

# Increasing the Quality of Public Transport in Prague

Former socialist countries of Central and Eastern Europe have been experiencing profound political, social and economic changes in the period since the shift from socialism to capitalism after 1989.

Similarly to all countries from this region, in Czech Republic those changes have resulted in equally striking transportation revolution. Per capita car ownership in the entire country has increased and the number of vehicle km has more than doubled. Conversely, public transport (PT) usage has fallen considerably. The modal shift from public transport to the private car has been a result of changing life style, development of business activities and among other reasons also of removal of restrictions on car manufacture and import.

The change of political and economic system brought also changes in funding policy. Until 1989 the central government funded all PT capital investments and operating subsidies. After 1989 most of such funding was transferred to local municipal authorities. The sharp reduction of state subsidies allocated to public transport has necessarily resulted in fares increases, which has also encouraged the shift toward the private car. The sudden surge in car ownership and use has caused significant social and environmental problems: congestions, air pollution and noise, traffic accidents and a massive parking problem. Given their financial limitations, Czech cities are struggling to preserve, and further develop, their public transport systems.

The example of the City of Prague clearly illustrates the above mentioned developments:

- Prague covers an area of 496 km<sup>2</sup> with almost 1.2 million inhabitants and 200,000 temporary residents; 90,000 commuters and 75, 000 visitors come to Prague on a daily basis.
- Prague is characterized by massive commuting from large suburban residential areas to the city center, which results in high demands on its PT network (metro 49.8 km, trams 140.9 km, buses 686.1 km).
- Prague has faced a steep increase in car ownership (93%) from the beginning of 90<sup>s</sup> (actually 1 car per 1.8 inhabitants).
- Generally, daily motor vehicle use increased by 157% for the last fourteen years. Volumes of all vehicle use in Prague on an average working day amounted to 18.77 mil. vehicle km within the entire road network in 2003 (3,520 km).
- In the first half of the 1990<sup>s</sup> the number of passengers using PT in Prague decreased by more than 800,000 a day, i.e. about 20% of ridership. In the second half of the 1990<sup>s</sup> the ridership has been stabilized (1,108,367 passengers/year 2003). Current modal split: 57% PT: 43% private car (before 1989 80 : 20).
- Prague Metro system clearly illustrates changes in PT funding policy. First section of line C opened in 1974, continuous state subsidies allowed to develop extensions of about 2 km per year till the end of the 1980<sup>s</sup>. From the mid-1990<sup>s</sup> there were significant cuts in the state aid. Whereas in 1996 the subsidy amounted to €32 mil. in 1997 it was only a half of the sum and in 1998 the subsidy was completely suspended. It was partially renewed in 2000 with the extension of line C to the Northern City (€11.3 mil.). In 2001 it was again close to €28 mil. For the important part the extension is funded by the loan in the amount of €143.85 mil. granted by the European Investment Bank. For 2002 and 2003 the state subsidy was decreased again (€15 mil. for each year).

- For example, after transferring most of financial burden (capital investment and operating subsidies) to local authorities, municipal budget of the City of Prague in 2003 amounted to €1.46 bn., with €510 mil. (35%) allocated to transport. Expenditures in connection with operation, modernization and development of PT account for over 69% of this amount.

With regard to an increased competition of private cars, multiple fare increases and given the fact that many services in other sectors have been significantly improved it has become clearly evident that PT has to offer services of higher quality.

Given the city's historic, hilly and architecturally diversified character, such effort can be successful only through a gradual implementation of a clearly defined transport policy. Eight of the nine principles introduced by the **“Transport Policy Principles of the City of Prague”** from the mid-90<sup>s</sup> are closely related to operation and development of PT system in the capital of the Czech Republic.

This presentation attempts to briefly illustrate the current implementation of five of those principles, which are very likely to have a direct or indirect impact on improving the quality of public transport.

