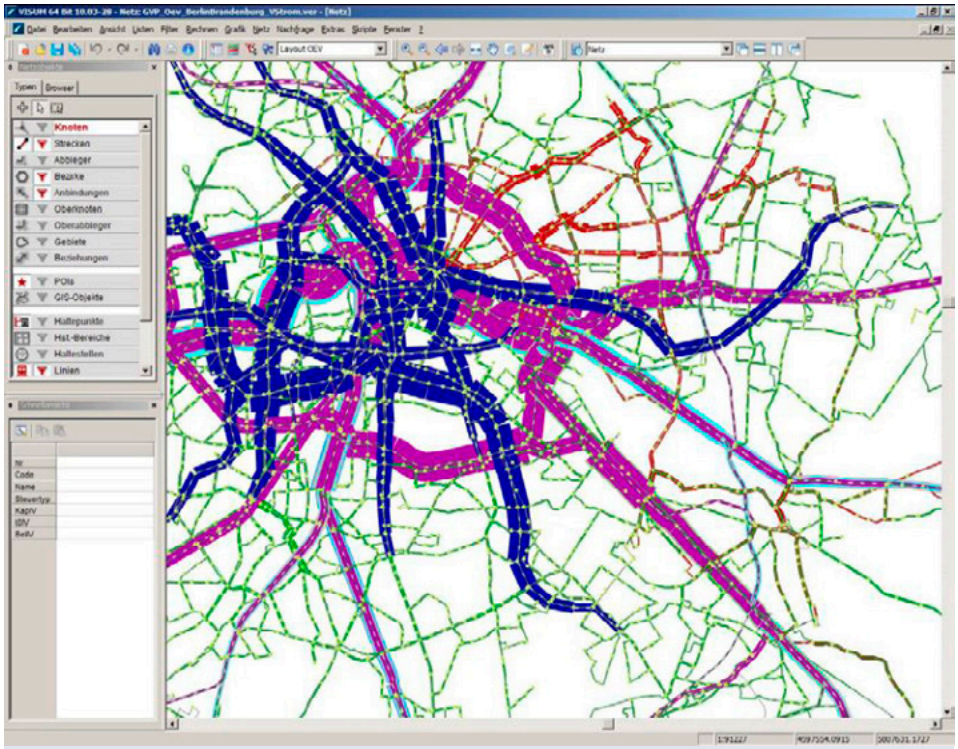


Figure 27: *Public transport demand forecast, Berlin 2025.* Source: PTV, TCI (2009), p. 78

☞ For more information on data needs and further technical issues of transport planning, please see SUTP Technical Document #13: *Urban Mobility Plans*, in particular Sections 2.1 and 5.1. Available at http://www.sutp.org

Promoting integrated urban development

The goal of modern urban and regional planning is not simply to accept changes in settlement patterns and respond by modifying the transport networks. Instead, an effort is made to promote sensible development of cities through the strategic identification of areas for different uses (housing, offices, industry, retail, transport, leisure, recreation, etc.).

In recent years, principles have been developed for meshing urban planning and transport planning. It is helpful to route expensive systems like metro, light rail and BRT through heavily used areas. Buses should provide feeder services to these main lines. It is important to make necessary intermodal transfers should be as convenient for passengers as possible.

Box 6: Curitiba (Brazil)

In Curitiba, new construction and urban concentration are almost entirely limited to BRT corridors. Urban development and public transport links are so closely connected that the location of high-rise buildings can be identified by following the BRT routes.

For more detailed information, see also "Transforming Cities with Transit" (Suzuki, H., Cervero, R., Iuchi, K. (2013))

Source: traffiQ

Public transport is most efficient in areas with high density. Therefore, public transport should to some extent define settlement patterns in the land-use planning process – and real estate planning should include planning of routes and stations for public transport. Effective public transport can have great influence on subsequent urban development.

Integrating public transport under an alliance structure undoubtedly includes the operation of unprofitable services. Just as a large number of small streams flow together into a major river, so feeder lines are needed for the main lines of a public transport system. Unprofitable services should be maintained if they fill in gaps in development in a district and provide a good public transport service to all the residents. Coordinating a network of this kind is an important task of a well implemented and strategically acting transit alliance. The present informal transport structures in developing cities can, after reorganisation and optimisation, be used to support the trunk corridors with feeder services.

Institutional cooperation for integrated planning

Planning authorities at city, regional or federal state levels in Germany develop public transport plans in close coordination with transit alliances. Public transport plans cover infrastructure and service offer development and are integrated with over-arching planning processes and documents, like Urban Mobility Plans (UMP).

☞ For more information on Urban Mobility Plans, please see SUTP Technical Document #13: *Urban Mobility Plans*. Available at http://www.sutp.org

Transit alliances represent the public transport sector in the respective committees and working groups, please refer to Box 7.

A coordinated approach of public transport and land-use policy must consider financial aspects as well. Public transport requires substantial numbers of passengers to

Box 7: Public transport plans

Many cities, metropolitan areas and regions have succeeded in enhancing public transport priority - and its perception - by adopting public transport plans. This gives binding force to the following goals:

- ***Commitment by policy-makers***: the public transport plan documents the commitment to offering and financing specific public transport services of a specified quality;
- ***Communication and transparency***: the public transport plan informs about planning objectives and the means to achieve those objectives;
- ***Reliability***: active or potentially interested transport operators can derive objectives from the public transport plan, giving them extra planning security;
- ***Coordination***: the public transport plan helps initiate coordination processes with all involved stakeholders — passengers, operators, public authorities and politicians — with regard to the planned goals and requirements;
- ***Integration***: the public transport plan integrates all aspects of public transport and the various specialist planning activities (land use, urban, economic, social and location policy, environmental protection, etc.) over a precisely defined time horizon.

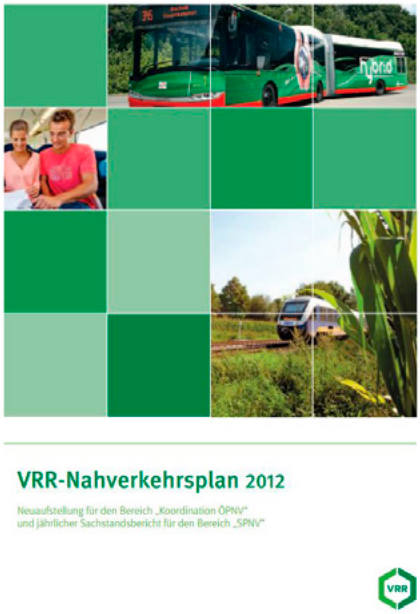


Figure 28: *Public transport plans, like the one of the Rhine-Ruhr transit alliance region, set the strategic and operational framework for the development of public transport infrastructure and services along determined quality standards.*
Source: http://www.vrr.de

be profitable, which is supported by densely populated residential areas, and a concentration of industry and services. Conversely, companies are only ready to invest in housing construction or industrial parks if these districts are well developed (including public transport) or can be quickly developed. The economic benefits of a well-coordinated approach to public transport and land-use policy measures usually emerge after several years, as both public transport and land-use planning are intrinsically long-term in nature.

Box 8: Land value capture as budgetary support

The greater a city's transport problems, the more likely it is that the value of real estate along a quality public transport corridor will increase. This increase in value should be used to help finance investment and any operating deficits. Various procedures can be considered here, depending on the initial situation and the legal system:

- The municipality and/or a (municipal) transport operator itself buys and develops the relevant real estate;
- There are contracts under private law with real estate owners in which the owners commit to helping finance public transport in exchange for providing a station or bus stop;
- Land or real estate taxes are imposed for real estate near metro lines.

☞ For more information, see also "Financing Transit-Oriented Development with Land Values" (Suzuki, H., Murakami, J., Hong, Y.-H., Tamayose, B. (2015))

There are many successful examples around the world, where urban public transport corridors or stations were financed, or at least partially financed through land value capturing methods (*e.g.* in Hong Kong, Japan, London).

Box 9: Bogotá (Colombia)

Citizenship streets have been developed in Bogotá, where businesses, public facilities and service establishments are concentrated. These streets are reserved for pedestrian use, located at TransMilenio stops, and make it possible to satisfy a large number of needs with a single trip. Bogotá has also deliberately located large new school buildings along the TransMilenio corridor. The city government has been far-sighted in linking land-use policy and TransMilenio, by having the public sector buy up undeveloped land near the planned corridor cheaply in the early days of development. It was expected that the land would increase significantly in value after TransMilenio's commissioning. When the land appreciated in value as expected, it was sold to investors who committed to building high-density low-rent housing for low-income population groups exclusively in the TransMilenio catchment area.

Source: traffiQ

It should be ensured that planning of transport routes is not unduly dominated by outside real estate interests. Several of the early large-scale mass rapid transit (MRT) projects in developing cities suffered from the fact that routes were determined less by transport needs than by real estate interests, and the beneficiary real estate companies did not end up sharing the costs of the MRT lines.

Particularly when planning major, capital-intensive transport projects, it is crucial to centralise planning. There are many negative examples of organisations that have implemented projects with heavy investments, but ultimately have had little impact on transport. There is also a danger that several projects might compete with each other to serve the same transport demand.

Achieving urban planning goals generally involves conflict. Specifically, it leads to situations where real estate owners can expect substantial profits if their land is scheduled for high-value uses. Conversely, real estate owners whose areas are not scheduled for high-value uses are likely to protest. Conflicts are not limited to individual owners, but can also arise between municipal authorities in a region. The way these conflicts are resolved largely depends on the regulations and political

culture in a region or country, and it is not possible to present universally valid principles for conflict resolution. It is clear, however, that early identification of the areas planned or approved for particular uses helps all actors to make appropriate decisions.

Box 10:

One of the earliest integrated urban and transport planning models is the ***axis model for Hamburg***, first presented in 1919. This involves concentrating the spread of housing on axes which lead along metro lines (and later arterial roads) from the inner city out into the surrounding area. The spaces between the axes were to be left free from development and to be used for local recreation purposes.

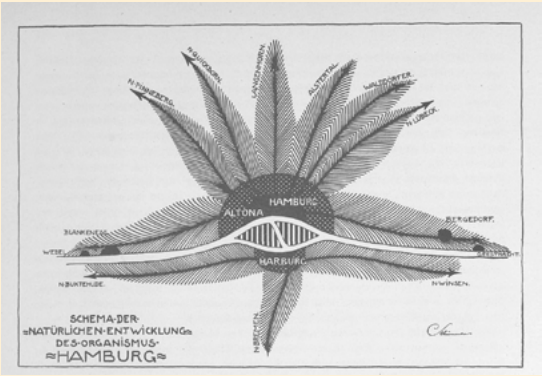


Figure 29: *Graphical representation of the first axis concept in Hamburg 1919.*
Source: Staats- und Universitätsbibliothek Hamburg (1921)

The axis model has since been modified — it turned out that the city was not adequately equipped to resist the immense pressure of the real estate market and to ensure that housing continued to concentrate along the axes, and that the spaces in between were free from development.

Source: Kellermann (2003): Die Entwicklung des Freiraumverbundsystems für Hamburg (The development of the integrated free space system for Hamburg).

2.2.2 Task 2: Organisation of Fare System and Ticketing

An integrated fare system is a central element in a transit alliance.

Box 11:

In ***Bogotá*** (Colombia) the TransMilenio allows passengers to transfer from (local) feeder buses to the express buses without having to buy a new ticket. Because passengers do not have to buy a new ticket for each individual segment of the journey, they accept the need for more frequent transfers required by the introduction of the TransMilenio.

Convenience and affordability

Where transport is not integrated, passengers have to buy a new ticket every time they transfer. Transport operators demand fares from every passenger on their vehicle. The drawbacks for passengers of non-integrated transport are obvious: travellers without a direct connection to their destination face high fares, as they have to pay every time they transfer during their journey (in many cities this means up to 3–4 times per trip). This often impacts poorer population groups living in the peripheral areas of cities. Many jobs, particularly in the formal sector, are located in the inner cities or other high-use areas. For these groups, the fare would take

Box 12:

In ***Curitiba*** (Brazil), a deliberate decision was taken to keep the difference in fares small for short and long distances. As a result, fares for longer distances — particularly routes from the city periphery to the centre which poorer population groups need — are relatively cheap. Tickets for shorter routes close to the centre, which wealthier people need, are relatively expensive. As a result, the ticket pricing scheme serves as a subsidy for the poorer part of the population.

away a significant portion of the potential additional income, often making employment opportunities economically pointless. It has been observed that transport costs sometimes eat up to 30% of household income of the poorest part of the population. As a result, inadequate public transport creates opportunity costs in the form of lost potential for economic growth.

