Journal of Transport Geography xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Journal of Transport Geography

journal homepage: www.elsevier.com/locate/jtrangeo

Czechoslovak light rail — Legacy of socialist urbanism or opportunity for the future?

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ARTICLE INFO

Article history:
Received 29 January 2015
Received in revised form 15 February 2016
Accepted 26 February 2016
Available online xxxx

Keywords:
Urban transport
Light rail
Fast tram ('rychlá tramvaj')
Prague
Bratislava
Brno

ABSTRACT

This article focuses on the development of the Czechoslovak 'rychlá tramvaj' ('fast tram') systems in Prague, Bratislava and Brno. Its aim is to examine whether these systems meet the requirements of light rail and whether it is possible to continue their development as a functional light rail city transport system. A further aim is a detailed analysis of the conditions and contexts affecting the gradual development of 'rychlá tramvaj' schemes in three selected metropolises in the former Czechoslovakia.

Urban development in Czechoslovakia was affected by the socialist planning system that constructed large housing estates on the edges of metropolises during the 1970s and 1980s. As a result, many commuters had to be moved between them and city centres daily; therefore, the necessity for high-capacity 'rychlá tramvaj' connections became apparent. After socio-political changes in 1989, a market economy was introduced and the trends of commercial and residential suburbanization have modified the spatial structure of the cities, and mobility has begun to be increasingly dependent on cars. In response to this, city councils departed from further development of 'rychlá tramvaj' schemes. Currently, the emphasis on sustainable mobility is apparent, principally because of smart city solutions, an environmental focus and a common European transport policy; thus, municipalities are rediscovering the virtues of light rail lines again. Because the 'rychlá tramvaj' systems from the 1970s and 1980s are still in operation, transforming them into modern light rail systems appears to be a convenient and cheap solution.

1. Introduction

Urban passenger transport is an important issue in cities and metropolises facing growing levels of (everyday) mobility. As lifestyles are changing and the trends of residential and commercial suburbanization, de-concentration of activities in time, de-concentration of activities in space and many others are in progress, (everyday) mobility in cities in more developed countries is increasingly based on the near-general availability of passenger cars (Hanson, 2004; Pooley et al., 2005), causing considerable negative side effects, at least from the environmental and social points of view (Hall, 1998; Christine Bae, 2004). Public authorities (city councils, regional and governmental bodies) are searching for appropriate solutions to this situation, and one of the most discussed possibilities, among others, for the support and extension of the quality and quantity of public transport services is the construction of light rail systems (Pucher, 2004). Although light rail has never been unambiguously delineated in the past, and there is still no clear definition of the system in the literature, at least one element of this system is often emphasized, namely the position of light rail somewhere between (heavy) trains, trams and metros (Priemus and Konings, 2001; De Bruijn and Veeneman, 2009 or similarly, Hall, 1998). Turton and Knowles (1998) and Knowles (2007) explicitly mention many attributes of light rail that differentiate it from other rail-based urban public transport modes. These characteristics can be divided into six categories — population, infrastructure, segregation, station spacing, operation and other parameters, see details in Table 1. Light rail solutions are perfectly suitable for middle sized cities with population under 1 million and the most important feature of them is their at least partly segregated form from the other transportation modes as they should use its own track without level crossings primarily in suburbs. Moreover, it is assumed that light rail has the capability to at least conditionally increase public transport ridership (Priemus and Konings, 2001; Pucher, 2004; Babalik-Sutcliffe, 2002) and also support urban development mainly in the sense of urban densification, central or inner city revitalization and urban sprawl reduction (Cervero, 1984; Priemus and Konings, 2001). The intensity of scientific research on this issue is therefore growing.

The urban development of Western cities, however, substantially differed from the situation in Central and Eastern European cities,

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http://dx.doi.org/10.1016/j.jtrangeo.2016.02.011
0966-6923/

Table 1
Characteristics of selected rail-based urban transport systems (classic tram, light rail, suburban heavy rail and metro).

Characteristics type	Characteristics	Classic tram (streetcars)	Light rail	Suburban (heavy) rail	Metro
Population	Number of inhabitants	200,000–500,000	100,000–1 million	Over 500,000	Over 1 million
Infrastructure	Route length	Under 10 km	Under 20 km	Under 40 km	Under 24 km
	Surface/underground form	Surface	Surface or underground	Surface to centre edge	Underground
	Power supply	Overhead	Overhead	Overhead or third rail	Third rail
Segregation	Level crossings	Frequently	In centre	No; if yes, then automatically controlled	No
	Segregation form	Hardly any, on street	On street in centre, segregated in suburbs	Segregated track (corridor, tunnel, …)	Segregated track (primarily in tunnel)
	Share of segregated track	Hardly any	Over 40% segregated	100%	100%
Station spacing	In city centre	250 m	300 m	–	500 m–1 km
	In suburbs	350 m	1 km	1–3 km	2 km
Operation characteristics	Average speed	10–20 km/h	20–40 km/h	45–60 km/h	30–40 km/h
	Peak interval	2 min	4 min	3 min	2–5 min
Other (rolling stock, technical specification, performance)	Carriage weight	16 t	Under 20 t	46 t	33 t
	Carriage capacity	50 seats, 75 standing	40 seats, 60 standing	60 seats, 120 standing	50 seats, 150 standing
	Carriage access	Step	Step or platform	Platform	Platform
	Number of carriages	1 or 2	2 or 4	Up to 12	Up to 8
	Engineering	Minimal	Light	Medium	Heavy
	Maximum gradients	10%	8%	3%	3–4%
	Minimum radius	15 m–25 m	25 m	200 m	300 m
	Power current	Dc 500–750 v	Dc 600–750 v	Dc 600 V–1.5 kV or ac 25 kV	Dc 750 V
	Maximum speed	50–70 km/h	80 km/h	120 km/h	80 km/h
	Maximum hourly passengers	15,000	20,000	60,000	30,000

