Tramway-oriented development: what results in what context? Comparative approach between France and the Czech Republic.

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Abstract

This paper explores tramway-oriented development within two different cultures, France and the Czech Republic, which nevertheless have significant factors in common with regard to the goal of promoting the modal share of mass transit from a sustainable development perspective. Besides the basic urban variables, such as density and mixity, our work attempts to explore characteristics of pedestrian access to transit stations at neighbourhood scale. The strengths and weaknesses on each side and the potential for transfer of "best-practices" are further considered.

Keywords: public transport; tramway; urban design; spatial planning; pedestrian

Résumé

Cette communication s'inscrit dans le champs de l'urbanisme orienté vers le tramway and focalise sur deux contextes culturels différents, dont pourtant les enjeux de promouvoir les transports en commun sont communs aujourd'hui dans le cadre du développement durable. A part la densité et mixité fonctionnelle urbaines, le travail s'intéresse ici plus particulièrement à approfondir des recherches sur les caractéristiques de l'accessibilité piétonne aux stations du TC à l'échelle de quartier. Les points forts and points faibles de chaque côté ainsi que les potentiels de transférabilité des "bonnes pratiques" pourront être regardés.

Mots-clé: transport en commun; tramway; urbanisme; aménagement; marche à pied

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1. Introduction

The modal shift from the private car to public transport is increasingly presented as one of the pillars of sustainable mobility in towns and cities within the "European model". At the same time, (re)constructing the city through the organisation of mobility is at the centre of current debate on spatial planning. The research field to which this paper belongs looks at the design of urban spaces to optimise public transport demand, a field which, in many research circles, is often referred to as "transit-oriented development". Originally based on the American "new urbanism", the transit-oriented development generally seeks to create the conditions for average urban density and mixed land use with an emphasis on pedestrians, in urban areas around public transport stations, with the aim of promoting public transport use, and increasing the modal share of walking, cycling and other alternatives to the private car (Cervero 2006, Maupu 2006). On this subject, whilst research on land use – represented here by urban density and land use diversity – is becoming extensive and firmly established, the same does not seem to be true for the different aspects of pedestrian access to public transport. Although "pedestrian-focused urban design" is cited in certain works that draw on principles of transit-oriented development (Cervero & Kockelman 1997, Dittmar & Ohland 2004), its real effects remain relatively unknown (Forsyth & Krizek 2010), probably because the analyses of these factors are not sufficiently close grained (Stransky 2011). We therefore propose to regard especially some different issues relating to pedestrian accessibility, notably in respect of the distance needed to reach stations on foot, road safety and comfort, and, finally, the aesthetics and legibility of the itineraries.

To explore this approach on the ground, we adopt a comparative approach between France and the Czech Republic, two countries that have followed markedly different trends in the role of public transit – and modal share – in recent decades. The role of public transport in the Czech Republic, very powerful in the days of the planned economy, is now in freefall not only as a result of the economic transition, but also because of a failure to relate transport and urban development, and because the image of public transport is often very poor (Pucher 1999). In France, by contrast, the long dominance of the private car is now being challenged through policies that seek to promote public transport, reflected in a real "boom" in tramway construction in many French cities (Larroque 1989), a trend that has been probably more significant in France than in other European countries.

The paper begins by explaining the issues relating to the role of public transport in France and the Czech Republic, in their particular contexts of economic, social and urban development. The second part proposes a list of urban variables that can be incorporated into fieldwork of an analytical or operational nature, in order to evaluate how urban spaces are integrated or not into the transit-oriented development concept. Finally, the article returns to the evaluation of selected French and Czech urban spaces, and concludes by comparing the two cultures from the perspective of the subject and by proposing some possible avenues for future research.

2. France and Czech Republic: similar origins, different evolutions, common challenges

As in most European countries and elsewhere, it was public transport – including the tramway – which triggered the spread of mechanised mobility within cities, since cars, rare at the time, remained the prerogative of the few and a symbol of luxury (Laisney & Grillet-Aubert 2006). Indeed, it was the tramway that structured and governed the form and sizes of streets and squares. The tramway line was the backbone of the transport system and the central framework of mobility within the city (ibid.). Not only all big cities, both in France and the Czech Republic, possessed at that time a generally well interconnected urban tramway network. By 1910, there were perhaps 95 networks in France, and around 15 in the Czech nations (Fournier 2006, Losos & Bouda 1983).

