Chapter 9

Financial Aspects of Urban Transport

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Additional information is available at the end of the chapter

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Abstract

The demand for urban transport quality is typically above financing possibilities of public authorities. Financing urban transport has always been one of the prime problems of city authorities because of the necessity to connect the city centres with their surroundings and to enable time saving and thus better quality of life for the citizens. This problem especially emerges in the twenty-first century when the citizen requirements for better urban and suburban connectivity are coupled with smart, intermodal and energy-efficient urban transport. The financing problem of urban transport is somewhat simpler in very populated and developed areas as the growing number of public transport users continuously finance urban transport fleet renewal. However, less developed areas have to have integrated pricing and social policies towards the end users of urban transport, which often turns to be unsustainable in the longer period of time. Depending on the project size, financial strength of municipalities and/or central state, urban transport infrastructure construction and maintenance are typically financed from national or local state funds or borrowing. Some urban transport lines can also be given in a concession. Financing urban transport encompasses either financing urban transport infrastructure construction or financing fleet renewal, or combined financing of both urban transport infrastructure and fleet renewal. The EU funds have contributed much to financing urban transport needs, especially in large metropolitan areas. Yet, many countries opt for financing regional and cross regional connectivity by roads, rail, airports or waterways, while urban transport remains a care of national or local public authorities. Most literature is devoted to rail, road and port infrastructure construction in general, while urban transport fleet renewal and operating performance of urban transport operators have not been widely discussed. This chapter aims to partly fill in this gap for the selected cities of formerly planned economies of the Central and Eastern Europe and Southern and Eastern Europe.

Keywords: urban transport, operating performance, fleet financing, transition economies

1. Introduction

The task of all public authorities is to insure the provision of safe, reliable and smooth-running (collective scheduled) passenger public transport in the urban and suburban city area. About 185 million passengers on average across the EU capital cities used the city public transport [1] in 2014, which is on average three rides per citizen per week or 150 rides per year. The statistics lacks for other cities, however. Of 57.9 billion journeys within the EU capital cities in 2014, 55.8% public transport passengers were transferred by buses and trolleybuses, 14.5% by tram, 13.6% by suburban rail and 16.1% by metro [1]. People in some cities reach desired locations in very reasonable time and do not need to have a car for urban transport purposes, while people from other urban areas travel by public transport so long that they appear to be much farer from some city areas than it is actually the case. Most people still travel between 30 and 40 minutes in one direction [2].

Good urban public transport organisation is crucial not only for sound city functioning but also for the urban economy as cities contribute more than 80% to overall EU gross domestic product (GDP) [1]. Public transport in the EU is governed by the Regulation 1370/2007 which came into force in the beginning of 2009 [19]. It regulates both national and international operation of public passenger transport services by rail, other track-based modes and road and public subsidies thereof. The maximum duration of public service contract is limited to 10 years for road transport and 15 years for rail transport, although it could be lengthened by 50% of the time if the operator needs to provide significant assets during the contract term. However, city transport service provision may be excluded on the grounds of their special historical or touristic interest.

Urban fleet is also subject to regulation of fuel consumption effects as transport in general, and urban transport in particular is one of the greatest causes of greenhouse gases (GHG) emissions and global warming. Most urban fleet vehicles are run on diesel fuel. Transport in Europe is almost 90% dependent on oil and its derivatives, and urban transport produces about a quarter of total CO_2 emissions from transport [3]. Other types of fuel consist of compressed natural gas (CNG), liquefied petroleum gas (LPG), biogas and biodiesel, while there are also full electric vehicles. Within the EU the fuel standards I–VI apply for all vehicles. Standard VI is the most stringent, while the differences between particular fuel standards are described in Ref. [4]. Many European cities procure only environmentally friendly buses, requiring fuel of either standard V or VI. Throughout Europe the mostly purchased buses are those of 12.2 m length, with 40–50 sitting and 30–70 standing places, with about 18 t weight. The cost-benefit trade-off (e.g. between diesel and CNG-run vehicles) is lower/higher purchase price vs higher/lower GHG emissions during the expected economic lifetime for the vehicle [5]. Due to constant technology advancements, the monetary difference between available technologies decreases. A research [6] shows that capital costs of ten diesel bus fleet purchase were 0.17 compared to 0.12 euro/km for 10 CNG bus fleet price, calculated on average 445.449 and 423.250 km passed in 2013 for diesel and CNG buses, respectively, and estimated annual depreciation. Maintenance costs of 0.28 euro/km passed favoured diesel buses as opposed to CNG buses whose maintenance cost reached 0.35 euro/km passed. However, operation costs were 0.64 euro/km

