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COMPARISON OF PUBLIC TRANSPORT SERVICES ORGANIZATION IN THE PRAGUE AND WARSAW METROPOLITAN REGIONS

Summary. This paper presents a selective comparison of the organization of public transport in the metropolitan regions of Prague and Warsaw. A brief description of the regions and the specification of the most important characteristics of public transport systems has been shown.

Keywords: Public transport, city transport, city logistics

PORÓWNANIE ORGANIZACJI PUBLICZNEGO TRANSPORTU MIEJSKIEGO W REGIONACH METROPOLITALNYCH PRAGI I WARSZAWY

Streszczenie. Artykuł przedstawia wybiórcze porównanie sposobu organizacji transportu publicznego w regionach metropolitalnych Pragi i Warszawy. Przedstawiono krótki opis regionów oraz wyszczególnienie najważniejszych cech publicznych systemów transportu miejskiego.

Słowa kluczowe: Transport publiczny, transport miejski, logistyka miejska

1. INTRODUCTION

Passenger public transport serves is provided for fulfillment of transport needs of citizens in certain region. The need of securing of transport services is generally accepted, it's essential part of sustainable development of every region. The metropolitan regions usually bring new challenges for passenger public transport, because the commuting intensity is very

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high and the capacity of transport network limited. Access roads are usually overcrowded due to the individual car transport. The capacity of railways isn't sufficient to enable long distance trains, intensive commuting trains operation with short headway and the freight transport, while the extension possibilities are restricted by cramped conditions in the inner cities and limited financial resources for building railways in other levels (underground, elevated connections). Due to the social character of public transport services the organization by competent authorities should be provided. The organization of public transport services in metropolitan regions is therefore very exacting.

The provider has to find optimal model of public transport services reflecting transport needs of the inhabitants in the central city, in suburban regions and other cities, coordinate all transport requirements from the central city, local municipalities and other relevant authorities. The issue of this paper is to show the differences between organization of public transport services in metropolitan regions in Czech Republic and in Poland shown on the example of the Prague and Warsaw regions.

Both countries lie in the central/eastern Europe and both of them have gone through the economic transformation from socialism to capitalism in recent 25 years. Czech Republic as well as Poland is also the member of European Union respecting *acquis communautaire*. Safe, efficient and high-quality public transport services are one of the main objectives of common European transport policy, mentioned in Commission's White Paper of 12 September 2001 "European transport policy for 2010: time to decide" as well as the focus on public transport services in the new Commission's White Paper of 28 March 2011 "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system" can be found [1, 2].

2. ORGANIZATION OF PUBLIC TRANSPORT IN THE PRAGUE METROPOLITAN REGION

The Prague metropolitan region is wider suburban area of Czech capital of Prague. This area covers the whole area of the Prague municipality area and adjacent parts of Central Bohemian region. The Prague metropolitan region covers approximately 3,500 square kilometres. The area is marked by the green colour in Fig. 1.

The whole area has approximately 1.83 million inhabitants. The real amount of people living in the discussed area is higher due to the people living in Prague and its surroundings without the official permanent residence (students, workers, foreign workers, students and long-time visitors, ...). The estimation talks about 2,5 million people in the region. The names of biggest cities Prague and Kladno are mentioned in the map, the location of other cities with population exceeding 10,000 is shown as well. The review of cities in Prague metropolitan region with more than 5,000 inhabitants is shown in table 1.