In France, however, this mode of transport went into significant decline from the 1930s onwards. The arrival of the "all car" era led to a contraction in the existing tram network. In the end, only three marginal examples remained: Lille, Saint-Etienne and Marseille, each with just one remaining line (Larroque 1989). Perceived as obsolete and dated, the tram yielded to motorised transport and the city was redesigned for the car, as proclaimed by George Pompidou. As the economy developed and standards of living rose, extensive car ownership became possible, accentuating the role of the car which – for different reasons (comfort, autonomy...) – became the dominant mode, to the overall detriment of public transport (Gouin 2007).

In recent decades, however, French public transport has made a comeback, associated with the imperatives of sustainability and other factors (Kyoto Protocol, New Athens Charter, Agenda 21, Grenelle, etc.). Although the launch of the Cavaillé Competition in 1973 triggered something of resurgence in the image of public transport in

France, it has only really made a full comeback in the last 20 years. However, the re-emergence of tramway systems is not as straightforward and is occurring in different conditions than a century ago. In finding their place today, these transit systems face strong competition from the car, a mode of travel to which the French are particularly attached (Fournier 2006). So different strategies have been sought and applied to attract customers to the new tramways. These measures are based also on the positive image of the tram and on joined-up thinking in the planning of public transport systems and urban development (Gouin 2007). So it would be helpful to observe how planning actually reflects the concept of "tramway-oriented development".

Unlike in France, tramway networks in the Czech nations survived even in the era when the "all car" philosophy was in vogue. In keeping with the practices of the then regime, deliberate policies were implemented to ensure that public transport should be the dominant method of personal mobility (Pucher 1999). Of course, car use grew, leading to the replacement of certain tram lines (and occasionally whole networks) by buses, but in most big cities the tram continued to be the backbone of the transport system. However, it has to be recognized that, in the context of a planned economy and limited individual purchasing power, the use of public transport was in fact much more a necessity than a choice. Public transport was the mass transit system, with no particular attention to passenger comfort or overall public transport image (ibid.). As paradoxical as it may seem, this transport policy was not generally associated with urban policies designed to coordinate urban development and transport. This ultimately led to a lack of coherence between public transport routes and the location of the residential areas that they were supposed to serve. This left a legacy of often mediocre pedestrian access to stations, a state of affairs that users had no choice but to accept in the absence of access to alternative modes. Against this background of a powerful political preference for public transport, there were nevertheless some housing estates built "deliberately" around the tramway infrastructures, whether these existed already or were built in parallel, at what we will look a little later on.

The change in political regime following the fall of the Berlin Wall transformed the situation. The transition to a market economy, and the sharp rise in living standards, were accompanied by a significant decline in transit use (Pucher 1999). Apart from the political, economic or social reasons that may explain the desire to "catch up with" the developed countries, the extent of the shift to the private car was also related to inaccessible and often mediocre public transport and, more generally, to the decline in the image of public transport (Kotas 2002). Today, public transport is often completely ignored by decision-makers in the planning of new housing estates.

3. Evaluation of the *tramway-oriented development* : inclusion of multiple fine-grained *urban variables*

For investigating of selected urban districts, we propose to classify the main factors, the presence and intensity of which are likely to influence people's readiness to use public transport, as *urban variables* relating to *tramway-oriented development*, into two main groups, depending on their character in relation to the territory. One set consists of variables about the land use and organisation of urban functions, and the other set consists of variables relating to the qualities of pedestrian access to tramway stations from their surroundings.