**Principle II. calls for the following: ... to harmonize development of transport system and development of residential areas; ... to aim at decreasing of transport demand in the city through urban planning.**

The chart drawn by the City Development Authority of Prague shows that densely populated housing estates in SE, E and W are served by metro system. A new metro extension is being developed to the Northern City housing estate. A new line D is planned to serve the southern residential area of Modřany.

One of the priorities of the Strategic Plan is a transition from an existing monocentric arrangement to a polycentric structure of the city. New secondary district centers have emerged in areas located close to main metro stations (Anděl, Karlín, Maniny, Bubny, Pankrác, ...).

Prague has succeeded in developing large “shopping parks” in coordination with the metro system by locating them at both terminuses of line B.

**Principle III. recommends ...to design, develop and manage transport structure as a complex system of all transport modes that have to cooperate rationally.**

### **ROPID and Prague integrated transport (PIT)**

The organising authority responsible for organising an integrated system of public transport in Prague and its neighbourhood (PIT) is ROPID – Regional Organizer of Prague Integrated Transport. ROPID was established as a municipal organization funded by contributions of the City of Prague and started to operate from 1 December 1993.

Rail transport (railway, metro, trams) constitutes the core of PIT system, buses are predominantly used as feeders to terminals developed next to railway stations/stops. The system benefits also from integration of P&R (Park & Ride) facilities, located next to metro or large railway stations in suburban areas, into PIT system.

PIT fare is based on travel time and number of zones. The area covered by PIT is divided into 7 fare zones; two of these zones, namely the P zone and the finishing 0 zone, cover the territory of the capital and neighbouring area is divided into five external zones (1, 2, 3, 4, 5) extending up to 40 km and somewhere even up to 60 km from the city centre. Introduction of an integrated transfer ticketing system has facilitated to make a journey including all

necessary intermodal changes using a single ticket irrespective of the means of transport or operator.

As of 1 October 2002 PIT services were provided by 16 operators with Prague Public Transit Co. Inc. as the major operator. Czech Railways hold also a dominant position in providing public transport services. Other operators are private bus undertakings established after dissolution of a state-owned bus transport undertaking (CSAD) after 1989. Until 1993 they provided transport services within the framework of Prague public transport only as subcontractors of Prague Public Transit Co. Inc.

A relatively dynamic development of PIT is illustrated by the following table:

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Number of municipalities serviced by PIT lines</b>	7	15	55	69	83	104	159	218	259	278
<b>Number of regional bus lines included in PIT</b>	6	11	31	38	48	54	89	114	131	146
<b>Number of railway stations integrated into PIT</b>	43	59	181	181	181	181	190	200	219	221
<b>Share of PIT tickets used on railway (%)</b>	17.4	25.5	29.1	32.5	35.6	37.2	39.2	43	52,1	56,5

Within two years from its establishment ROPID managed to prepare and implement contracts with respect to the new fare and PIT ticketing system (effective from 1 June 1996). These contracts are a basis for engagement of more operators in the ITS within the Prague region.

Integrated fare has been implemented based on a Tariff Agreement signed by all operators. This agreement solves distribution of revenues based on a key developed by ROPID. Regional bus lines included in PIT system are operated based on dozens of contracts negotiated between the City of Prague (represented by ROPID) and/or relevant municipal authority (outside Prague boundaries) and the relevant operator. Operators of newly introduced lines are selected through public tenders announced by ROPID.

Integration of the Czech Railways in the PIT system is covered by a separate bilateral Tariff Agreement between the City of Prague, represented by ROPID, and the Czech Railways. Railway transport has played an important role in developing the PIT system. To be able to become an adequate part of the core transport system it must promptly cope up with many drawbacks (such as e.g. obsolete rolling stock, poor conditions of railway stations or poor quality of travel comfort), but mainly with drawbacks of operational nature by implementing cycle transport on all tracks included in the PIT system (25 tracks within PIT region, including 10 tracks with 43 stations and stops within the territory of the capital).