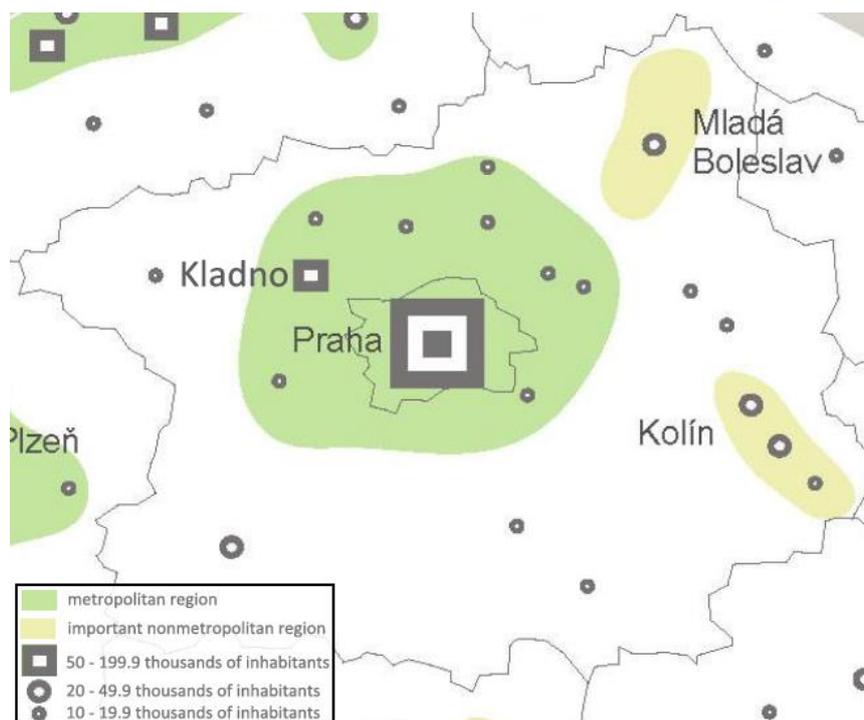


Fig. 1. Central Bohemia region with marked area of Prague metropolitan region [3 edited by author]
 Rys. 1. Czechy z zaznaczonym obszarem regionu metropolitalnego Pragi

Table 1

Review of municipalities exceeding 5 thousands of inhabitants
 in Prague metropolitan region [4]

Name	Population	Comment
Prague	1,241,664	Czech capital and biggest city.
Kladno	68,682	13 th biggest city in Czech Republic, the biggest city in Central Bohemian Region
Mělník	19,532	Plus 1,043 inhabitants in adjacent city of Liběchov
Beroun	18,778	Plus 6,998 inhabitants in adjacent city of Králův Dvůr
Kralupy nad Vltavou	18,098	Plus 1,932 inhabitants in adjacent city of Veltrusy
Brandýs nad Labem-Stará Boleslav	17,389	Conurbation
Neratovice	16,472	
Slaný	15,353	
Říčany	13,856	
Čelákovice	11,615	
Roztoky	7,839	
Hostivice	7,506	Plus 1,930 inhabitants in adjacent village of Chýně, plus 1,231 inhabitants in adjacent village of Jeneč
Jesenice	7,036	This municipality doesn't have the status of city
Králův Dvůr	6,998	Adjacent to above mentioned Beroun

cont. table 1

Český Brod	6,843	
Černošice	6,447	
Úvaly	6,037	Plus 1,428 inhabitants in adjacent village of Škvorec
Odolena Voda	5,542	

Despite the local centre can be found in the Prague metropolitan region, the relations of this centres to Prague are very strong as well as the relations of other municipalities in the region. The strongest relation is commuting to school and work.

Prague has dominant position in Czech economics (about 25% of Czech GDP) with the emphasis on the tertiary sector (approximately 80% of job in Prague). Many foreign investments were placed in Prague and Prague is also one of the most visited cities in Europe for tourists.

2.1. Public transport services in the Prague metropolitan region

The public transport service in Prague is based on three lines of underground, wide network of tram lines, municipal train lines and backbone bus lines. This backbone network is supplemented by the standard bus lines, ferryboats, cable car and the regional bus and train lines on the area of Prague. The public transport service is integrated in one system named Pražská integrovaná doprava (Prague Integrated Transport), abbreviated as PID. PID Integrated transport system brings the standard benefits of integrated transport systems – common tariff, timetable, contractual and transport terms, cooperation of traffic modes and including P&R, K&R, B&R to the system of public transport. The map of backbone network in the city of Prague is shown in Fig. 2.