Tariff integration and fare revenue distribution

When fares are completely integrated, passengers only have to buy one ticket for all segments of a journey within the transit alliance area. Not only does this mean that passengers may save on fares, but also that the transport company saves money, because the number of transactions is reduced. When transferring between lines or means of transport, there is no further payment under this system, as passengers simply use their existing tickets.

A transit alliance has to ensure that the transport operators continue to receive a reasonable income once a tariff alliance has been launched. For the individual operators, there is a significant change once they join a tariff alliance: they do not retain the farebox revenue directly, as proceeds go into a common pool for redistribution. This requires entry into an agreement between the transport operators on distributing funds from the pool.

It is essential to establish a process to ensure the entire farebox revenue is delivered into the pool. Typically, these processes are based on printed tickets or ticket machines recording all sales electronically. Smartcard systems are another viable and economic option for monitoring farebox revenue. In some cities, the task of fare collection is provided by a separate company commissioned by the transit alliance or transport authority.

Of course, the different transport operators have diverging interests in the distribution of income. In a first step,

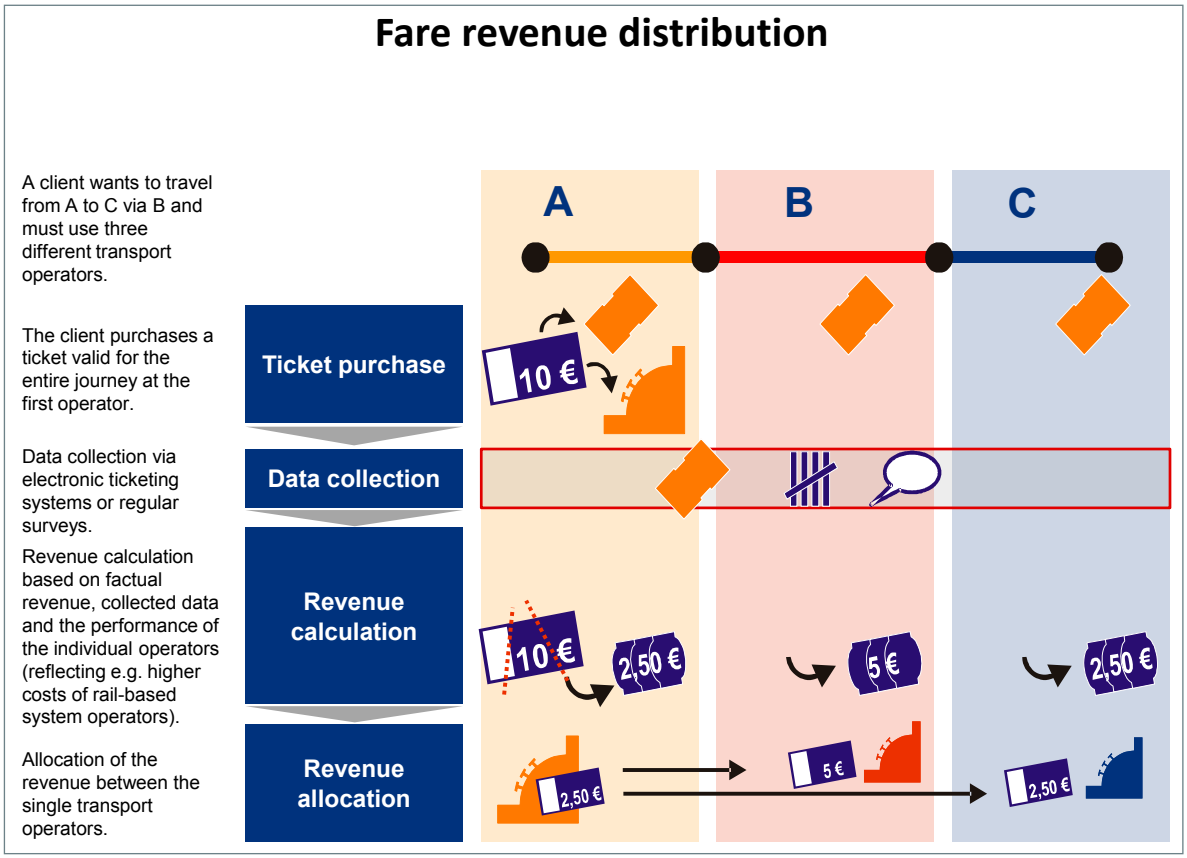


Figure 30: *Fare revenue distribution, simplified illustration.* Source: traffiQ

it is important to establish principles governing revenue distribution. The first principle is that the costs incurred by an operator are adequately covered, to ensure that the operators have an interest in providing the service.

In addition, the distribution of revenue should, if possible, include incentives for operators to comply with quality standards and the goal system of the transit alliance. Options here include bonus-malus systems based, for example, on the fulfilment of the contractual conditions agreed upon, customer satisfaction or the number of passengers. Figure 30 illustrates the fare revenue distribution between several operators in a simplified way.

Before launching an integrated fare system, it is necessary to estimate possible losses in revenue. If the public sector does not cover a potential revenue decrease, the fare system must be modified, *i.e.* fares must be increased (for options for financing subsidies, see Section 3.2). Lower fares generally lead to increased demand, which means that some of the income lost from the introduction of the tariff alliance can be offset by attracting new customers. However, passenger demand in response to a change in fares varies significantly from country to country, making general estimates difficult.

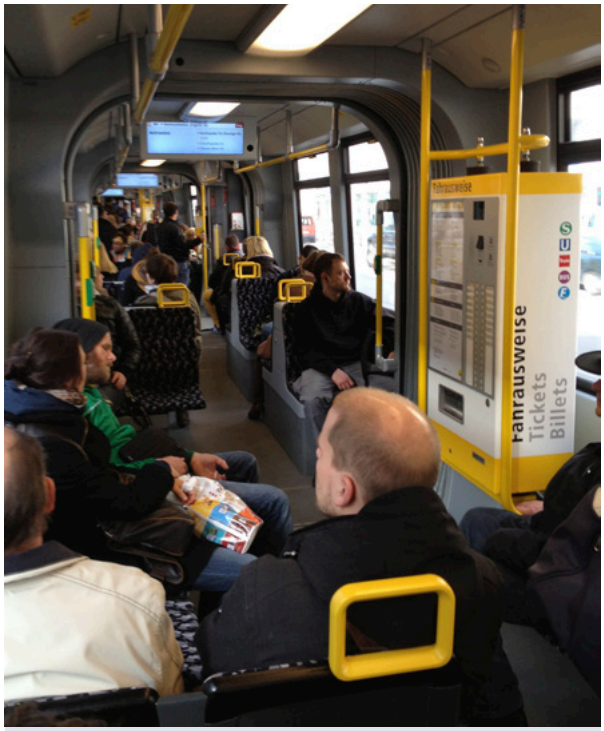


Figure 31: *Tickets can be bought on the vehicle in many transit alliance regions, as here in Berlin. Because most users have time passes, usually there are no big queues.*
© Daniel Bongardt 2012

Tariff structures

In a tariff system fare level and structure must be established. There is often a trade-off between simplicity and appropriateness. It is logical that fares should increase along with increasing distance and/or validity for a longer period of time (*e.g.* validity of 60, 90, 120 min, likely with discounts for dayly, weekly or monthly passes). This principle can also be reflected through zones within a tariff alliance. The fare then depends on the period of validity and on the number of (geographic)

Box 13: Season tickets

In ***Germany*** and several neighbouring states, there has been intensive advertising in recent years for the sale of season (monthly or annual) tickets. For regular users, these tickets offer steep discounts compared with individual tickets (monthly season tickets in Berlin or Vienna, for example, cost about the same as 25 tickets for single journeys). This simplifies the process for passengers, who no longer have to buy tickets every day. As there are no additional costs for additional journeys, passengers are motivated to make trips with public transport even where there are alternatives (*e.g.* evening leisure traffic).

The process of selling tickets is thus simplified for the transit alliance and transport operators, and revenue is more predictable. Season tickets are bought at the beginning of the month, creating positive cash effect for the transit alliance. Some transit alliances have taken further steps to promote the use of public transport: transit alliances offer discounted annual tickets to private businesses for their employees. Students at many German universities are required to buy discounted tickets for a semester as part of their enrolment procedures, thus creating a heavily discounted offer for users and secured income for the transit alliance. A significant majority of public transport passengers now use season tickets. In many cases, the sale of school passes largely funds many regional bus routes that would otherwise be economically difficult to run.

tariff zones in the trip. However, such systems can quickly become very complex. This may not seem a problem for regular customers, but the complexity and incomprehensibility of fare systems repeatedly emerge as obstacles for users of other means of transport and prevent them from switching to public transport.

An alternative model is a simple fare system with a small number of zones and, in the extreme case, a fare unrelated to the distance travelled or period of validity. The implication here is that passengers travelling short distances will be charged disproportionally, compared to passengers travelling long distances. Here again, it is expected that participants in a transit alliance will take different positions. Representatives from local communities in surrounding areas whose residents mostly travel long distances to the inner city will support a system with small differences in fares based on distance, while inner city representatives will support a system which reflects the difference in distance proportionally in fares as closely as possible. In Germany, zone systems are most frequent, but the complexity of the systems varies.

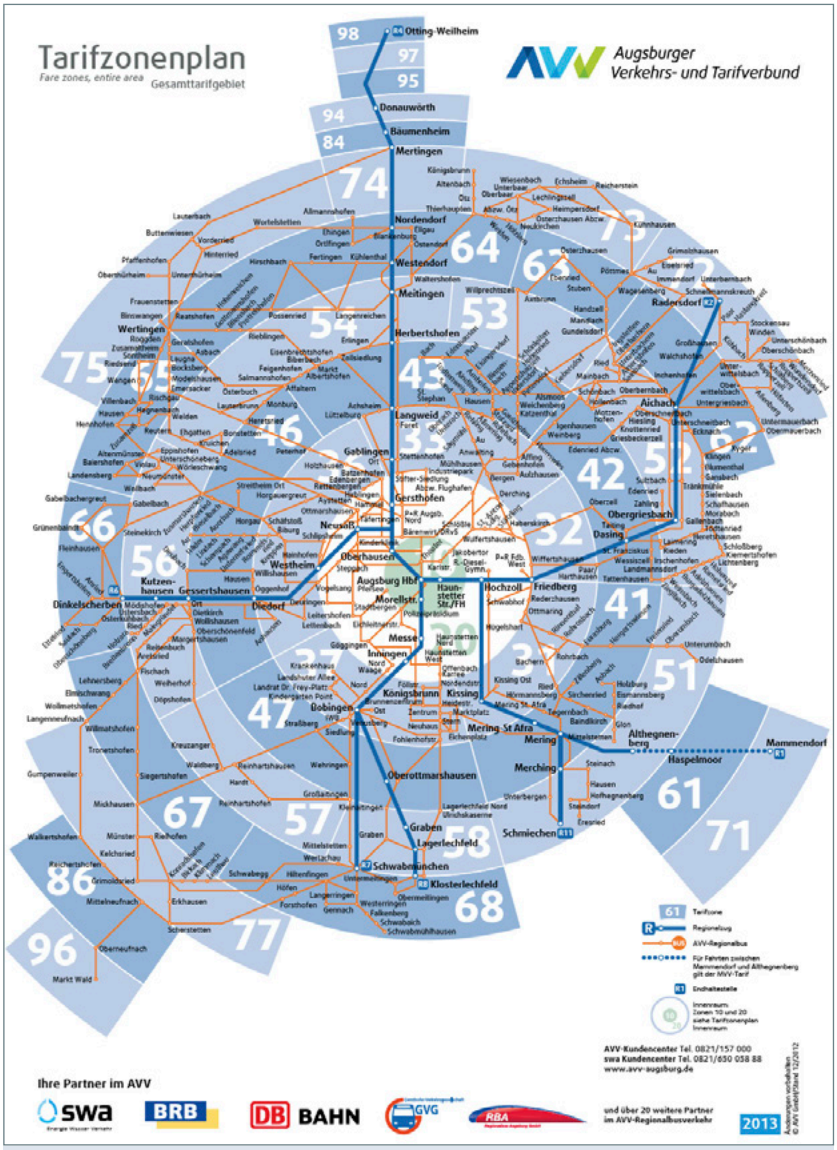


Figure 32: *Complex fare zone system in Augsburg.* Source: *https://www.avv-augsburg.de*

Tickets and access control

A major decision for a transit alliance is to determine the physical characteristics of tickets. The ticket design needs to allow all staff responsible for checking tickets to judge quickly if a ticket is valid or not. Tickets must also be safeguarded against forgery, which can be a significant problem. A harmonised system and a strategy to address fraud are therefore advisable.