### **Quality criteria for designing public transport offer in Prague**

Based on regular traffic surveys and based on requirements of particular city districts and municipalities ROPID draws up a plan of annual volumes of transport services to be provided in the year to come and calculation of costs of transport service provision. This plan is submitted to the Prague City Council for their approval. Based on the approved plan ROPID develops a particular Public Passenger Transport Organization Project (PPTOP) covering routes of all lines and frequency of applying to individual lines. It is then provided to operators as a basic material to prepare timetables. When designing the PPTOP ROPID draws on quality criteria recommended by a working group consisting of representatives of the Transport Department of the Prague City Hall, ROPID, Prague Public Transit and

Transportation Engineering Institute. This working group has recommended as the main priority to focus on the following issues:

- passenger-carrying capacity of PT vehicles;
- the highest permissible intervals between links on PT routes;
- city centre availability.

The initial intention to design standards from 1996 was extended by a design of nominal values even for 2005. Quality criteria were approved by the Prague City Council in August 1995.

Standard passenger-carrying capacity of PT vehicles was determined, defined as the number of passengers in a vehicle with all seats occupied and provided that the floor area designed for standing passengers accommodates 4 persons/m<sup>2</sup>. This is the basis to determine the required level of use of passenger-carrying capacity in per cent.

### The level of use of passenger-carrying capacity in max. hour

Period	subsystem	PPTOP 1996				PPTOP 2005			
		max. hour		max. quarter of an hour		max. hour		max. quarter of an hour	
		standing pers./m <sup>2</sup>	% of standard capacity of 4pers/m <sup>2</sup>	standing pers./m <sup>2</sup>	% of standard capacity of 4pers/m <sup>2</sup>	standing pers./m <sup>2</sup>	% of standard capacity of 4 pers/m <sup>2</sup>	standing pers./m <sup>2</sup>	% of standard capacity of 4 pers/m <sup>2</sup>
morning peak	metro	3,2	80	3,4	85,0	2,6	65	2,7	67,5
	tram	2,8	70	3,9	97,8	2,6	65	3,6	90,0
	bus S	4,0	100	5,7	142,5	2,6	65	3,7	92,5
	bus K	4,0	100	5,7	142,5	2,6	65	3,7	92,5
off-peak	metro	2,6	65	3,2	80,0	2,0	50	2,4	60,0
	tram	2,4	60	4,0	100,0	2,0	50	3,3	82,5
	bus S	3,2	80	5,6	140,0	2,0	50	3,5	87,5
	bus K	3,2	80	5,8	145,0	2,0	50	3,7	92,5
afternoon Peak	metro	3,2	80	3,3	82,5	2,6	65	2,7	67,5
	tram	2,8	70	4,5	112,5	2,6	65	4,2	105,0
	bus S	4,0	100	5,6	140,0	2,6	65	3,7	92,5
	bus K	4,0	100	5,7	142,5	2,6	65	3,7	92,5

The table clearly shows efforts to reduce vehicle occupancy rate, and that also to reduce the number of standing persons to achieve the level of use of passenger-carrying capacity of no more than 65% in peaks and 50% in off-peaks by 2005.

### Proportion of seated and standing passengers in PT vehicles

rail vehicles	max. 1:2	at least 30% seated persons
buses	max. 1:1	at least 50% seated persons

The above mentioned figures are applied to reconstructions and orders for acquisition of new vehicles.

The highest permissible intervals between links on PT routes on working days  
(excluding evening and night operation)

means of transport	metro		tram		bus	
city zone	1+2	3	1+2	3	1+2	3
interval (min)	5	10	10	10	15(30)	30(60)

For the purposes of the preceding and the following table the territory of the capital has been divided into 3 zones as follows: 1 – central zone, 2 – middle zone, 3 – external zone (outskirts). Figures in brackets are admitted only in justified cases and should not be exceeded.

City centre availability (i.e. travel time needed to reach the centre)

City zone	Assessment of availability (min)		Share of trips in accordance with the standard (%)		
	1996	2005	morning peak	off-peak	afternoon peak
1	20	20	90	90	90
2	40	35	90	80	90
3	60	55	90	80	90

These figures are taken into account e.g. when designing routes in order to meet the criterion which provides that 90% passengers reach the city centre from the outskirts in less than 60 (55) minutes.