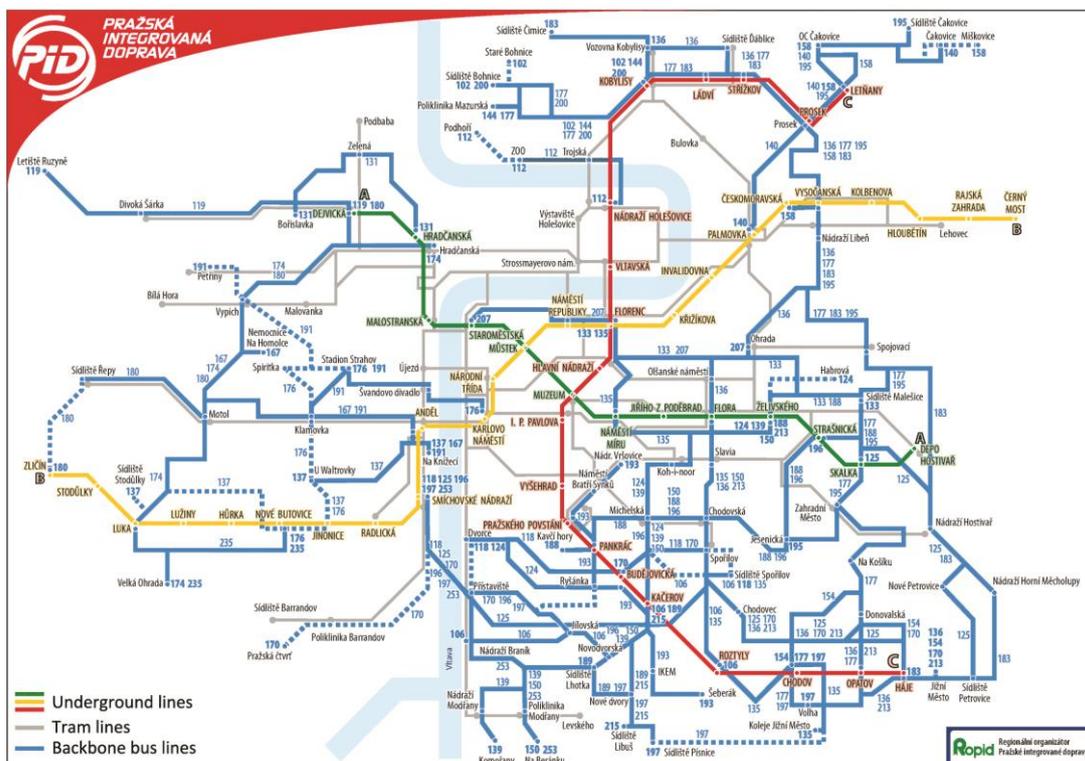


Fig. 2. Backbone network of underground, tram and backbone bus lines in Prague [5 edited by author]
Rys. 2. Sieć szkieletowa metra, tramwaju i autobusu w Pradze

PID system covers almost the whole area of Prague metropolitan region, it serves 361 municipalities with its 2,590 stops. The public transport services in parts of Prague metropolitan region, where PID system isn't operated, are provided by the local bus lines and municipal bus lines. These lines are sometimes operated in the same area, where PID lines are operated. This situation might be confusing for passengers and competent authorities shall find a solution to integrate all public transport services in the Prague metropolitan area into one unite system.

The basic data about lines integrated in PID system is assumed in the Table 2. This table includes available exact data and estimations from mentioned statistics in cases where exact data isn't available.

Table 2

Basic data about lines integrated in PID system [5-9]

Transport mode	Operational network [km]	Amount of lines (day / night lines)	Transport performance in 2011 [km]	Annual amount of transported passengers [-]
Metro	59.10	3/0	53,826,161	530,493,000
Trams	142.40	21/9	45,017,769	311,057,000
Municipal bus lines	700.00	162 ⁴ /15	62,308,376	318,070,320
Suburban bus lines	- ⁵	155 ⁶ /10	24,708,464	52,927,590 ⁷
Train lines	671.00	33 ⁸ /0	13,947,199	18,421,000 ⁹ 9,190,790 ¹⁰
Funicular	0.51	1/0	22,556	1,841,450
Ferry lines	1.47	4 ¹¹ /0	55,747	641,730

2.2. Organization of public transport

The overview of public transport organization in Prague metropolitan area is divided into two separate parts, first part describing the PID system and the second part describing the lines outside the PID system.

⁴ Including 21 lines are the lines for school children operated shooldays only (these lines have only few connections, often only 1), 1 line operated for disabled people (☿ 1 Chodov – Florenc – Černý Most), 1 airport line (AE "Airport Express" Hlavní nádraží – Letiště), 9 shopping mall lines (connecting shopping malls with metro stations).

⁵ The value isn't available.