Sources: based on Turton and Knowles (1998), Knowles (2007).

which were affected strongly by the rigid central planning system during the second half of the 20th century. Residential and commercial suburbanization did not become real in cities in centrally planned countries to such an extent as in Western countries, if ever (Sykora, 1999; Sýkora, 2001). Significantly, lower levels of car ownership in Central and Eastern European countries (only 208 passenger cars per 1000 inhabitants in Czechoslovakia even in 1990; Mitchell, 2007; Maddison, 2003) were reflected in a lower share of individual transportation by road in the total population mobility (Fava, 2013; Chmelík, 2015). A good example of specific post-war urban development is provided by the former Czechoslovakia, a country in the middle of Europe which had ambitions to develop its cities but was fettered by communistic inefficiency and a lack of resources. As a consequence of these circumstances, large housing estates on the edges of the built-up areas were constructed in Czechoslovak metropolises at that time instead of suburbanization (Horská et al., 2002). The distance between these new neighbourhoods and centres was substantial, mostly varying from 5 to 10 km in individual cases. As a result, tens of thousands of commuters had to be moved between these housing estates and city centres and large factories daily; therefore, the necessity for high-capacity connections became apparent. Socialist ideology obviously preferred public mass transport; thus, existing classic tram systems were extended from city centres to the new distant housing estates employing a new type of fast line called 'rychlá tramvaj' in Czech ('fast tram' in English, Prokeš, 1979; Surový, 1979; Fojtík, 2004). These new lines varied in the degree of separation from streets and the elimination of level crossings. The system of 'rychlá tramvaj' appears to some extent to be in accordance with the concept of the light rail. The extensive development of the 'rychlá tramvaj' concept in some Czechoslovak cities at that time can be perceived as a strong stimulus for public transport on the one hand and for the growing divergence between socialist and Western (or maybe more accurately Anglo-American) cities on the other.

Because there is a certain lack of awareness about the development of the 'rychlá tramvaj' system in Czechoslovak cities as a specific type of light rail in international geographic literature, this article focuses on an assessment of the Czechoslovak light rail system called the 'rychlá tramvaj' and attempts to find an answer to the question of whether it is currently more a questionable legacy of socialism or an opportunity for the future. Thus, the aim of this contribution is to examine whether the original Czechoslovak systems of 'rychlá tramvaj' currently meet the requirements of light rail and whether it is possible to complete them as a functional light rail city transport system. In addition, a further aim of this paper is a detailed analysis of the conditions and contexts affecting the gradual development of 'rychlá tramvaj' schemes in Czechoslovakia; we pay particular attention to the factors shaping individual 'rychlá tramvaj' cases in various metropolises as well as to common factors impacting the light rail circumstances in the whole area of former Czechoslovakia.

The structure of the paper is adapted to its main aim. Section 2 contains a theoretical discussion on the issue of light rails, on their function in current cities and on their relationship to the smart city concept. Section 3 focuses on the key methodological principles employed in the empirical part of the paper and discusses its territorial scope. Section 4 explores the development of the 'rychlá tramvaj' schemes in Prague, Bratislava and Brno before 1990 and then after that year. This section represents the principal part of the paper as we present in it rich empirical material and answer the main research question about the prevailing nature of the 'rychlá tramvaj' and, moreover, interpret and compare socialist 'rychlá tramvaj' solutions in detail. In Section 5, we identify key conclusions.

2. Light rail — urban effects and role in smart city solutions

The idea of light rail has its origin in German-speaking countries where older and slower tram systems were modernized or considerably rebuilt into a new type of transport, namely light rail (Turton and Knowles, 1998). Contemporary scientific interest in research on the geographic, economic, social and environmental issues of light rail is related to the rediscovery of surface rail-based urban transport in North America and in some European countries including the United Kingdom in the 1980s and 1990s and at the beginning of the 21st century. Although many cities abolished their tram networks during the first half of the 20th century or no later than the 1950s (e.g., Hall, 1998), new light rail systems, meaning systems without continuity with older trams, were established in many cities 50 years later. Black (2003) shows that there were 22 new systems in the United States and Canada in 2000, De Bruijn and Veeneman (2009) describe the decision-making process connected with the preparation of many new light rail schemes in the Netherlands, and Knowles (2007) analyses the changing conditions for the development of light rail in selected

Please cite this article as: Seidenglanz, D., et al., Czechoslovak light rail — Legacy of socialist urbanism or opportunity for the future?, Journal of Transport Geography (2016), http://dx.doi.org/10.1016/j.jtrangeo.2016.02.011