3.1. Variables representing land-use and the organisation of urban functions

3.1.1. Urban density

Density is generally considered as the crucial factor in the planning adequate public transport provision. However, while this effective public transport provision corresponds to a relatively high degree of urban density, the ideal levels of density may nevertheless be perceived differently from a sustainability perspective, or indeed from the point of view of residents, for whom a high level of urban density is not always necessarily a desirable option (Dempsey 2010, Chambefort & Lensel 2011). Despite all these differences, there is a consensus on some leading priorities today. First, the phenomenon of urban sprawl needs to be contained – if not stopped – and future construction confined to existing built-up areas (Malverti 2000). Second, there is a need to return to the "traditional vocabulary" of urban development, in other words to revive the block and the parcel, as well as the street and the square (Wachter 2003).

3.1.2. Functional mix

Beside its positive effects for transit-oriented development, functional mix can also be shown to have other virtues: a city of proximity and short distances limits the need to travel (Wachter 2003), and mixed urban space, which encourages walking, helps to develop social relations and urban ambience (ibid.). A functional mix helps

to structure space polycentrically (Lavadinho & Lensel 2010) and therefore to balance public transport systems by generating the bidirectional demand at peak hours that polycentricism encourages. The consensus today is that it is preferable to correct the excesses of functional zoning and to return to land use diversity.

3.1.3. Polycentricism

Polycentricism can be seen as an emerging form of modern urban space, as well as a fundamental model for city organisation (Wulfhorst, L'Hostis & Puccio 2007).

3.2. Variables representing the conditions and qualities of pedestrian access to tramway stations

3.2.1. Distance, time and energy needed to cover the routes

The maximum distance that people are theoretically ready to travel in order to access public transport is often considered to be the crucial variable in planning public transit systems (Van der Poorten 2010). However, the theoretical (geometrical) distance and the real (Manhattan) distance can be very different, since the available network of routes does not usually provide straight-line access, but obliges walkers to make detours of varying lengths (Héran 2011, Leysens 2011, Richer & Palmier 2011).

3.2.2. Road safety and pedestrian comfort

This broad aspect is explored in a number of studies, in particular the relation between walking and other transport modes (GART 2000, VTrans 2002); however, we find much less work on access to public transit. In thinking about road safety, we need to focus on the points where pedestrian routes intersect with other transport infrastructures. The approach to pedestrian crossings and traffic calming measures is of primary importance here. From the point of view of comfort are considered the arrangement of street furniture and lighting.

3.2.3. Route aesthetics and legibility

Although both aesthetics and legibility can be perceived as an aspect of "enjoyment", only the second can be measured objectively, although the urban design aspect of the first can have a greater impact (Taylor 2009, Timms & Tight 2010). In fact, there have been attempts to measure the aesthetic qualities of urban space: there are methods for assessing the design of a street (Ewing 2009), although the subjective dimension remains crucial (Nasar 1997). Since the focus of this paper is the objective dimension, we will confine ourselves to the question of legibility. The visual characteristics of a space can stimulate access to the public transport station, which becomes "a mental landmark to which the user naturally refers when seeking orientation in space" (Stathopoulos 1993). Along the same lines, the more the station is "easily identifiable, easy to find and access in the urban environment, the more attractive and frequented it will be" (Sahabana & Mosnat 2002).

The legibility of the station from its environment can also be presented as a piece of "urban information", an element that can be used for orientation and to pick out the station in its environment. Factors of this kind can then be divided into two types: firstly, urban information in the literal sense, represented by elements that are directly perceptible and legible, such as arrows, symbols and other forms of signage and landmarks; and secondly, urban information in the figurative sense, where spatial characteristics (topological, geometric, dimensional or other) can have an impact. In other words, what we are talking about is the "quality of a space in terms of how easy it is to decode – and therefore to identify – for the pedestrian walking to the station" (Stransky 2011). This notion can be founded in several theoretical concepts; the most common is the theory of urban composition which deals with the physical layout of all the components of a space (Kupka 2011). The elements of urban composition can finally also be understood as aesthetic factors (Konvička 2005). To provide some more concrete examples relating to transit-oriented development, we can consider the following scenarios:

- urban axes, e.g. avenues and other urban thoroughfares, which lead to the station as a dominant landmark;
- other visual effects, such as ground markings, tree-lined alleyways, lines of street lamps;
- public spaces around the station, which accentuate its urban quality;
- street furniture that suggests the appearance of the tram;
- proportions of buildings or public space chosen to generate a positive gradient leading to the station.