⁶ Including 1 line for cyclists (🚲 Dobřichovice,nádraží – Kytín,náves) operated only from April till October.

⁷ Overall number of transported passengers by all regional bus services in the Central Bohemian Region.

⁸ Including 1 line for cyclists („Cyklovlak" Praha Masarykovo nádraží – Slaný) operated only weekends from April till October and 2 historical lines („Pražský motoráček", „Posázavský motoráček“) operated only on chosen weekends.

⁹ Only in the area of Prague municipality.

¹⁰ Overall number of transported passengers by all train services in the Central Bohemian Region.

¹¹ Including 1 seasonal line (P5 Kotevní – Císařská louka – Výtoň) operated only from April till October.

2.2.1. The PID system

The PID system is organized by Regionální organizátor Pražské integrované dopravy (Regional Organizer of Prague Integrated Transport), abbreviated as ROPID. It is established as a contributory organization of the City of Prague. It organizes the public transport services in its area and closest surroundings. It is responsible for all public transport contracts provided to fulfil transportation needs in the area of Prague. The aim of company of ROPID is:

- providing of public transport services and planning of the development of the integrated transport system,
- application of principles of public transport services organizing, determination of needed level of public transport services and communication with affected municipalities,
- processing of the quality standards and their system,
- transport arrangements, headways, lines, timetables, cooperation and connection proposals,
- preference arrangements,
- economical providing of the PID system everyday operating,
- tariff and pricing proposals,
- public transport services contracting,
- financial flows organization, clearing,
- competitive award procedures.

As mentioned above ROPID organizes public transport services in the wider area than Prague, the financial subventions are provided by the city of Prague, Prague city parts, Central Bohemian region, local municipalities and other subjects (shopping malls, large companies). The financial subvention is given by certain subjects to provide the public transport service according to its needs. The needs of all subjects are coordinated by ROPID which brings favorable synergic effects.

The PID system consists of 413 lines. The most part of them is operated by the Dopravní podnik hlavního města Prahy (The Prague Public Transport Company) abbreviated as DPP. This company operates all metro and tram lines and most of the bus lines. The other lines are operated by another 16 operators, chosen lines are operated by more operators. Thanks to PID rules and tariff the information about certain line operator isn't important for the passengers, they are using PID as an unitary system. The financial flows in PID system are shown in the scheme in Fig. 3.

2.2.2. The lines outside PID system

The Prague metropolitan region isn't served only by lines provided by the PID system. Chosen bus lines in the area aren't integrated. These lines are provided by the Central Bohemian Region, few of these bus lines are cooperating in Středočeská integrovaná doprava (Central Bohemian Integrated Transport), abbreviated as SID. This cooperation is based mainly only on tariff integration and transferable tickets for regularly clients, the cooperation with the train transport isn't organized at all. This schizophrenic situation is caused by the problematic cooperation between Prague and Central Bohemian Region. The ROPID was founded by Prague and its main objection is providing of public transport services according to Prague needs and Central Bohemian Region doesn't want to lose its influence on organizing public transport in its own area. But the cooperation between two above mentioned systems of PID and SID or replacing them with one new system is discussing and this situation will be solved soon.



Fig. 3. Financial flows and organization of PID system – logo sources: [5, 10-27]

Rys. 3. Przepływy finansowe i organizacja systemu PID

Few bus lines between Prague and the cities in metropolitan region, for example Kladno, are still operated by the operators on the commercial basis without subvention. These lines aren't integrated into PID nor SID, they are only licensed by the Central Bohemian Region.

3. ORGANIZATION OF PUBLIC TRANSPORT IN THE WARSAW METROPOLITAN REGION

Warsaw is the largest city and the capital of Poland and Mazowsze region - the largest of the 16 provinces. Warsaw's population is 1.7 million people. Warsaw itself confined in its administrative borders, virtually has ceased to grow. Warsaw metropolitan region is constantly growing population. On the one hand, some people decided to escape further away from the center, on the other hand, the lack of space in Warsaw encourages citizens to choose new satellite towns of residence. This increases the importance of public transport not only the city but also the agglomeration one. Warsaw metropolitan area is 627,088 hectares, three million people, the population density is 490 persons per km², and in the Warsaw city 3293 per km² and is one of the highest in Poland. Warsaw, in terms of the political system is both: a municipality and a town and is divided into 18 districts The Warsaw metropolitan region consists of 72 municipalities (Fig. 4) [30].