Establishing a system of this kind depends to a large extent on how the checking system is designed. In the case of bus systems only, the driver can check tickets as passengers get on the bus. However, when a large number of passengers want to get on, it can slow down

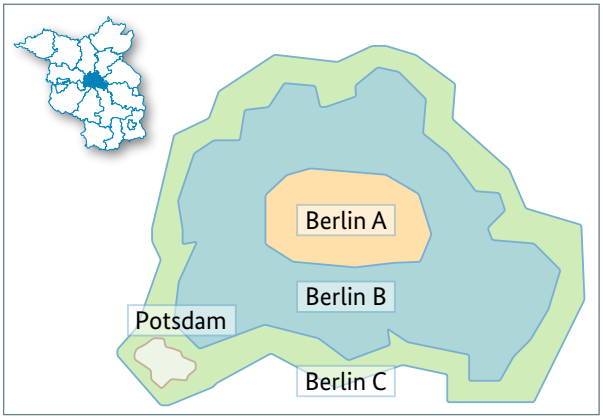


Figure 33: *Simple fare zone system in Berlin.* Source: http://www.s-bahn-berlin.de/aboundtickets/allgemein.htm

the boarding process and lengthen travel time. In the case of metros, access can be controlled manually or with the help of automatic barriers. The same is the case with full featured BRT systems that are designed as closed systems. Light rail pose a special situation. These are often integrated into the roadways, and automatic barriers are difficult to implement. Meanwhile most cities apply electronic ticketing systems, and validation is performed via card readers at stations or inside the vehicles.

In a large number of public transport systems access to metros, light rail and buses is without any particular control. This minimises access and stopping times. Instead, employees randomly check passengers to ensure that they have valid tickets. Passengers travelling without valid tickets are required to pay substantial fines. Cities with a system like this report a fare evasion ratio of between 3–15 %, with the ratio being largely dependent on the intensity of the inspections and the penalties for evasion. Mixed systems are also common, with random checks when there are large numbers of passengers and a requirement to show tickets to the bus driver for each trip when bus lines have few passengers or during off-peak times. Tickets are either centrally printed and distributed, or issued by ticket machines at stations or on buses.

Electronic ticketing and smart cards

Electronic tickets create new possibilities for issuing and using tickets. The first generation of electronic ticket systems was based on magnetic stripes applied to one-way paper tickets. In recent years, electronic tickets are predominantly based on RFID chips which can be integrated into smart cards or cell phones. Electronic tickets can significantly speed up access control, especially in metro stations. However, on light rail or bus systems, additional manual controls are unavoidable. Many cities also changed into fully electronic ticketing, not allowing manual purchases of single tickets anymore.

Smart cards can also be used for other small payments. Often also Public bike Systems can be accesses via the same cards. Cooperation arrangements with private businesses and other facilities may enhance the acceptance and popularity of such cards and lower barriers to the use of public transport.

The smart card also has advantages for transit alliances and operators, as electronic documentation of travel for which the smart card is used makes it possible to analyse the type of use and to consequently improve the services offered.

Box 14: Examples

Besides the Oyster card in London, the ***Octopus smart card in Hong Kong*** (China) is a well-known example of the use of an electronic ticket. In both cases a credit is recorded on the card; card readers then debit the fare for public transport travel on the basis of the length of the route. Paying fares with the Octopus card is significantly cheaper than buying a classic ticket. There is something else that has helped the Octopus card become popular; more than 3,000 merchants (businesses, restaurants, snack bars, etc.) have signed up with the Octopus card and accept card payments. The card is therefore not only a ticket for travel, but also a parking ticket, purchasing card (partly with bonus programme), access card (schools, hotels, offices) and can even be used as a time card in companies. Hong Kong's residents generate over 11 million transactions a day. Octopus Card Ltd. is wholly owned by Octopus Holding Ltd, in which all major transport operators are involved. The alliance concept is most certainly supported by this marketing concept. This identifies local transport in the city with its seven million inhabitants as a uniform service, organised by the Transport and Housing Bureau and operated by the various operators: Metro Train (formerly KCRC), Metro (MTR), tram, bus, ferry and rack railway. Hong Kong does not have a tariff alliance; each operator runs its own fare system. However, the Octopus card has proven to be a successful tool to increase the convenience of using public transport.

A smart card was introduced in Izmir (Turkey) back in 1999. Initially, the so-called Kentkart could only be used on buses, but it was soon extended to the metro and to the ferry, which plays a significant role in the city. To help Kentkart make a permanent breakthrough, it was linked to fare reductions, so that the old paper tickets are now a rare sight. In the process, the transfer stops between bus and ferry were improved and timetable connections optimised. From the start, the data collected from the Kentkart was used for planning purposes. The bus system was gradually restructured and the lines now act as feeders for the metro.

Source: traffiQ

With the help of the smart card, trips can be billed at different rates. Discounts or season ticket functions can be easily integrated. A particularly interesting element is the distinction between peak and off-peak times, which is easy to implement with smart cards. With this application, travel can be more expensive during rush hours and relatively cheap during off-peak times. Basically, an arrangement of this kind can boost the use of public transport outside the rush hour.

Figure 34: *Light rail with smart card reader in Strasbourg, France.* © Robin Hickman 2014

Such differentiated fare systems do, however, include risks if passengers do not understand the complexity of the system. Where there is a distance-related system, passengers need to register not only at the start of the journey but also at the end, otherwise they will be charged for the maximum distance. This is not a problem at metro stations with entrance barriers, but with systems without such barriers or with buses, this is repeatedly forgotten. In London, the TfL earns an additional unjustified EUR 75 million a year (about 1.5 % of total revenue) as a result of passengers forgetting to check out. This is why it is essential to ensure that passengers accept and understand the smart card system.

Introducing a smart card system into an existing network is a challenge, as the conversion needs to be organised in a short period. This requires significant investments in new equipment, passenger information and employee training.

2.2.3 Task 3: Developing Infrastructure at Stops and Stations

The station or bus stop is the passenger's first point of contact with the transport system. Stops should accordingly be designed to be as attractive as possible. Transit alliances define quality criteria for station infrastructure and often coordinate related investments.

General requirements

Where financially feasible, the following comfort aspects should be considered for public transport stops:

- Elevated area around the stop to promote passenger safety;
- Information for passengers (fare information, stop signs, information on bus routes departing form the stop, timetables, route map, map of surrounding area);
- Ticket machines;
- Protection against weather;
- Seats.

Metro, rail and BRT stations typically have a significantly higher number of passengers than most other stops. For this reason, they offer an opportunity to generate additional revenue from advertising or leasing sales areas. Again, other elements can be added to the comfort functions listed for public transport stops, depending on the availability of funds. These may include both staffed offices for ticket sales and passenger information, Wi-Fi and shops, allowing passengers to be productively engaged while waiting.

Rapid transit stations (particularly when located underground) should be easy to access and well lit in order to enhance passengers' subjective sense of safety. In

Figure 35: *Elevated BRT station protects passengers from weather influences and contributes to safety aspects in Curitiba, Brazil.*
© Karl Otta 2005

addition, objective safety can be supported by security personnel and CCTV (closed-circuit television cameras).

Escalators and lifts are important comfort elements from a passenger's point of view, and their importance increases with an ageing population. Lifts are also vital for transporting handicapped persons (particularly wheelchair users). However, they involve substantial costs maintenance and operation. Where a lift installation is waived initially for cost reasons in a construction project, the option of adding this equipment in a later phase should be considered during construction.

Figure 36: *Bus stop with public transport map and line maps in Berlin.*
© Manfred Breithaupt 2009

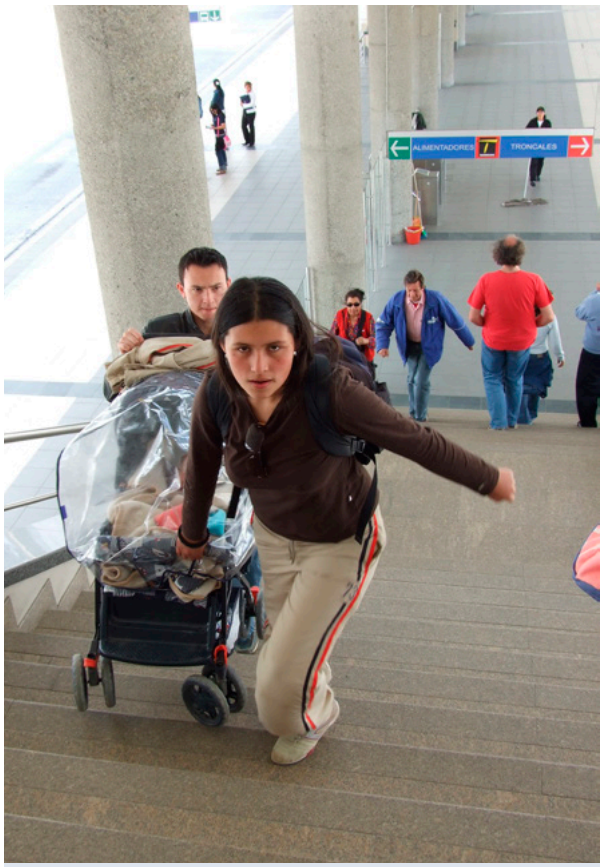


Figure 37: *Will the family still use Bogota's Transmilenio BRT system once they can afford an own car?*
© Carlosfelipe Pardo 2007

In the case of MRT stations with heavy demand, it is particularly important that stations are constructed in such a way as to ensure passenger safety. Where there is overcrowding, there is a risk that passengers waiting on the platform will be pushed onto the tracks by the passengers behind. Potential danger increases in case of panic. There are a number of structural and technical measures for preventing such accidents. For example, rails can be separated from the platforms by transparent walls, with entrances through automatic doors opposite train doors (platform screen doors). Passages and stairs should be wide enough to avoid congestion. For emergencies there must be an option for erecting effective barriers to close off overcrowded areas. In addition, a concept must be drawn up in advance for evacuation routes in case of emergency.

Physical integration of interchange stations

An integrated transport system depends in many cases on connections. This is particularly the case where a high-capacity rapid transit system (metro, light rail, BRT) is the backbone of the system. In such cases, particular attention should be paid to the design of transfer stops. To shorten travel time and enhance passenger comfort,

Figure 38: *BRT Transoeste Station in Rio de Janeiro, Barra da Tijuca.* © Manfred Breithaupt 2017

transfer distances should be minimised. This must generally be taken into account in the construction phase. In the case of transfers between metro and railway lines, this can be done through multilevel stations where the individual lines operate at different levels. Ideally, such stations are located directly above one another, so that only one flight of stairs is needed to get from one line to another.

Even more convenient, although generally more structurally demanding, are transfer possibilities on the same platform. For this, the lines involved must be on the same level.

Rather less structurally demanding are transfer facilities outside densely populated areas, *e.g.* between bus and suburban rail or bus and light rail.