The above mentioned criteria are used in PPTOP development and serve also as a guidance in developing timetables. They apply only to public transport within the capital and do not apply to regional bus lines.

**Principle V. calls for ... development of transport system not only in terms of passenger-carrying capacity, but also in terms of ... sufficient quality.**

In the first half of the 1990s Prague Public Transit Co. Inc.'s effort was aimed at improving provision of passenger information which was practically neglected in the past. A more comprehensive and systemic approach to service improvement was established only after introduction of the Service Quality Programme which was prepared in 1997 and implemented in 1998 in a close cooperation with Parisian RATP.

The Programme is based on the European standard EN 13816 "Transportation Logistic and Services - Public Passenger Transport - Service Quality Definition, Targeting and Measurement" adopted in April 2002, whose main objective is to promote a qualitative approach to PT operation.

Development of the first customer-oriented quality standards implemented from 1998 was based on the quality cycle method (CYQ) developed by RATP and forming the basis of the European standard. This method distinguishes between the action range of individual quality actors, clients on the one hand and operator and his partners on the other. It respects clients' expectations and offers an action framework taking into account various corporate limiting factors.

The cycle is thus based on **expected quality** representing a manifold set reflecting individual client perceptions of transport and services. **Desired quality** in the form of defined service quality standards is a compromise between meeting clients' needs as much as possible and converging, but nevertheless different interests and needs of the transport undertaking to achieve a sustainable quality with regard to limitations of financial, social, environmental and managerial nature.

Apart from a brief service standard definition the desired quality has two other basic dimensions: desired level as assessment of the percentage of customers benefiting from the service standard and definition of situations, which are considered unacceptable.

Definition of accurate, consensual and customer-oriented criteria is very demanding in terms of transparent and developed cooperative relations among all actors and helps in their developments.

Field service **quality measurements** are a key element of the system enabling to assess the **quality delivered** by the undertaking. Credibility of quality management system depends to a considerable extent on the reliability of standards measurements. Measurement is thus a key instrument of quality management and it is advisable that it becomes, despite its high demands on resources, a fully respected activity.

**Perceived quality** closes the quality cycle and is a result of the process of identifying whether the quality delivered is not inconsistent with subjective client perception of such quality.

Four priority service quality standards have been measured from the beginning of 1998:

- Punctuality
- Passenger information
- Customer care
- Uniform discipline

From 2000 the 5<sup>th</sup> standard has been introduced addressing improved - “operability of ticket vending machines”, and from 2004 the 6<sup>th</sup> standards “operability of metro stations equipments for people with reduced mobility”.

In its five years of existence of the Quality Programme the desired quality has been redefined several times in terms of anticipated developments of clients’ expectations. Experience of Prague Public Transit Co. Inc. has confirmed the nature of the quality cycle as a mobilization instrument stimulating gradual changes in customer focus.

In the course of six years of its existence the Service Quality Programme has been developed within the framework of the initial five quality standards – increased volume of samples measured, objectivized measurements, implementation of corrective measures in cases of identification of reserves against defined desired levels of achievement, changes of in-house regulations, etc. Gradual improvements of standards achieved have been particularly a result of initiatives taken by a number of programme participants, most obviously by corporate unit faced with the competitive pressure in the system of regional bus services included in the PIT system. Competition has been obvious even within the company. For example excellent achievements in applying the standard of passenger information within the Tram Unit resulted in similar measures (technical equipment of bus interiors) taken by the Bus Unit facilitating comparable achievements. On the contrary, amendments of in-house legislation and field control measures resulting in significant improvements in punctuality with respect to bus services initiated adoption of similar measures by the Tram Unit management. Apart from initiatives the programme identifies places of stagnation, more precisely lack of preparation to response to impetuses offered by regular measurements of performance.