4. Tramway-oriented development in France and the Czech Republic: realities, possibilities, prospects

Regarding the main groups of variables listed above, we focus now on certain French and Czech cities. For the purpose of comparison, we have chosen four cities, two contrasting cases in each country, and conversely two similar

cases between the different countries; the contrast or resemblance here is in terms of the size of the agglomeration as well as the role of the tram in the city, represented by the size and connectivity of the network, the modal share of the tram in total public transport, etc. The cities chosen for this purpose are Orléans and Montpellier in France and Liberec and Brno in the Czech Republic.

We will regard the tramway urban relations specifically in collective housing estates which generally involve the highest population density among all type of urban neighbourhood, and were also constructed "deliberately" around some tramway infrastructures during the planned-economy period in Czech countries. For each of selected cities, firstly, on agglomeration scale, we verify how these housing estates are – or are not – globally served by tramway infrastructure. Secondly, on neigbourhood scale, we focus on some selected housing estates quarters in order to regard how these are – or are not – globally designed, regarding to here proposed urban variables relative to the transit-oriented development.

4.1. Orléans

The capital of France's Centre Region, the city of Orléans has a population of 110,000, 370,000 for the total conurbation. In historical terms, it is an important city with an interconnected tram network dating back to 1880. However, this was completely abandoned before the Second World War. The Orléans tram system was revived in 2000 with a single line, and a second line was opened last year. As regards its route in relation to the town layout, especially the first Orléans tramway line was designed to serve as many significant urban focal points as possible. This means that access to the tram is relatively good, but also that there are numerous diversions and detours on its route, making it ultimately less commercially competitive in terms of operating speed.

The routes for both of the lines were chosen to serve also most of the existing housing estates across the city: in the case of the first line, the districts of Fleury-les-Aubrais, Mouillère and la Source thus have an urban density and also a certain functional mix that favour the concept of tram-oriented development. By contrast, the position of the station in certain cases, e.g. in the Mouillère housing estate, is significantly less favourable in terms of access routes. Indeed, the safety and legibility of pedestrian access to the station within that neighbourhood are not very convincing either. In addition, some estates have been newly created around the tram stations and on previously unadopted land. Whilst the features of the Coligny apartment complex, with the station and public space in the middle of the district, match the idea of tram-oriented development, this is not the case for the Aulnaies district: it is a long walk from the station to the newly created dwellings here, with a number of detours, whereas the land immediately around the station has been converted into a large open-air car park, a poor choice in terms of urban density. In a neighbouring district, certain plots around Lorette station are still completely unadopted, despite the fact that significant detours were made to the tram route in order to serve them.

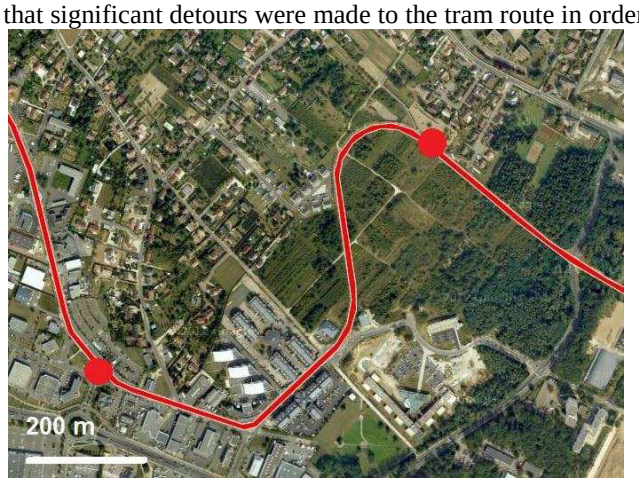

Fig. 1. Land use around Les Aulnaies (on the left) station is out of step with the concept of tram-oriented development, and the choice of the tramway route around Lorette raises questions (source: author on GoogleMaps).