Figure 39: *Light rail-bus station in Strasbourg.* © Robin Hickman 2003

There are many examples of stations for different lines being built in an unregulated manner, so that changing between lines involves a time-consuming and inconvenient walk. It is virtually impossible to correct mistakes in this regard once construction has been completed

Figure 40: *Multi-level metro-suburban train station (Berlin Ostkreuz).*
Source: http://www.s-bahn-berlin.de/aktuell/2007/images/047_ostkreuz_aufbau_gross.jpg

Figure 41: *Multi level metro-metro station (Berlin Schöneberg).* © Axel Mauruszat 2007

Accessibility and multimodality

Particularly in less heavily populated regions, accessibility of public transport stations depends not only on bus lines but also on other forms of transport. Suitable interfaces should be provided for these too. Private car drivers and cyclists need parking space (Park & Ride, Bike & Ride) and suitable facilities for dropping off passengers at a stop or station (sometimes called Kiss & Ride zones), pedestrians require safe and attractive walkways. In addition, there should be adequate areas for taxis, auto rickshaws, etc.

Figure 42: *Technical solution for barrier-free access to a BRT station in Curitiba, Brazil.* © Karl Otta 2005

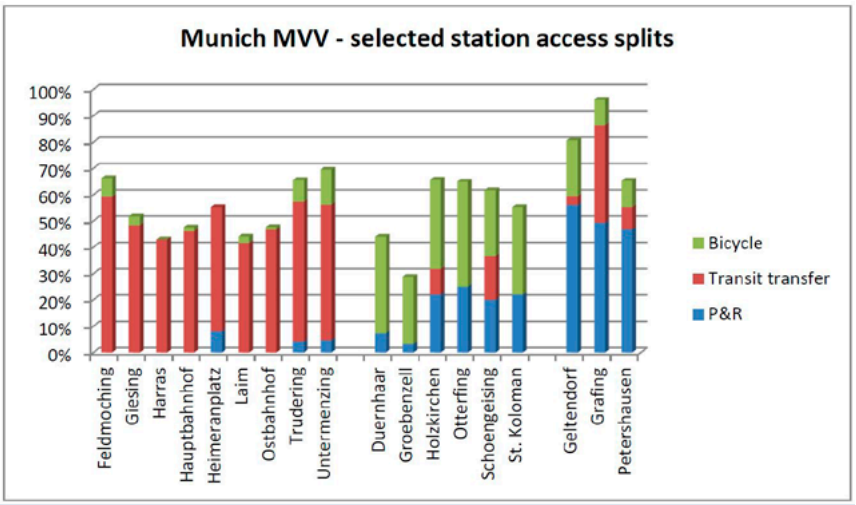


Figure 43: *Munich suburban rail - selected station access mode shares. The difference to 100 % results from access by walking.* Source: Hale (2013)

The attractiveness of public transport services can be raised considerably by improving station facilities. Next to the particular function of a station or stop, the needs of existing and potential customers in its catchment area shall be carefully considered – a principle that is followed successfully by the Munich Transit Alliance (MVV) in processes of modernising or planning transit stops and stations.

Box 15: Taxi traffic

In the case of ***Shanghai*** (China) and similar to Buenos Aires (Argentina), it was determined that taxis searching for passengers were empty for up to 80 % of their travel through the city. These unproductive trips could be significantly reduced by establishing taxi-waiting zones at major metro stations, where passengers could take a taxi. This would increase passenger convenience, reduce emission from cars, and probably reduce taxi costs.

Figure 43 shows the access mode shares for commuter rail (S-Bahn) stations in the region of MVV. While passengers access major transfer stations mainly by other means of public transport and walking (left part of the figure), stations in the suburbs are approached by considerably more private car drivers and cyclists.

In regions with dense bicycle traffic, it is important to consider how parking spaces for bicycles can be provided at mass rapid transit (MRT) stations and major bus stations. Providing safe and sheltered bicycle parking at a MRT station can promote the use of this environmentally friendly means of transport.

Figure 44: *Underground bike parking station at Muenster main railway station.* © Mathias Merforth 2013

Figure 45: *Public bike system in Guangzhou.* © ITDP China 2010

Public bike systems are a rapidly growing business in many cities. At present there are over 1,000 such systems operating, with continuous and nearly daily expansion. Here again, suitable interfaces at public transport stops are useful. Transit alliances can integrate and promote bike sharing systems, as the supplementary offer increases the flexibility of public transport by creating continuous travel chains.

Figure 46: *A park & ride facility at Kassel railway station, Germany.* © Dominik Schmid 2010

The need for integrated stop and station planning

Normally, operators only plan their own stations, and consideration of interchanges with other lines, buses, cars or bicycles often takes a back seat. The requirements of planning law and financing mostly mean that operators are unable to influence the development of the area outside their own facilities.

This is why a typical task for a transit alliance is to handle the integrated planning of stations that takes into account all transport modes and to push through implementation. These tasks include planning and financial coordination. This can be very elaborate and complex with integrated stations, as the station facilities often belong to different operators with different interests, planning cycles and financing options. In Germany, the state provides investment funds through interface programmes for the development of facilities where financing from operators' regular funds would be difficult or impossible.

Designing integrated stations often leads to conflicts over use (*e.g.* the question whether the best places outside a metro station should be reserved for buses, or whether these should include access for taxis or private cars). In mediating such disputes, a transit alliance — as an independent tribunal — often plays a decisive role.

2.2.4 Task 4: Timetable Arrangement

A transit alliance is responsible for organising the timetable. The primary goal of any timetable is to offer adequate transport capacity for passengers. On the other hand, it is important to avoid offering services for which there is no demand. This is another reason for a transit alliance to regularly collect transport demand data.

In today's developing cities, particularly in high-density centres, the overwhelming problem is to offer adequate capacity.

The problem is completely different in areas with rather low demand for transport. Here, the challenge is to

provide a reasonable frequency of service that attracts customers. In western countries, waiting times of up to ten minutes are acceptable to customers in urban areas, but longer waiting times typically lead to a loss of "choice passengers" to other means of transport.

So-called choice passengers (choice riders) are not bound to using public transport for their trips, because they could use a bike or can afford going by car. In contrast, captive-riders typically have no real alternative in their mobility choices.

In the case of direct connections, waiting times for passengers are easy to plan, but transfers pose a greater challenge. Here, the task of the transit alliance is to set departure times for connecting lines so that waiting times for transferring passengers are as short as possible. Very convenient to passengers are so called fixed-interval schedules, were interchanges are optimised in terms of transfer times.

☞ For more information on fixed-interval schedules, please refer to Box 3.

Timetables become a challenge for buses and trams that use public roads in mixed operations. In these cases it is difficult to stick to timetables. Separate bus lanes and tram corridors are of course ideal, as they can help to stabilise timetables considerably. Another possibility is to keep bus lines (particularly those which feed metro lines) as short as possible. This prevents knock-on delays over extended periods.

The function of the transit alliance is then to create and implement an appropriate timetable that suits passengers.

2.2.5 Task 5: Providing Passenger Information

Informing passengers about services has a central importance in public transport. This is especially true for integrated public transport systems where transport services are significantly more extensive, with a simultaneous increase in the complexity of the information. New technologies are rapidly developing in this area.

Passengers' information needs

The passenger's need for information depends on the user profile: regular commuting passengers travelling the same route every day need little information. Passengers who infrequently travel or take different routes need more information. Economic growth will generate a bigger share of travellers with high demand for information: leisure traffic will increase, wealthier people will choose between different modes of transport, and the share of employees working at changing workplaces will increase. All these groups need simple, relevant information.

Socio-cultural aspects also need to be considered in the information strategy. These include, for example, illiteracy rates, familiarity with maps, and the spread of the internet, cell phones or smart phones.

Passengers need information at two typical points: first, in planning their trip (*e.g.* from home); and second, directly at the stop. Traditionally, passengers were supplied with timetables in book form for use at home, while current timetables are displayed at stops. Nowadays these forms of providing information are being largely replaced with new technologies.

An important task for the transit alliance is to ensure that information is easy to recognise and available at the right time and in the right place. This involves taking into account further details:

- The corporate identity of the transit alliance should be uniform (*e.g.* layout of information, signs and drawings);
- The information provided is standardised (*e.g.* timetable, map of surrounding area and network map at every station);
- The station names are standardised (the same designation for all operators and in all documentation, particularly for transfer stations).

Data provision

Real-time information from multiple operators within alliance-wide timetable systems has been a key achievement in recent years, and is a crucial aspect of expanding existing systems.

Figure 47: *Tram station with real time information in Karlsruhe.* © Manfred Breithaupt 2010

At stops and stations, information on scheduled timetables are increasingly being supplemented by real-time systems that show the next vehicle arrivals, taking into account current delays or changes. Market research shows that passenger satisfaction is significantly enhanced by real-time information on waiting times. Stops are currently being equipped in many countries with QR (Quick Response) codes which enable smart phone users to access departure times for a station at any time.

Although the amount of real-time information available will vary, the primary considerations are a) what information to relay to customers and where (details of specific delays and general information on disruptions), and b) how to communicate complex information to passengers as simply and transparently as possible. One of the public transit alliances' key tasks in this respect is to devise solutions which provide passengers with the information they need in a clear and comprehensive manner, but can also be introduced and maintained at reasonable cost.

The technological basis for all advanced passenger information systems is an electronic timetable that is available on the internet and is made accessible for all passengers through user-friendly graphic interfaces. This information can be accessed on the internet or from a smart phone. Most information systems in Central Europe but also in more and more cities in Asia and Latin America now offer information for specific addresses, including walking times to and from stops.

Such systems normally include details on all services in the alliance area and can therefore be used to look up connections from and to any given stop, address or key destination. The systems typically contain details on the fares and other important information. When entering the relevant search criteria, the results pages outline the key details on the various connections found; more in-depth information is usually available on specific pages or directly linked (*e.g.* lines used, transfer points and information on delays, disruptions, barrier-free connections, maps, fares).

However, traditional network and route plans are an important source of information, which visually help passengers plan and navigate their trips.

Figure 48: *Information tableau with comprehensive information in Zurich. © Daniel Bongardt 2012*

Box 16: Examples

In ***Manchester*** (UK) a separate company was formed to deal specifically with passenger information. This company is the only one allowed to publish passenger information. Information on public transport in Manchester is very comprehensive, and is increasingly provided and used today in a wide range of electronic media.

The London transport authority TfL (Transport for London) maintains an elaborate customer information system. Many customers and potential customers use the service at Call Centre London Transport every day:

- Approx. 80 % of customers act on the recommendations of the information service;
- Approx. 40 % of passengers get a recommendation on how to simplify or shorten their trips;
- Over 10 % of callers would not have used public transport for their journey without the information.

In ***Sao Paolo*** (Brazil), the metropolitan transport office (STM) is an institution that coordinates communication and marketing for the transport operators involved (metro, regional trains, regional and local bus companies), but transport operators still appear under their own name. There is no common brand that creates a public identity. No agreement has been reached on uniform external marketing. It is uncertain whether the improvements in public transport are actually noticed and appreciated in these circumstances. This is often also the case in other Brazilian cities, were private bus operators have been granted an operating concession for up to 20 years (in large cities there are up to 15 concessionaires).