3.1. Public transport services in the Warsaw metropolitan region

The primary means of public transport are buses in Warsaw. City bus service in Warsaw consists of 250 lines with a total length of about 2600 km. Supported by approximately 1,800 buses belonging to five operators. The average length of a bus line is about 17 km. The lines at the busy hour in the urban and suburban routes runs 1355 cars (morning peak). The size of a planned monthly transport work is about 8.2 million vehicle-kilometers.

The tram system in Warsaw consists of 24 tram lines (solid), operated by the Warsaw Tramways Company. The total length of the tram lines is approximately 406.8 km. The total number of tram fleet at the disposal company Warsaw Trams is 762 cars. The solid lines on a weekday, at the height of the movement, is being operated by 702 cars in motion.

The metro system consists of a single line with a length of 23 km connecting Kabaty with Młociny. The second metro line is currently under construction. On the line 21 stations were located approximately every 1.1 km. Average communication speed on a weekday is 37.5 km/h.

The main links between Warsaw and Mazowieckie Province is also provided by regional and agglomeration rail. Suburban railway is mainly used to support travel from agglomeration area. In Warsaw, also a separate line Warsaw Commuter Rail transport operates takes service at the corridor Grodzisk-Warsaw Central Station. At the regional and urban transport, associated with commuting to Warsaw, two operators operate: Koleje Mazowieckie Sp. z o.o. and SKM Sp. z o.o [29].

At June 15, 2005, after many years of absence, a passenger water transport was resumed. Warsaw Trams launched a water tram from Old Town to Poniatowski Bridge. From May 1 to June 30 water tram floats on weekends and public holidays and from July 1 to August 31 - also on Fridays. On weekends and holidays, four times a day, and on Friday – three times [31].



Fig. 4. Warsaw metropolitan region [30]

Rys. 4. Metropolia Warszawa

3.2. Organization of public transport

In the light of the Law on the Organization of Warsaw City public transport is a public undertaking of infrastructural relevant for the entire city. The implementation of transport policy, determining the applicable tariffs for transport services and the implementation of financial policies from the city's budget corresponds to the President of Warsaw.

Public transport in Warsaw is being managed by the Transport Authority (ZTM), established by resolution of the city of Warsaw. The scope of the ZTM is programming, organizing, monitoring and control of passenger transport in the city of Warsaw and initiating development projects in public transport. ZTM crosses the Warsaw city administration border in bus and rail (provided by SKM SP. z o.o.) to municipalities that were incorporated into the system - 30 municipalities bordering Warsaw. These are not all the municipalities and districts of the metropolitan area of Warsaw.

Suburban bus lines, operating under the supervision of ZTM, cover a number of suburban municipalities. The municipalities have the ZTM agreement communication services. They determine layout and bus routes and timetables for suburban lines, as well as determine the level of funding for these lines by suburban municipalities. Similar arrangements apply to rail services carried out by SKM.

One element of the integration of public transport in the Warsaw metropolitan region is an integrated ticket for different types of public transport (Fig. 5) [31].