4.2. Montpellier

Capital of the Languedoc-Roussillon region, the city of Montpellier has a population of 260,000, 540,000 for the conurbation as a whole. The development of the tram system began in 1880 and continued until the mid-20th

century, culminating in an interconnected network of 5 lines, subsequently dismantled. Montpellier revived the tramway in 2000 with the opening of two lines; in 2012 a further two lines have been built, forming a genuinely interconnected network. We included the town of Montpellier in this research because we were particularly keen to talk about the new construction on the land around the Malbosc, Port Marianne and Pablo Picasso stations, which are noteworthy examples of the concept of tram-oriented development.

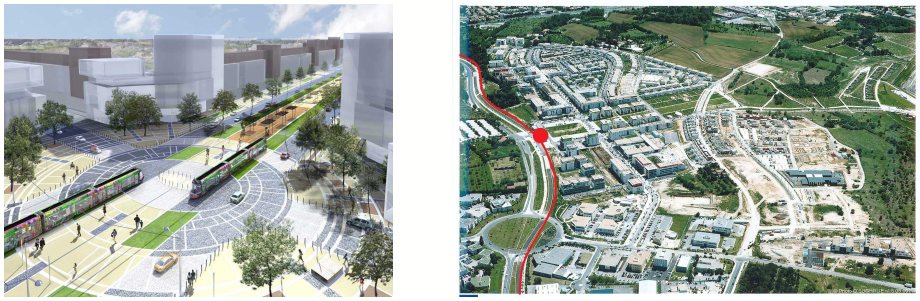

Fig. 2. (a) The design of the Port-Marianne district and (b) the design of the Malbosc district in Montpellier include elements in harmony with the concept of tram-oriented development (source: author on www.serm-montpellier.fr).

These areas have been designed with medium urban density, acceptable for residents and efficient for transport provision *via* a mass transit system. Similarly, there is a significant functional mix through a concentration of numerous shops and services near the station, which itself is located as close to the middle of the district as possible. At the same time – by contrast with the Czech districts, what is probably explained by the different construction date – all the aspects that favour pedestrian access to the tram are present here: there is a network of access routes offering good overall conditions of safety, comfort and legibility.

4.3. Liberec

Situated in northern Bohemia and once Czechoslovakia's second city behind Prague, the town of Liberec now has 100,000 inhabitants. A rich town with a strong industrial tradition, it began developing its tram system in 1900, achieving a network with several branches. Liberec is one of the few Czech towns where the arrival of the "all car" era led to the suppression of the tram system. Here, this process was only partial: a crosstown line and an interurban line were maintained. Paradoxically, it was later, in the 1990s when the country was midway through the economic transition to a market system, when this tram system came close to eradication for financial reasons. In the end, it held out; a new tram line, designed to serve the city's largest apartment housing district, is currently under construction.

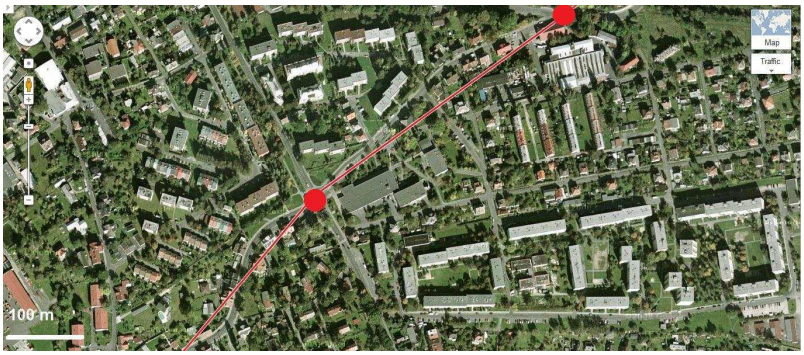

Fig. 3. The Gagarinova and Vratislavice housing estates in Liberec were built around the existing tram infrastructure and therefore include elements favourable to tram-oriented development (source: author on GoogleMaps).