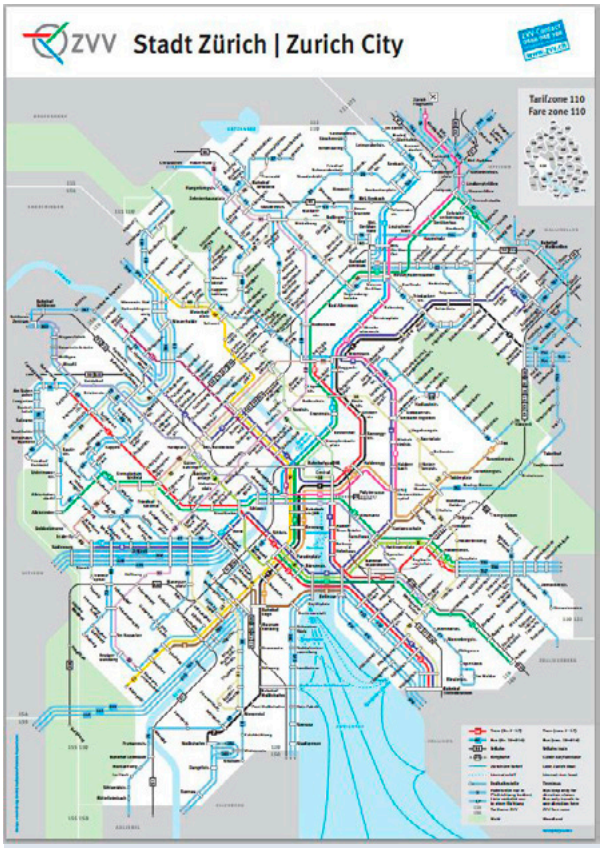


Figure 49: *Public transport network map of Zurich city as part of ZVV transit alliance – showing commuter rail, tram, bus, funicular and waterway connections.*
Source: http://www.zvv.ch

2.2.6 Task 6: Quality Management

Many people rely on public transport to fulfil their personal mobility needs. Low public transit quality usually causes people to search for alternatives. Rising incomes and the related possibility of personal car ownership can lead to a shift away from public transit. Therefore it is important for a transit alliance to take the perspective of transit users when defining and maintaining quality standards. Customer satisfaction ultimately motivates passengers' willingness to pay – a requirement for a positive long-term development of public transport quality and the economic viability of transit services.

Figure 50: *Rather unattractive bus station in Irkutsk, Russia (meanwhile modernised).* © Karl Otta 2004

Quality comprises the entire service offer, starting from adherence to timetables, cleanliness at stops and in vehicles and the appearance and (driving) behaviour of service personnel. In any case, transit alliances should define or jointly elaborate quality standards with the operators responsible for services within the alliance. Those quality standards are then integral part of the bidding documents, leading to awarding concessions to transport operators within the geographical area of the respective transit alliance. The role of a transit alliance consequently includes monitoring adherence to agreed standards. Quality standards are not 'luxuries', but essential for establishing an attractive service offer that is able to attract new – and retain present – passengers. The violation of quality standards must have consequences for the responsible transport company.

How quality is maintained between transit alliance and operators must be assessed and decided for each case individually. Certain aspects can be controlled by technical means, (*e.g.* non-compliance with timetables or trip cancellations), while other aspects require monitoring staff on the ground (*e.g.* the behaviour of driving personnel). Valuable information for quality management can be obtained by integrating passenger feedback, which can be done by conducting passenger surveys and systematic analyses of incoming complaints (and praise).

Staff and financial resources for controlling quality should be budgeted at an early stage of forming a transit alliance. In addition to effective quality control mechanisms, special incentives can lead to active and constructive engagement of operators in terms of service quality. Bonus-malus systems or a direct allocation of (additional) farebox revenue can support the operators' interest to maintain high quality standards.

Quality doesn't come for free. Though the relation is not exactly linear, it can be stated that the higher the quality, the higher the costs of public transit services. In all considerations regarding the aspired quality, the relation between cost and benefit must be kept in mind. At first, costs apply to transit alliance and operators. Increased user benefits should subsequently materialise in the form of higher farebox revenue due to increased ridership and higher willingness to pay.

☞ For further information on measuring public transport quality and performance, please refer to SUTP Technical Document #9: *Measuring Public Transport Performance*, available at http://www.sutp.org

Figure 51: *Modern public transport vehicles and regular maintenance contribute to a good user experience as well as to operational efficiency due to higher energy efficiency and longer life cycles. Transmilenio bus in Bogotá.* © Carlos Pardo 2010

3 The Transit Alliance as a Project

Establishing a transit alliance is not a routine task. Aside from political commitment, technical and professional knowledge along with project management skills is essential. Comprehensive international literature exists on project management, and there is little need for more than a few comments at this point. The following section has particular relevance for the task of establishing a transit alliance (for a step-by-step checklist, see Appendix).

Every project should start with a description of the project goals. Without the most accurate possible description of the overall and subordinate goals, the project will not be able to run smoothly and cannot be successfully completed. At the beginning are political decisions regarding goals, roles and responsibilities of a transit alliance.

- Is the primary aim to increase the number of passengers, or to mitigate the adverse impact of informal paratransit?
- Is the intent to initiate a far-reaching fare structure reform, or is the emphasis on creating an attractive offer to choice riders?
- Is the formation of the transit alliance to be accompanied by extensive expansion or conversion of infrastructure?

This process of determining the goals may itself take some time, although this is a necessary and worthwhile investment before the start of the actual project. A political commitment on doing something in general terms for public transport is hardly sufficient.

The general conditions should be analysed and evaluated while examining

- What legal requirements exist, what is the status quo, and who are the stakeholders?
- Who else is affected by the formation of a transit alliance?

Possibilities range from passengers to transport operators; from the owners of the infrastructure to political actors, and possibly banks as potential lenders. It is necessary to decide the roles of the individual stakeholders.

- What is known about the stakeholders that need to be considered?
- How do they feel about creating a transit alliance?
- Is anyone influential enough to block the planned transit alliance? Who would actively support a transit alliance, and under what conditions?
- Is the aim to involve them, or is the goal to act and subsequently implement the results, even in the face of opposition?

Third, given the scale of such a project, it is essential to draw up a complete project plan, including a description of all the work packages included. This should summarise the individual steps, the estimated time they require, and all the participants needed for the individual packages. The resulting schedule provides the necessary sequence for completing the work packages and the overall project, and makes it clear when intermediary results (milestones) can be expected. A realistic estimate should be made of the time required to set up a transit alliance. Naturally, preparatory project planning should include the costs incurred (material, human resources), and the financing aspects should be clarified.

Like any other major project, establishing a transit alliance involves a number of risks, which can extend from questions of financing, unexpected political changes, through to unforeseeable resistance from transport operators. The better the responsible parties are prepared in the analysis of possible risks and in formulating possible preventive or curative measures, the greater the likelihood of reducing the possibility of risk and/or the potential damage.

Time needs to be scheduled to communicate with existing operators, also informal operators, being found practically in all developing cities to explain the (and their) advantages of creating a fully integrated urban public transport system. They need to be convinced, that after restructuring their business will grow and their income will be not less compared to the present situation. A valid argument is often, that due to the shrinking attractiveness of public transport, there is a downward spiral leading to a reduced public transport share. Lower occupancy, reduced frequencies, less customer acceptance and competition by private motorised transport or (moto) taxi services will ultimately reduce the profitability of low-quality services.

The actual project implementation should include feedback at regular intervals on the milestones developed in the planning phase.

- Was an important goal perhaps not recognised earlier?
- Has another influential stakeholder appeared, or has an existing stakeholder been inaccurately assessed?

- Is the timetable still valid, or does it need to be corrected?
- Are there adequate human resources?
- Has a previously unrecognised risk become apparent?

Project marketing is important, too. To some extent, it is a constant companion throughout the entire term. Chapter 1 has made clear that current, potential and future passengers are the beneficiaries of an integrated public transport system. When creating a transit alliance it is therefore advisable to establish a communication strategy to proactively advertise the benefits of the future transit alliance for passengers (*cf.* definition of goals at the start of project planning).

Box 17: Benefits of a Transit Alliance

There are many reasons behind a decision to set up cooperative public transit alliances, and such structures will have benefits for passengers, transport operators and local authorities alike. A further reason, though, is generally to make public transport more efficient in economic terms.

For passengers in Germany, the shift to a transit alliance model arose in a landscape characterised by individual transport operators in isolation from each other within a single urban area; there was also a growing interest in coordinating urban and regional transport more efficiently in merging metropolitan areas. Transport operators thought to integrate the range of services within a given area and to work together to achieve optimal organisation of the entire public transport system. At the time the first alliances began to emerge, new suburban railway networks had to be interconnected with the existing urban transport systems, creating a growing need to interlink the transport and fare sub-systems in various regions.

Cooperative transit alliances that link different operators and local authorities are intended first and foremost to meet the demands of passengers for a more integrated transport network, and provide easier access to public transport. The primary goal of transit alliances is to make life easier for the passenger; advantages for customers include tickets and passenger information valid for multiple operators, better coordination of transport services and more convenient transfers. Working together in transit alliances makes particular sense where using the individual public transport sub-systems entails frequent transfers.

Source: VDV, GIZ (2010)

Box 18: Hamburger Verkehrsverbund (HVV) — Hamburg Transit Alliance

The first transit alliance (Verkehrsverbund) was established in Hamburg in 1965, following five years of planning. It was founded as an association of three operators in Hamburg (municipal HHA, operating the light metro, trams and urban bus service, S-Bahn Hamburg, the metropolitan heavy rail division of the German federal railway (DB), and VHH, operator of suburban bus services). The original intention was only to establish a joint ticketing system, but during planning it was found that a robust organisation was needed to organise this joint ticketing system and that it would be a good idea to pool other functions like network planning and marketing in a joint organisation. The system was very successful and because of increased ridership and farebox revenue it has been used as blueprint for many other public transport organisations in Europe. In the beginning, it mainly covered services within the city limits. Over the years, neighbouring communities applied for membership and the territory covered has since tripled.

Source: VDV, GIZ (2010)

3.1 Initiating a Transit Alliance

Establishing a transit alliance normally requires several years of planning and analysis of local requirements.

In the first stage, the initiators collect all relevant available information, and supplement where any basic information is missing. This involves the following:

- Existing mechanisms for transport and urban planning;
- Existing traffic flows and demand forecasts;

- Population and settlement development forecasts within the municipality;
- Overview of the agencies and institutions involved in planning, licensing and financing public transport;
- Overview and understanding of the legal framework and existing processes (licensing, financing, vehicle safety, etc.);
- Structure of formal and informal operators (operators, associations and syndicates).

This information should be systematically organised to obtain a better understanding of the actors, their goals and interests, and their processes. There are various tools for carrying out such analyses and visualising the results (*e.g.* process mapping, stakeholder analysis). External planning experts can be consulted if there is a lack of internal expertise.

Once the basic information is available, the initiators can discuss and evaluate which goals to pursue and identify top priorities. Political and popular support for the project can be decisive for success, along with the availability of suitable funding for establishing and operating an integrated transport system.

It is helpful to describe a target situation, and possibly to consider intermediate steps. Further, it is crucial to be clear about opposition from individual stakeholders, and to identify measures to overcome this opposition. Communication with stakeholders and the media should be included in the planning at an early stage. It is also helpful to monitor on an on-going basis whether the resulting costs are covered or can be covered. Budgeting must distinguish between three components:

1) ***Non-recurring costs*** which arise in the planning and implementation phase;
2) ***Permanent subsidies*** which may be needed, depending on the details of the tariff system and service levels,
3) ***Current costs*** of the transit alliance itself.

Each individual phase of implementation must be carefully monitored, and the initiators should be in a position to respond quickly in the event of emerging problems or conflicts. This is why it is advisable to assign a project team to cover the entire planning and implementation phase.

Specific events often provide opportunity to acknowledge the need to establish a new transit organisation. Examples are major international events (such as sporting events like the Olympic Games in London 2012)

Figure 52: *Belo Horizonte's Bus Rapid Transit system "MOVE" has started its operation ahead of the FIFA World Cup Brazil 2014.*

or impending investment in a metro, light rail or BRT system, where it becomes clear in the course of planning that roles and responsibilities must be reallocated. These events can be utilised to justify the need for a new form of transit organisation.

3.2 Financing and need for subsidies

Financing is a major challenge for a transit alliance. Across the world, there are hardly any examples of urban public transport systems that cover all their costs while providing a decent standard of quality and comfort. In developed nations it is common practice for the state to provide funds to cover the gap between revenue and expenditure of public transport systems. There is a wide consensus that conditional subsidies are useful and required. It has become clear that larger cities cannot provide adequate mobility without effective public transport. Subsidies for public transport are often justified by environmental benefits and due to the negative external costs of excessive car usage (congestion, air pollution, accidents, etc.). In most nations, road traffic does not cover its direct costs either — road construction and maintenance are generally financed by public funds.