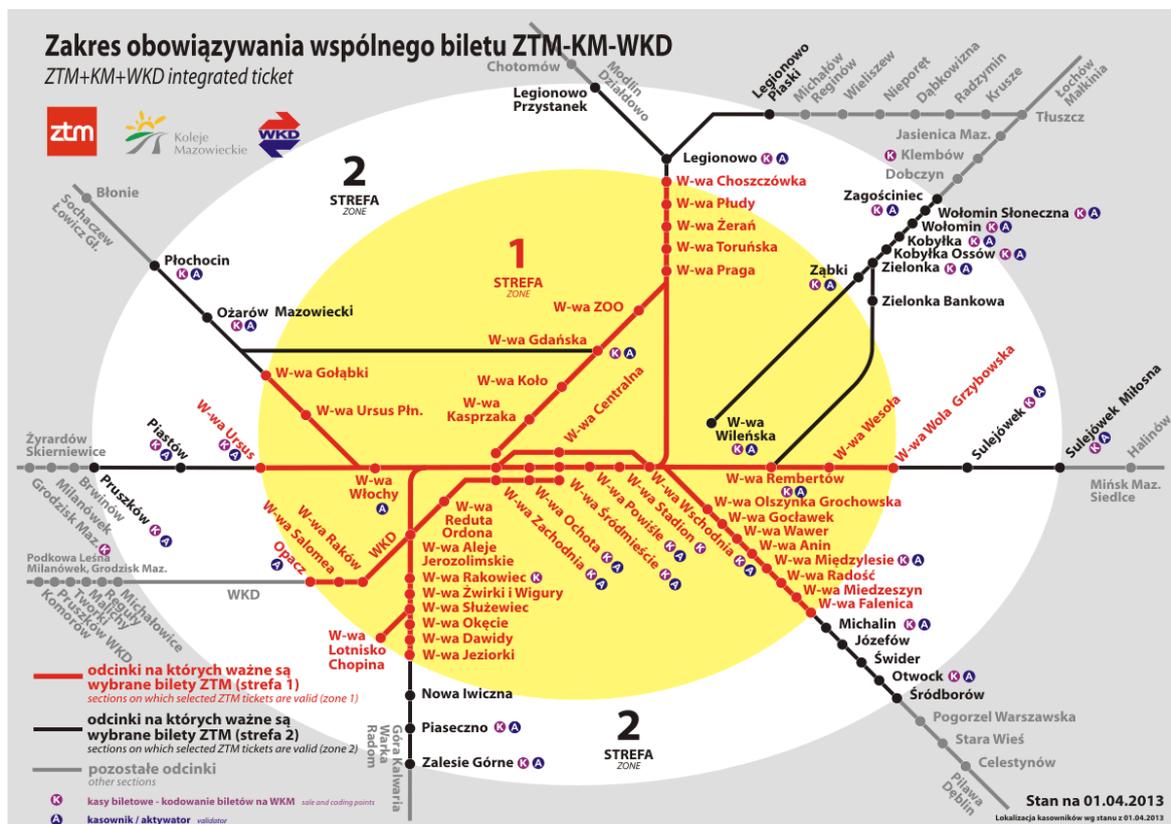


Fig. 5. Lines with integrated ticket [31]

Rys. 5. Linie ze zintegrowanym biletorem

Table 3

Basic data about lines integrated in ZTM system

Transport mode	Operational network [km]	Amount of lines (day / night lines)	Cars	Annual amount of transported passengers (2012) [-]
Metro	23,1	1 (2 in 2014)	240	152940452
Trams	406,8	24	762	206710115
Municipal bus lines	2600	208/42	1859	439071583
Train lines		5	31	137791211
Ferry lines		1	4	

Through the streets of Warsaw in 1859 buses were driving - (as of December 31, 2012), 762 trams (as of November 30, 2012), 31 trains of SKM - (as of December 31, 2012), and 240 metro cars (as of December 31, 2012). The public transport included 3482 bus stops 557 train stops in Warsaw and 1491 stops in other municipalities of Warsaw metropolitan area.

4. CONCLUSIONS

The organization of public transport in Prague and Warsaw is similar. There is one main body whose job is programming, organizing, supervising and controlling the passenger transport. However, this is a very difficult task, therefore it can be considered within the competence of the organizer should be included [28]:

- the provision of adequate transport service in the agglomeration;
- regulating the financing of the public transport services of high quality in urban and suburban lines, including the issue of subsidies for services and their efficiency;
- propose a common tariff transport taking into consideration the area and the length of time passing;
- determine a uniform, high standard of transport services;
- schedules coordinating;
- integrate the subsystems of public transport, particularly at interchanges;
- the development and supervision of the "Park and ride" facilities in urban areas;
- regulation of the public transport market, including increasing competition.

In the interest of Prague and Warsaw is to maintain a high share of public transport use of all traffic into the center. This is critical to reduce the intensity of traffic on the main streets leading to the center and in the center. Key in this regard are efforts to integrate all organizational and functional subsystems of public transport (train, bus, tram, metro), serving the cities of their administrative boundaries, and travel between cities and suburban municipalities.

Moreover, the organization of transport of any major European city should develop a strategic plan for public transport in the short term (five years), the long-term (15-20 years). In order to reduce environmental pollution and the negative impact of individual transport the urban transport systems should be developed in a sustainable way.

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