In keeping with the "logic" of the time, several collective housing districts were built in the years 1970-1980, outside the catchment zones of the existing tram infrastructure, very fact the tram system was not extensive enough to provide provision for all housing needs. On the other hand, through an integrated urban planning strategy, two older apartment housing estates of that time, and a recent complex, were built around the existing tram routes. A detailed examination of these two old districts, Gagarinova and Vratislavice, reveals aspects favourable to the concept of tram-oriented development. Not only is there density and functional mix – through a

concentration of shops and services close to the station, which is located in the middle of the district – but there are also factors that facilitate pedestrian access to the station (or from it). In particular, there are shortcuts and urban lighting pedestrians, crossings in immediate proximity to the station and even old neighbourhood maps posted all along the routes, showing the location of the station. By contrast, in the recently built Nová Ruda district, apart from density, there is no sign of the need for proximity having been included in the plan.

4.4. Brno

The capital of South Moravia (a region in the east of the Czech Republic), the country's second capital after Prague, the town of Brno has a population of 380,000. This city, of industrial and cultural importance for centuries, began developing its tram system after 1900. An extensive network was gradually built over the first half of the 20th century. Subsequently, this network was retained and developed even during the 1960s; it is now 70 km long with good interconnections, forming the backbone of Brno's urban transport system. The principles behind the Brno tram system, and the coordination with urban planning, are considered to be the most advanced in the Czech Republic. However, as in Liberec, several housing estates were built in the 1970s outside the tram system's catchment zones, and here – by contrast with Liberec – despite a network with good connectivity.

On the other hand, again as with Liberec, numerous older housing estates were built around the existing tram lines; thus the districts of Starý Lískovec, Bystrc, Líšeň, Lesná and Řečkovice include a number of elements favourable to the concept of tram-oriented development. Not only is there density and functional mix – through a concentration of shops and services close to the station, which is located in the middle of the district – but there are also factors that facilitate pedestrian access to the station (or from it) – shortcuts, urban lighting for pedestrians, crossings in the immediate proximity of the station. Especially in the first three districts mentioned, the tram lane runs right through the middle of the district, separate from the lanes set aside for other modes of transport which, because of the design of the street network, tend to relatively light in these districts.

To fit fully with the concept of tram-oriented development, however, these districts in Brno, like those – to a slightly lesser degree – in Liberec, could do with better designed public spaces. In most cases, in fact, these have remained "empty" since the era of the planned economy, and are therefore lacking in any form of comfort (and any kind of street furniture) or legibility (the uniformity of Central Europe's big housing estates is a fairly well-known phenomenon). Today, the city has a number of plans for extensions to the tram network, most of them designed to serve the old housing estate districts that have missed out until now; moreover, the main preference throughout the town is for electrified modes, and there are no non-electrified lines operating in the central area.

Fig. 4. The Bystrc housing estates in Brno were built around the existing tram infrastructure and thus include elements that favour tram-oriented development (source: author on GoogleMaps).

4.5. Situation analysis of the two cultures in relation to tramway-oriented development

Whilst transit-oriented development is now a common objective around the world, in the Czech Republic it is the housing estates of the planned economy era – built in the 1970-1980s – which seem closest in their characteristics to achieving this objective, by contrast with most of the estates of more recent construction. These old districts offer – at least theoretically – the right urban density for a mass transit system. Another advantage is

the short average journey between the district and the station – which is generally well placed in the centre of the area – by an interconnected network of pedestrian routes. This network is generally separated from other traffic and includes planned shortcuts or pedestrian crossings. On the other hand, other aspects of these districts still bear the imprint of their time, particularly a functional mix limited to small day-to-day services and shops, concentrated in the immediate proximity of the stations. There are also clear deficiencies in terms of landscaping, with hardly any sign of street furniture or elements that might make the space easier to understand.

Indeed, it is for these reasons amongst others – including a social desire to escape from the legacy of the past – that these old housing estate districts risk losing their appeal in the eyes of today's population. However, municipalities are gradually introducing renovation projects, starting with the buildings and moving on to the public spaces. So it will be important that these projects should include factors that might contribute to tramway-oriented development, in order to stimulate demand and prevent the shift to car use that has been the recent trend. It should be specified that in the two Czech cities considered, after a massive shift to the car in the early years following the change of political regime, public transport has managed to stabilize its position in the urban transport system. A possibility for the future could be that, through the emphasis on transit-oriented development, public transport will be able to attract back part of the population that currently opts for the car.