The trade-off between cost-recovery and high quality

Several major cities (*e.g.* Hong Kong, Singapore, Taipei, Tokyo, Osaka) report that their metro companies are profitable. However, in many of these cities, capital investment is financed by the public sector. There are also sources of revenue from real estate developments (construction and commercialisation of buildings along MRT corridors) which wholly or partly benefit the MRT operator(s). The authorities in China have recently reported that the operation of metros results in heavy losses, even if investment costs are excluded.

☞ Please find further information in Smith (2012) and Wang, Zhou (2013)

In transit alliances in European countries, fare revenues typically cover 40–80 % of the total operating costs. This depends mainly on population density and quality of service, and also on how operators are compensated for the reduced fares or free travel offered to specific groups (*e.g.* students, pensioners, handicapped persons).

In developing countries, target-oriented subsidisation of public transport has been relatively rare so far. The fact that metro operators can get by without subsidies is frequently presented as the result of good management. However, having a closer look may show that deficits often come along with neglecting maintenance and necessary replacements, or with low or irregular payment of bills and wages. As a result, systems deteriorate, passenger comfort declines, and safe operation can perhaps not be assured in the long run. Cases are reported where the public sector intervenes with financial aid just at the point when service cancellation looms. That has been the case for some tram and trolley bus systems in cities of Eastern European and Central Asian countries in the recent past. A strong political commitment to public transport accompanied by the reasonable prior allocation of public funds allows for efficient, sustainable and target-oriented development of transport systems and services, instead of fire-fighting.

Figure 53: *Tram modernisation is often a cost-efficient alternative to the procurement of new vehicles. The figure shows a refurbished tram with level-access entry operating at a Kiev tram system.* © Mathias Merforth 2012

Figure 54: *The procurement of new vehicles is often supported by public funds, to guarantee modern vehicle standards and travel quality. Bus in Kassel, Germany.*

Mobilising resources

However, there is often a conflict with other public responsibilities over scarce funds. To ensure financing for public transport, a number of cities have created separate financial structures or earmarked certain taxes. In these cases, a specific source of revenue is earmarked by, without a need for an annual resolution in the budget. This may include toll revenues (*e.g.* in London, Oslo), parking charges or petrol royalties (Denmark).

Another option for financing public transport is to use the profits from real estate development along the transport corridors, known as land value capture (see also Chapter 2.2.1). Ways of using these gains vary, depending on the legislative environment. Contracts under private law are the simplest solution, in which real estate owners commit to co-finance the transport infrastructure. In several cities the transport operators themselves

As already identified, farebox revenue is mostly not sufficient to cover all operating costs. Therefore, operators must be financially compensated. Part of the compensation is justified on the grounds that in many cities legislation requires specific groups of passengers (*e.g.* children, pensioners, veterans, handicapped persons) to get reduced or free tickets. The legislature is then required to compensate the transit alliance (or operators directly) for these payments. The regulation of payment for transport services, public subsidies and compensation payments is typically outlined in public service contracts.

When constructing new transport systems, or planning new services, it is necessary to estimate what deficits will emerge in the operating phase, and how these are to be covered. On-going administrative expenses of the transit alliance have to be included in the financial planning as well.

Figure 55: *The tram Velez Malaga has been taken out of service due to a complete lack of profitability after its construction.* Source: Wikicommons, 2007, *https://commons.wikimedia.org/wiki/File:Trikk_velez-malaga.JPG*

Figure 56: *Electronic road pricing helps to control vehicle access Singapore's city centre. The generated revenue is partially used for public transport operations.* © Manfred Breithaupt 2010

buy land and construct and develop real estate parallel to construction of the transport infrastructure. Another conceivable option is a mandatory levy or tax. French cities impose a transport tax that all medium and large size companies in the urban area must pay.

☞ For further information on financing aspects, please refer to SUTP Module 1f: *Financing Sustainable Urban Transport* and SUTP Module 2a: *Land Use Planning and Urban Transport*, available at http://www.sutp.org.

3.3 Problems with integration of existing transport companies

Basic structures for public transport are present in virtually all major cities. These structures often consist of buses, minibuses or similar vehicles. In some cities buses operate under public licences or concessions, in others bus transport is unregulated or even illegal. Such systems are often supplemented by taxis and motorcycle taxis.

☞ For case studies and further information on informal public transport see CDIA (2011).

From informal to formal structures

In completely unregulated or illegal systems, the entrepreneurs themselves determine routes and fares, and income is directly earned. Hence the operators of these buses have an interest in operating the most economically attractive routes themselves. There is no public coordination, with – at best – informal structures for agreeing routes, frequency of service and fares.

Figure 57: *Informal transit in Nakhon Ratchasima, Thailand.* © Dominik Schmid 2010

In cities with at least some regulation, bus transport is controlled by issuing licences or concessions that entitle entrepreneurs to operate specific routes. The details specified in the licences and concessions can vary and may include the following:

- Setting the route;
- Frequency and quality of service;
- Fares;
- Vehicle safety;
- Provision of information on passenger numbers;
- Penalties for violating quality requirements;
- Time limit or termination option;
- Exclusive service.

Such a concession or licensing system can be seen as the first stage in the way towards a transit alliance. Transport planning should therefore introduce a ***licensing*** or ***concession system*** at the earliest possible stage.

☞ For more details see SUTP Module 3c: *Bus Regulation & Planning* and the *BRT Planning Guide*, both available at http://www.sutp.org

Box 19:

Foshan (China) initiated a fundamental reorganisation of its public transport system in an effort to bring about sustainable improvement. A legal entity was created that covered the inner districts in the first stage, rather than the entire city of six million inhabitants, in order to gather experience. The licences previously held by unregulated transport operators were bought back, giving the Foshan Transport Company (FTC) the necessary power to enforce reorganisation of the entire bus network with 60 routes. The services and timetable were established and new contracts were signed with the transport operators. Currently, there is a single fare for tickets, but graduated fares are to be introduced for the whole city. The contractually agreed transport services are now monitored by GPS. The number of passengers has grown by almost 50 %. The next steps are to expand the FTC to cover the whole city, and to integrate an almost complete underground railway line into the system. The project to integrate transit services took three years in total from the decision to the opening of the FTC, a comparatively brief period.

Source: traffiQ

The most radical changes occur when integrating a newly constructed metro, light rail or BRT system into a bus-reliant transport system. Normally where the bus is the main mode of public transport, numerous routes connect the areas with heaviest demand. When introducing a high-capacity line it makes sense to organise feeder bus lines to connect the new service with residential areas and destinations of interest.

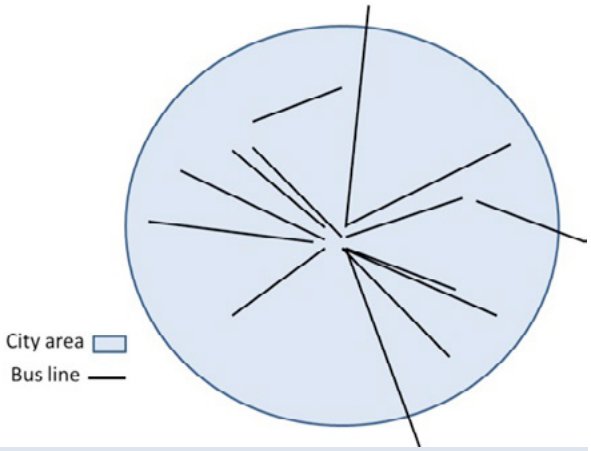


Figure 58: *Model of unregulated bus network*

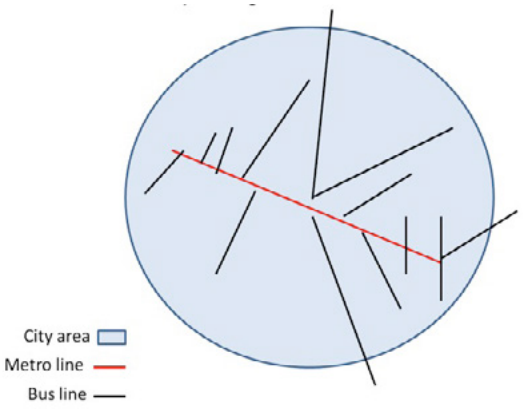


Figure 59: *Model of regulated transit with metro line*

Carefully dealing with opposition

When reorganising public transport networks, the agency in charge will likely have to deal with opposition from established operators. They would no longer be able to independently determine their routes, frequency of service, fares, deployment and equipment of vehicles, etc. They would lose this power and instead become contractors of a transit alliance or regulatory authority.

Incumbent operators often refuse to change the routes they serve. They fear a reduction in profit or even a total loss of business, and there is often a fundamental refusal to change familiar ways of operating.

There are many ways of handling such opposition, depending particularly on the legal situation. If the system has time-limited licences or concessions, the authorities are in a stronger position to renegotiate or cancel them. There is experience available from many cities where such transformations took place, *e.g.* in Bogota, Quito, Johannesburg, Seoul and others.

Box 20: Transsantiago

In Santiago (Chile), the entire bus network was reorganised in 2007. Planning included harmonising bus routes with the metro system and several BRT routes. Previously, there was a large number of bus routes offering passengers slow connections but without the need for transfers. A new ticketing system was introduced along with the new network. The reorganisation ended in a fiasco that almost brought down the government. It turned out that passengers had not been adequately informed of the changes, and that the new bus network had not been sufficiently thought through. At the same time, the city had tried to reduce the number of buses in service by 40 %. Once the problems had been addressed, public satisfaction with the system grew, along with the number of passengers.

Source: traffiQ

The predominant share of public transport provision is informal in most developing cities, and generally defined by the lack of a licensing procedure, or a regulatory vacuum. According to field studies in cities where informal public transport dominates, associations or syndicates of bus owners often assume the coordinating role, with limited control by respective authorities.

☞ There are a number of studies on structures in informal public transport, see *e.g.* Kumar, Barrett (2008), Trans-Africa Consortium (2010), CDIA (2011)

Assessments of the informal transport sector are ambivalent. On one hand these operators provide urgently needed transport services that are not provided by the public sector. On the other hand, the lack of supervision may lead to substantial problems with driver reliability and vehicle safety. A further problem is that the city has little power to influence these operators. If the transport operators refuse to cooperate, there are few actions to be taken against them if operating licences are not required.

Box 21: Johannesburg

In Johannesburg, a BRT system (Rea Vaya) was established in the run-up to the 2010 soccer World Cup. Minibuses (informal taxi operators with minibuses with 12–16 seats) previously served the routes planned for the BRT. There were major problems with safety and working conditions in this minibus system, and there were even violent clashes between drivers (taxi wars). From the start, policy-makers were expected to offer minibus drivers alternative occupations. In the first step, minibus drivers were informed in detail of the plans, and the associations of drivers were given administrative assistance to organise them as counterparts able to negotiate. A plan for the transition was then worked out together with drivers associations. Minibus drivers were given an opportunity to relinquish their vehicle and concession voluntarily. In return they were given shares and offered jobs in the new bus company. The package included training, payments to the drivers during the transitional period, and compensation to drivers who had been harassed by other minibus drivers. GIZ supported the BRT planning process in Johannesburg.

☞ For a detailed report, see GIZ (2011), SUTP Case Studies in Sustainable Urban Transport #7: *Negotiating the Deal to enable the first Rea Vaya bus operating company*. Available at http://www.sutp.org

The options depend not only on the legal status of the incumbent operators but also on political and media support.

Where opposition from operators is serious, it can be helpful to support the formation of an association of operators as a first step, so that the transport authority has a party it can deal with (this has been done in Bogotá, Johannesburg and other cities). Subsequently, an effort can be made to introduce voluntary commitments by operators on quality and safety.

Incentives can be created to integrate informal operators, with training measures, investment grants for new vehicles and guarantees for fare revenue if operators are willing to participate in a concession system or operate centrally allocated routes in the future.

Figure 60: *Public transport in Johannesburg relies to a large extent on small buses.* © Manfred Breithaupt 2007

Another incentive can be limiting access to bus lanes or bus stations to bus operators who participate in a formalised system.

Finally, depending on the legal situation there is also the possibility of increasing pressure on operators. This can be particularly useful if transport services are not being provided legally, or if safety standards are breached.