The results achieved within the framework of five quality standards measured can be currently assessed as stabilized to the extent that the transport operator feels ready to negotiate about a new stage of incorporating the quality requirements into the contract as well as to consider a gradual replacement of the unilateral penalty approach by a bonus/penalty system which could present a significant incentive of further quality developments.

The Service Quality Programme of PPT is an in-house corporate initiative. It is not yet a subject of any contract with the transport authority. It introduces new impulses which are monitored by Bohemian and Moravian transport undertakings.

Participation of PPT in the CYQUAL Club, co-founded by RATP, STIB, TPG and Metro Madrid, is a background for its further development through sharing experience of major partners. Mutual discussions involving issues such as measurements, internal and external

communication, preparation of certification, staff training, etc. contribute to further development of the programme and service improvements.

The programme is a kind of preparation for the upcoming competitive environment and its further progress is fully depending on management development – establishment of an appropriate structure, training system and a more dynamic implementation of corrective actions.

The progress of the programme so far has confirmed that it is an efficient tool in changing the corporate customer focus. Work performed in connection with defining (and redefining) the service expressed in client's logic, measurements of results and implementation of action plans facilitating a gradual progress towards set goals have many managerial impacts:

- establishment of internal partnerships; application of same standards in individual networks (metro, trams, buses) results in cooperation in joint issues and in synergy of activities
- discussion about service quality are not more based on feelings but on objectivized measurements of results; such results illustrate development trends; development of their presentation boosts corporate culture
- increased continuous demands on the service provided; staff training is more focused on the service defined in objective terms
- trend of positive changes in mentality of significant staff groups

**Principle VI. calls for the following: ... to prefer operation and development of environmentally friendly transport system.**

Since 1974 the metro represents the key element of Prague PT system. Prague tram network with its more than 140 km of track is one of the largest in Europe.

The first part of the metro line C extension (Holešovice – Ládví) started in September 2000. The 4 km long segment leading to a densely populated area in the northern part of the city, and opening for the operation in one month, will ensure a crucial improvement of radial links to the city center for approx. 90.000 inhabitants. Construction of the 2<sup>nd</sup> stage is scheduled to start in 2004.

Tram line extension Hlubočepy – Barrandov in operation from December 2003 serves a densely populated S-W Barrandov housing estate, served by buses traveling on steep and congested roads. The track, completely separated from car traffic, with two bridges, is 3.6 km long.

**Principle VII. calls for the following: ... to ensure safe pedestrian transport and provide a transport system acceptable for persons with impaired mobility and low orientation ability.**

PPT Co. Inc. consistently aims at making its services available to all groups of inhabitants and improving the accessibility of its PT system to persons with impaired mobility. PPT Co. Inc. continues in its effort to implement measures to provide Metro stations with barrierless access. Twenty-two of a total of 50 stations were provided with barrierless access (passenger lifts, freight lifts with an attendant, pavement level access ramps). The availability of passenger lifts at all stations is an integral part of new Metro line projects (IV.C1, IV.C2 and the completion of the IV.B and V.B segment).

On the metro, acoustic beacons have been installed in metro station to help the blind find their way. The installation of receivers for the blind onboard surface transport vehicles is another important measure. This equipment, installed in all tram cars and buses, enables remote-controlled activation of an external announcement giving waiting passengers the route

number and destination of the approaching vehicle and alerting drivers to the fact that a blind person wishes to board. All of the above equipment can be operated by a single universal command transmitter which to date it is available to about 2 000 blind citizens in our company.

PPT's fleet is equipped with vehicles enabling barrierless loading/unloading. At the end of 2003, the bus fleet included as many as 310 low-floor vehicles and other 100 low floor buses are to be bought in 2004. These buses now operate on selected links of 79 routes on working days. Links served by low-floor vehicles are designed in timetables at stops for easier identification.

Zden•k Došek  
International Relations, Quality Service  
Prague Public Transit Co. Inc.  
Tel. +420 296192010  
e-mail: dosekz@r.ddp.cz