In France, by contrast, transit-oriented development scarcely existed at the time the tramway emerged, and it is only now that we see policies favourable to it. However, the realities observed on the ground are unambiguous. Many examples are very stimulating, such as a new tramway infrastructure introduced sensitively into existing housing estates or districts newly created in parallel with the tram infrastructure. Some examples are less convincing, such as poorly placed stations in existing dense districts or new districts developed around stations without any reference to tram-oriented development.

The recent trend in favour of the tramway, particularly strong in France, merits a broader look. In fact, although the tramways introduced into French cities are generally deemed to be "successes" from the point of view of attractiveness, effective use of urban public space or contribution to economic development, this would not seem always to be the case. Indeed, the investment in new tram systems can sometimes deliver poor returns, not only from the purely economic point of view, but also in terms of sustainability, viewed against the various principles of sustainable development. For example, there is a risk that instead of a mode of transport that the town really needs, the tram might be more like a fashion statement and a showcase for municipal power. We have noted that political statements often dominate the official discourse on the relevance of the tramway in the city, whereas scientific research, in particular on medium-sized towns, has a lower profile. At the same time, in different discussions within the scientific community, we have found a social-based criticism of the "French-style tramway", regarding the relevance of the "city-tramway pairing": because in many cases the network is limited to one or two lines, it ultimately serves only a small proportion of the total population. Another problem we have identified relates to "urban renewal" around the tramway: the tram lanes are often very carefully designed and developed, but with a complete absence of investment in the districts nearby.

However let us return to the question of the "tram as fashion statement", which is also linked with the notion of the tramway's image. The positive role it can play in enhancing urban space, along with its attractiveness to customers, is indeed far from insignificant (Foot 2009, Hamman 2010). What is the reality of this essentially psychological aspect, and can we find a scientifically more precise way of describing it? While the challenge of the tram's image is clearly present in France (ibid.), the question should be posed also in the Czech Republic that transit's image tends to be somewhat tarnished, no doubt through its association with the old communist legacy. Conversely, could this positive image in France enable the tramway to achieve the role in total transport provision it actually still has in the Czech Republic, despite its poor image among many users?

5. Conclusion

This paper had two main interrelated objectives: to develop research in the field of public transport development and to look more specifically at two particular urban cultures. Concerning the first one, it emphasises the need for the analysis to take a number of concurrent factors into account; however, while this is enough for an initial, more global reading of the terrain, it fails to provide the quantitative basis of assessment which comes from looking specifically at the way each aspect of transit-oriented development has a weighting, which can be assessed. On this subject, we are currently developing a method which aims to represent the study areas through

GIS data model (using data both from existing databases and from terrain collection), and to evaluate them through GIS analyses, in order to permit a more effective evaluation and comparison of different terrains. Further, some in-depth sociological surveys of statistics on user individual mobility, as well as of user attitudes should be conducted, in order to find out their preferences and to explore the effects of tram-oriented development on the use of the tram by its potential clientele. Finally, we propose to include some semi-directive surveys, such as investigations with technical departments, directional analyses of the main pedestrian flows close to stations, and the production of mental maps.

The basic global reading of the French and Czech terrain corresponds to the second objective of this paper. In the Czech Republic, in conditions of strong competition from the car, and after a collapse that followed the change of regime, the role of public transport is currently stagnant; the concept of transit-oriented development has been almost absent from recent projects. However, culture can provide experience from the past: in the era of the planned economy, housing estates were built that come close to the concept of tramway-oriented development; with the help of certain appropriate modifications, these districts still have the potential to meet these development objectives. Inspiration from recent French strategies in this field could also be relevant. In France, by contrast, the current drive to encourage tram use by citizens long accustomed to the advantages of the car, could be supported, amongst other things, by the Czech experience. Apart from numerous very stimulating examples, moreover, some of the new French tramway projects themselves fail to take account more carefully of the concept of tramway-oriented development.

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