Figure 61: *Along the "Rea Vaya" BRT corridors in Johannesburg, public transport quality has significantly improved.*

3.4 Expanding the transit alliance geographically

Before making any decision on geographical coverage, it is necessary to analyse existing transport networks and routes. Particularly in developing cities, the size of the suburbs and travel patterns between the districts change rapidly. Therefore, the trips to be expected, or those that are desirable in terms of urban and land-use planning, need to be reflected in transport planning.

One obstacle to the establishment or expansion of a transit alliance is that transport networks in major cities often do not coincide with the administrative boundaries of cities and municipalities. This creates potential for conflicts, as the interests and priorities of individual cities and local authorities in the development of transport networks may diverge.

It usually makes sense to include at least the entire suburban area around a city in a transit alliance. However, if it is foreseeable that conflicts between different municipalities will endanger the success of a transit alliance, the establishment of a spatially limited alliance can be considered alternatively.

Summary – The Path towards Fully Integrated Public Transport

Car and motorcycle ownership in developing countries is rising at a fast pace while overall quality and comfort of public transport systems frequently stagnates. Although at cases large investments in mass rapid transit systems are undertaken, the needs of customers regarding seamless travel are often not met. Performance and profitability of expensive new systems are reduced by a lack of integration with other public transit services and non-motorised transport as well as by operational deficits and on-street competition between different operators. These factors create unattractive services for passengers, who must contend with badly arranged transfer stations and the need to buy several tickets when transfers are required. Hence, it is no wonder that the mode share of public transport in most developing cities is shrinking and the downward spiral of public transport continues.

Transit alliances in Germany, Switzerland, Austria and the Netherlands and a few other cities worldwide managed to raise the quality of public transport significantly and achieved remarkable success in attracting even those who easily could use their own car. Setting-up a transit alliance sometimes increased ridership three- to four-fold, causing considerable modal shifts away from private motorised vehicles. Their success originates in the integration of fare and information systems, the coordination of timetables as well as joint marketing activities and successively integrated local transport planning. Fully integrated public transport systems are able to fulfil customers' needs for convenience, adequate travel times, comfort, and easy access to public transit.

Transit alliances are a powerful and well-proven instrument for managing and coordinating public transport services in cities, regions and metropolitan areas.

A major concern of public authorities is the efficient use of available funds. In this respect, transit alliances take over tendering and monitoring duties and are responsible for contracting with the individual operators. Transit alliances can facilitate the introduction of quality and efficiency standards by integrating incentives and quality indicators in public service contracts. Therefore, capacities to continuously monitor quality of service and cost-effectiveness should be built up.

German citizens take the benefits of the alliance concept for granted, as expressed under the motto 'One timetable. One fare. One ticket.' Experienced alliance users often only truly become aware of just how beneficial the Verkehrsverbund (Transit alliance) model is when they are forced to buy different tickets for travel by metro, bus and tram in an alliance-free region (for example, abroad) and find themselves lost without the informative — and now familiar — network maps covering multiple means of transport.

(Günter Elste, former President of the Association of German Transport Companies, VDV).

Proper transit quality control includes the conduction of customer satisfaction surveys and direct investigations by the authority's staff. This can help to maintain the operators' interest to make public transport systems more attractive to customers. More attractive services will ultimately result in higher demand and farebox revenue.

The formation of a transit alliance requires careful planning, as a multitude of actors with partly differing interests – and even former competitors – must be included: individual carriers, private or communal public transport operators, infrastructure entities, local authorities and, above all, public transport users. Communication is essential not only to assuage potential protests against an alliance, but instead to convince all involved parties of the advantages of fully integrated urban public transport.

APPENDIX

Checklist for Establishing a Transit Alliance

Please note: The following steps do not necessarily need to be performed in the sequence shown – there is some overlapping, some flexibility is to be expected.

Collect basic data

- Master Plan for urban development or similar documents;
- Urban Mobility Plan or similar document, including information on:
  - Projections on population growth;
  - Projections and scenarios for transport sector development (including motorised individual transport and public transport);
- *Status quo* of public transport operations including paratransit, including information on:
  - Structure of formal and informal operators (operating companies, single operators, associations and syndicates);
  - Routes operated;
  - Vehicles;
  - Stops;
  - Traffic/passenger flows (origin & destination, passenger counts, passenger surveys);
  - Fare and payment structures;
- Overview of the agencies and institutions involved in planning, licensing and financing public transport;
- Understanding of existing processes for licensing and financing public transport.

Assessment of framework conditions for establishing a transit alliance

- Overview of the legal framework for the public transport system (*e.g.* requirements for driver licences, operator licensing, vehicle safety, financing);
- Preliminary identification of necessary improvements to the regulatory framework;
- Preliminary calculation of necessary investments (including for planning, building/upgrading infrastructure, purchasing vehicles, driver training, etc.);
- Preliminary calculation of funds required for establishing and operating the transit alliance;
- Preliminary calculation of expected fare revenues;
- Identification of relevant stakeholders:
  - Political stakeholders and associated partners (including public relations and press departments);
  - Current employees of both the formal and informal public transport sector, related associations, etc.;
  - Authorities and departments involved with planning, licensing and financing public transport;
  - Passengers and beneficiaries such as industrial/commercial establishments, shopping centres, etc.);
- Stakeholder analysis:
  - Expectations and requests of stakeholders;
  - Strategy for stakeholder participation/concept for external communication;
- Identification of risks:
  - Political and regulatory/organisational risks for transforming the current system into a transit alliance;
  - Risks related to planning and technical issues;
  - Risks related to timing and duration of transition period;
- Risk analysis:
  - Probability of a negative event happening;
  - Potential damage.

Setting targets

- Analysis of shortcomings of the current public transport system (including paratransit); achieving political consensus that such shortcomings shall be eliminated;
- Political decision to establish a transit alliance, including its main goals – *e.g.*:
  - Assuring access & satisfying the demand for mobility;
  - Fostering the local economy through provision of adequate access;
  - Affordable and fair fare system to enable universal access to mobility;
  - Costs covered (to the extent possible) by fare income;
  - Improving road/traffic safety;
  - Transit-oriented urban development;
  - Environmental protection.
- Political decision on those targets that can or cannot be achieved by the transit alliance;

- Political decision on target structure of the transit alliance:
  - Define an appropriate size of the future transit alliance, depending on local geographic, economic and political structures;
  - Define the decision hierarchy and organisational structure of the transit alliance;
  - Define the network to be covered by the transit alliance (routes and stops);
  - Set quantitative and quality related targets, such as maximum travel time within a metropolitan area, maximum walking distance to the next MRT station and to next bus stop, maximum transfer time to connecting public transport mean during off-peak periods and throughout the day
  - Standards for timetable integration, passenger information and marketing;
  - Outline of a common fare structure and necessary technology.

Implementation

- Establish a project team which shall be responsible for implementing the transit alliance;
- Milestones:
  - Final timeline for implementation;
  - Final organisational chart & business plan of the transit alliance;
  - Necessary contractual arrangements (*e.g.* between alliance, communities and regions involved);
  - Detailed infrastructure planning;
  - Detailed planning for timetable integration, passenger information and marketing;
  - Detailed planning for fare structure and necessary technology;
  - Final budget (calculations of expenditures including infrastructure and operating costs, as well as on revenues based on fares and public subsidies, if applicable);
  - Final concept for coordination with current operators, including paratransit;
  - Final concept for external communication;
- Final decision of political stakeholders on implementing the transit alliance, agreement on the above mentioned milestones;
- Implementation;
- Monitoring, evaluation, necessary adjustments; continuously reflect on service level indicators and benchmarks;
- Regular budget monitoring.

Recommended Reading

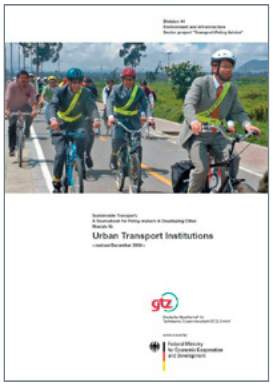
Publications of the Sustainable Urban Transport Project (SUTP)

Available for download free of charge at http://www.sutp.org.

SUTP Poster: 10 Principles for Sustainable Urban Transport

This poster shows selected sustainable urban transport policies and measures which will make cities a better place to live in.

(Available in more than 27 languages)



SUTP Module 1b: Urban Transport Institutions

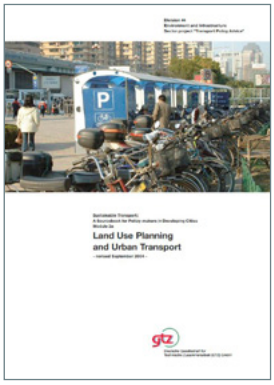
This module presents an analysis of urban transport institutional successes and failures in developing cities. It considers several in-depth case studies in a range of countries, explaining how institutional shortcomings have arisen and manifested. The module draws conclusions from the case studies in the form of recommended policy approaches required for effective urban transport institutions.

(Available in English, Spanish, Chinese and Romanian)

SUTP Module 1f: Financing Sustainable Urban Transport

This Sourcebook module provides detailed information on available options for financing urban transport. It presents different financing instruments and ways in which they can be best used, and how to optimally combine them. This module is dedicated to policy-makers, financial sector specialists and urban planners/practitioners working on key challenges related to financing urban transport systems.

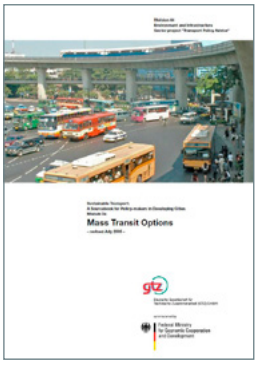
(Available in English, Chinese, Spanish, French, Indonesian, Portuguese and Vietnamese)



SUTP Module 2a: Land Use Planning and Urban Transport

Which cities have succeeded in establishing land use patterns which support the more environmentally-friendly and efficient modes of transit, walking and cycling? What are the benefits of better land use planning for developing cities? What are the key components of a successful land use and transport planning program in a developing city? How should urban transport and land use be organised? What can developing cities do to address increasing problems of urban sprawl and automobile dependency? This module addresses all of these questions and provides policy recommendations, with several case studies from developing cities.

(Available in English, Chinese, Spanish, Indonesian)



SUTP Module 3a: Mass Transit Options

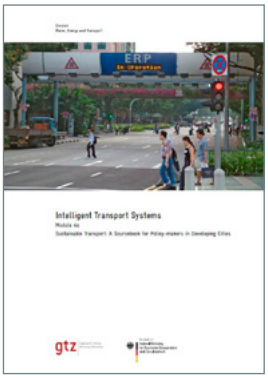
Choices about a mass rapid transit system are choices about a city's future. This module surveys mass transit systems around the world, and compares the different systems according to key parameters such as cost, construction time, environmental impacts, poverty impacts, speed, passenger capacity and so on. It concludes that although there is no single mass transit solution, for most developing cities Bus Rapid Transit may be the best option. It is complemented by a Training Course on Mass Transit.

(Available in English, Chinese, Spanish, Indonesian, Romanian and Vietnamese)

SUTP Module 3c: Bus Regulation & Planning

This module provides direction to developing cities on how to break out of a low quality, high-risk, low profit, low investment spiral in which so many urban bus systems in the developing world are now caught. It introduces and outlines the concept of an annual planning cycle, and shows how developing cities can improve bus systems from the viewpoints of operators, drivers, regulators, and passengers. It is complemented by the Training Course on Bus Regulation and Planning – Bus Sector Reform.

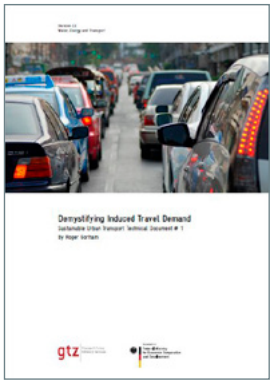
(Available in English, Spanish, Indonesian, Korean, Romanian and Vietnamese, Chinese)



SUTP Module 4e: Intelligent Transport Systems

As technology has developed in various areas, the transport sector has also benefited. These technologies used collectively for achieving safer, affordable and environmentally friendly transport systems are called Intelligent Transport Systems (ITS). The objective of this module is to display to decision makers the various advantages of different ITS measures and how it could be implemented in their cities urban transport systems for best outcomes.

(Available in English, Chinese, Spanish, Ukrainian, Vietnamese)



SUTP Technical Document #1 - Demystifying Induced Travel Demands

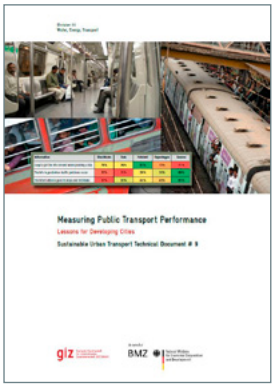
"If we build it, they will come": The question of induced travel demand attracts substantial interest from decision-makers, planners and the wider public alike. This technical document is intended as an introduction to the concept of induced travel demand and the principal arguments and debates surrounding the phenomenon.

(Available in English and Ukrainian)

SUTP Technical Document #4: Transport Alliances - Promoting Cooperation and Integration to offer a more attractive and efficient Public Transport

This report summarises the development of the German public transport alliance system, the so called Verkehrsverbund that is often regarded as the first and most successful form of integrated transport in the world. It offers information on aspects ranging from institutional issues to best practices in introducing an integrated fare system. This document also looks at transport alliances in the neighbouring country of Switzerland. The publication contains 130 fully illustrated pages 70 figures and 9 tables. Additionally it provides further reading and links on additional aspects of public transport alliances and public transport integration.

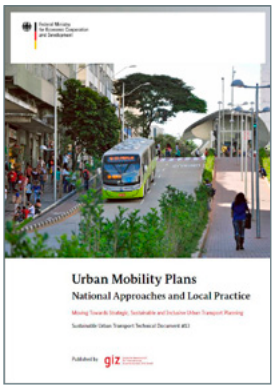
(Available in English, Russian)



SUTP Technical Document #9: Measuring Public Transport Performance- Lessons for developing cities

How can we make public transport a more attractive and viable mode of travel? What do our riders expect from our services and how can we serve them better? How can we make our cities more sustainable by increasing the modal shares of public transport? What sort of indicators shall we develop to evaluate and benchmark our existing public transport systems? Most developing country cities and public transport authorities face these questions as they take on the big challenge of augmenting and improving public transport services. While doing so, cities need an effective performance measurement system for public transport which helps them assess their progress and define where they want to go in the future. This technical document describes the role that performance measurement can play in public transport planning and management, the need for developing cities to adopt performance evaluation and the steps for initiating this. The document also presents examples on performance measurement from various cities across the world and their experiences. The document has been authored by Chhavi Dhingra.

(Available in English)



SUTP Technical Document #13: Urban Mobility Plans

The document reviews approaches for Urban Mobility Plans (UMP) from various countries and showcases a growing number of examples calling for a shift away from the traditional, infrastructure-oriented approach towards sustainable and people-oriented planning. Urban Mobility Plans are used as planning tool and policy instrument to guide the development of transport in urban areas and surrounding regions. In several countries, such as Brazil, France and India the development of Urban Mobility Plans has become an obligatory requirement for receiving national government funds for urban transport projects. The paper's intension is to support local policy-makers and planners in shaping urban mobility planning processes and policies in an effective and inclusive manner.

(Available in English, Spanish, Portuguese)

SUTP Case Study #7: Negotiating the Deal to enable the first Rea Vaya bus operating company

This case study deals with the transition process from informal paratransit services to a full-scale BRT scheme in Johannesburg, South Africa. It provides a rare, detailed insight in the complicated but successful negotiations between the City of Johannesburg and representatives of more than 300 individual minibus-taxi owners. The Case Study outlines the enormous challenges in bringing together the interests of public bodies and paratransit operators faced with a radical change to their business models and possible income losses. Further, it shares some of the lessons learned by the City of Johannesburg negotiations team in the process that may be useful to other cities transforming their public transport networks, with the participation of affected public transport operators.

(Available in English)

Other publications

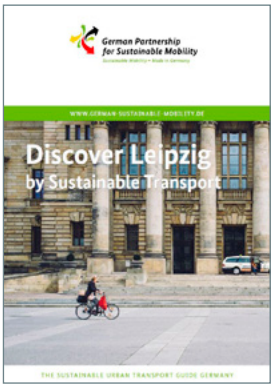
Discover Berlin by sustainable transport

Berlin is now once more a world-class metropolis – it is regarded nationally and internationally as a centre for politics, culture, art, media, science and sport. It is a major European transport hub and is continuing to grow in importance. People are drawn to Berlin for all sorts of reasons, from its quirky reputation and vibrant night life to its diverse range of old and new architecture and the high quality of life it offers.

Our new travel guide “Discover Berlin by sustainable transport” leads you from the new main train station to the transport hub of Alexanderplatz, to the redeveloped Potsdamer Platz with its high quality architecture before ending the tour in the trendy borough of Kreuzberg. Along the way, you will be able to experience different modes of transport, including the bicycle sharing system. The detour sections will describe the transport system in general, and present the city’s bicycle sharing system and the low emission zone system.

Download here: http://www.german-sustainable-mobility.de/publications

(Available in English)



Discover Leipzig by sustainable transport

Explore Leipzig by sustainable transport now with the new travel guide released by GPSM today! It features four tours that will let you discover the city using sustainable transport modes. In contains valuable information on the sights you will pass by and on Leipzig’s history and transport development.

The guide provides you with facts on mobility in Leipzig, *e.g.* bike-sharing and car-sharing as well as on the public transport network, regional and local transport companies, railway networks, ticketing and pricing.

On top, it features links to extensive informative material on general traveller’s information, sightseeing in Leipzig and bike trips.

Download here: http://www.german-sustainable-mobility.de/publications

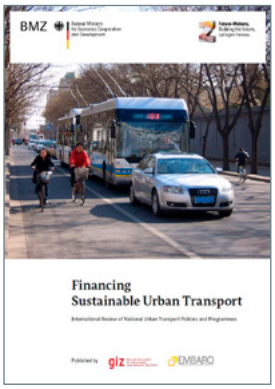
(Available in English and French)

Case Studies on Funding Sustainable Public Transport

To illustrate German financing public urban transport practice in detail, GIZ published two case studies – one on tendering public transport services in Frankfurt and one on integrated transport operation in Berlin.

Download here: http://sustainabletransport.org/case-studies-on-funding-sustainable-public-transport

(Available in English)



Financing Sustainable Urban Transport – International Review of National Urban Transport Policies and Programmes

Sustainable urban transport (SUT) systems are urgently needed in developing and emerging economies world-wide. Fast rates of motorisation, especially increases in private car ownership and travel have already turned congestion, air pollution and noise into common problems in many emerging and developing cities. Due to lost time and higher transport costs, road congestion is estimated to cost Asian economies 2–5 % of GDP per year already. Asian cities also suffer from the highest air pollution levels in the world with transport being one of its largest contributors.

As the number and size of cities is growing, metropolises are increasingly facing challenges to develop high-quality infrastructure and operation for all modes, especially sustainable modes such as walking, cycling and public transport. Hence, urban transport is no longer only a local concern. National urban transport policies and programs are an opportunity for central governments to help cities cope with the related challenges.

Download here: http://sustainabletransport.org/financing-sustainable-urban-transport-international-review-of-national-urban-transport-policies-and-programmes

(Available in English, Chinese)

SUTP.
Sustainable Urban Transport Project

SUTP – Sustainable Urban Transport Project. 2016: Celebrating 15 years of dedication to sustainable urban mobility — SUTP supports decision-makers worldwide to plan and to implement innovative and sustainable mobility solutions. SUTP offers a comprehensive knowledge platform, capacity development, hands-on advice and networking opportunities. Within the past 15 years, more than 5 000 decision-makers, planners and students have benefited from our training offers. We've produced a rich library of Sourcebook Modules, Technical Documents, Case Studies, Factsheets, Policy Briefs and Reading Lists. All documents are accessible through our webpage, along with a comprehensive photo collection and a video channel. Be invited to use and distribute them!
http://www.sutp.org
https://www.facebook.com/sustainableurbantransport-project
https://twitter.com/_SUTP

Transformative Urban Mobility INITIATIVE

TUMI – The Transformative Urban Mobility Initiative enables leaders in developing countries and emerging economies to create sustainable urban mobility. It offers technical and financial support for innovative ideas.
In TUMI the German Federal Ministry of Economic Cooperation and Development (BMZ) has brought together some of the world's leading institutions working on sustainable mobility with city networks and think tanks to implement projects on site where they are needed most. Partners include ADB, CAF, WRI, ITDP, UN-Habitat, SLoCaT, ITDP, ICLEI, GIZ, KfW and C40. A transition towards sustainable urban mobility requires a shift in policy making and investment decisions. TUMI will support projects, leadership development and career building for urban leaders, decision-makers, planners and students; ultimately connecting 1 000 leaders worldwide. We believe in capacity building, mobilization of investments and supporting approaches on the ground as the most effective measures to follow the set goals and achieving a more sustainable urban future.
http://transformative-mobility.org

German Partnership for Sustainable Mobility
Sustainable Mobility – Made in Germany

GPSM – German Partnership for Sustainable Mobility — The GPSM is serving as a guide for sustainable mobility and green logistics solutions from Germany. As a platform for exchanging knowledge, expertise and experiences, GPSM supports the transformation towards sustainability in developing and emerging countries. More than 150 friends from academia, businesses, civil society and associations are participating in the network and are happy to share their knowledge.
http://www.german-sustainable-mobility.de
https://www.facebook.com/germansustainablemobility
https://twitter.com/GermanMobility

GIZ INTERNATIONAL FUEL PRICES

International Fuel Prices provide decision-makers with data on fuel prices on a global scale.
GIZ, with its global network of projects in 135 countries, regional offices and representations in 64 developing countries, publishes a biennial study "International Fuel Prices" on the global fuel sector since 1999. On an annual basis, we are convening fuel regulators to discuss appropriate pricing and taxation schemes for fuel prices.
http://www.giz.de/fuelprices
https://energypedia.info/wiki/International_Fuel_Prices

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Abbreviations

AVV	Augsburger Verkehrs- und Tarifverbund (Augsburg transit alliance)
BHLS	Buses with High Level of Service
BRT	Bus Rapid Transit
CCTV	Closed-circuit television camera
DB	DB Bahn AG (German Federal Railway)
FTC	Foshan Transport Company
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
HHA	Hamburger Hochbahn AG (Hamburg municipal transport operator)
HVV	Hamburger Verkehrsverbund (Hamburg transit alliance)
IETT	İstanbul Elektrik Tramvay ve Tünel İşletmeleri (Istanbul Metropolitan Area Local Transport Operator)
ITS	Intelligent Transport Systems
KCRC	Kowloon–Canton Railway Corporation (Hong Kong)
LTA	Land Transport Authority (Singapore)
MRT	Mass Rapid Transit
MTR	Mass Transit Railway Cooperation (Hong Kong)
MVV	Münchner Verkehrs- und Tarifverbund (Munich Transit Alliance)
RATP	Régie autononome des transports Parisiens (Transport operator)
RER	Réseau Express Régional (Regional Express Network, Paris metropolitan region)
RFID	Radio-frequency identification
RMV	Rhein-Main-Verkehrsverbund (Rhine-Main transit alliance)
S-Bahn	abbr. “Stadtschnellbahn” (Name for suburban and commuter rail networks in Germany, Austria, Switzerland and Northern Italy)
STIF	Syndicat des transports d’Île-de-France (Public Transport Authority for Paris Region)
SNCF	Société Nationale des Chemins de Fer Français (French National Railway Company)
STM	Secretaria dos Transportes Metropolitanos (São Paulo Public Transport Authority)
TfL	Transport for London (Public Transport Authority)
VDV	Verband Deutscher Verkehrsunternehmen e.V. (Association of German Transport Companies)
VHH	Verkehrsbetriebe Hamburg-Holstein AG (Bus Service Operator)
ZTM	Zarząd Transportu Miejskiego (Warsaw Public Transport Authority)
ZVV	Zürcher Verkehrsverbund (Zurich Transit Alliance)

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