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for diesel buses vs 0.41 euro/km for CNG buses in 2013. Overall, the analysis [6] showed the total costs of diesel bus fleet of 1.03 euro/km compared to 0.92 euro/km for CNG buses in 2013. Such a difference is based on the average fuel price of 1.11 euro/l for diesel and 0.58 euro for 1 m^3 of CNG. The EU plans to halve the use of conventionally fuelled cars in urban transport by 2030 discontinue their use in cities by 2050 and achieve CO_2-free city logistics in major urban centres by 2050, all to reduce GHG emissions by at least 80% in 2050 [3]. This ambitious goal implies greater than ever expected use of public transport in the following decades. The level of ambition is striking as currently personal cars account for 81.6% total passenger kilometres in EU-28 [7] and public transport for the rest, i.e. buses and coaches (9.3%), railways (7.4%) and tram and metro (1.7%). The separate statistics on trolleybuses is not led, although trolleybuses are strongly recommended as clean and silent mode of public transport throughout the EU. The cost of a trolleybus is about 20% in addition to the price of a standard city bus, but its expected lifetime is 20 instead of 12 years, it is more environmentally friendly, and it consumes less electric energy than buses do diesel fuel in monetary units [8]. In terms of expected economic lifetime, the highest benefit-cost ratio has metro and light rail. One metro vehicle costs on average about 1.5 million euro with expected lifetime of 40 years, whereas one tram/light railway vehicle cost ranges from 1.2 to 1.5 million euro. However, the construction of metro network is estimated to 130 million euro/km, whereas the construction of light rail/tram network is much cheaper at about 15 million euro/km on average [9].

Regular public fleet purchase depends very much on the organisation of city public transport and operating performance of the urban transport operators. This chapter reveals the mutually linked factors that cause such differences and hence the differences in public transport fleet and overall public transport quality.

2. The organisation of the city public transport

Transport statistics is in general more often available for main transport infrastructure at country levels (roads, motorways, number of buses, number of passenger kilometres, etc.). Available public transport statistics usually combines national, regional and urban transport. The data on operation of either public or private urban transport operators are widely not available, or they are available only for metropolitan areas and some largest companies if they are not a part of the city holdings. While there are some studies explaining the organisation of urban public transport in some bigger Central European cities such as Prague, Budapest or Kraków, the data on city public transport in Western Balkan countries is widely neglected. The reason for putting them together is that they all belonged to centrally planned economies until the 1990s and followed different economic path thereafter.

The city transport operators presented in **Table 1** have been selected based on the criterion of more than 100 thousand inhabitants of the city. However, due to the large subsample size, i.e. the disproportionate number of cities of such size per country, this threshold has been increased to 145 thousand citizens for Czechia and Hungary only. **Table 1** also contains the data on transport modes available in the selected cities as well as the data on majority ownership of

the public transport operators. In all cities the public authority owns the public infrastructure, while the public operator operates either its own fleet or the public fleet. The city public transport operator can be in public, private or mixed ownership, while in most cases, it is publicly owned. Some city transport operators are independent companies, while some of them are parts of holding structures (Zagreb). Public transport operators in the cities are typically the utilities owned by local authorities that have been providing such services for decades. However, some cities have contracted other operators in addition (Prague, Budapest). Such contracts are an exclusive right to use a certain route or lines or operate the entire network of urban and/or suburban lines in certain city area. Subject to predefined quality of service, such contracts may be authorisation rights (licences) with or without investment in any kind of transport infrastructure that are valid for a certain number of years. In some countries this term is bound to the depreciation period of the public transport fleet. There are also public transport operators covering entire regions and/or multiple urban and suburban areas in a certain region. The example of such a company is Arriva Dolenjska in Primorska in Slovenia, a Deutsche Bahn-owned company, providing public transport services in Slovenian cities: Novo Mesto, Koper and Piran.

Country	City	Modes of transport	Urban transport operator	(Majority) ownership of the operator	No. of city citizens as per latest census
Czechia	Prague	B, M, T, R	Dopravní podnik HL.M. Prahy, a.s.22% of public bus transport is operated by other operators Czech railways (one urban railway line)	Public Private Public	1.289.211
	České Budějovice	B, TB	Dopravní podnik města České Budějovice, a.s.	Public	154.588
	Brno	B, T, TB	Dopravní podnik města Brna, a.s. operates both urban and regional transport in South Moravia	Public	385.913
	Plzeň	B, T, TB	Plzeňské městské dopravní podniky, a.s.	Public	188.045
	Ostrava	B, T, TB	Dopravní podnik Ostrava, a.s. Arriva Morava, a.s.	Public Public (but international)	326.018
	Hradec Králové	B, TB	Dopravní podnik města Hradce Králové, a.s.	Public	145.373
	Olomouc	B, T	Dopravní podnik města Olomouce, a.s.	Public	161.641
Slovakia	Bratislava	B, T, TB	Dopravný podnik Bratislava, a.s.	Public	432.000
	Košice	B, T, TB	Dopravní podnik města Košice	Public	240.433
Hungary	Budapest	B, M, T, TB, R	Budapest public transport company (Budapesti Közlekedési	Public (the only operator until 2010) Public	1.741.041

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Country	City	Modes of transport	Urban transport operator	(Majority) ownership of the operator	No. of city citizens as per latest census
			Zártkörűen Működő Részvénytársaság—BKV) MÁV Hungarian State Railways Private Company VOLÁNBUSZ Transport Company VT-Arriva	Public (but national) Public (but international)	
	Miskolc	B, T	MVK Rt.	Now private (a part of Miskolc holding, but it is used to be in public hands)	172.637
	Szeged	B, TB	Szegedi Közlekedési Korlátolt Felelősségű Társaság Tisza Volán	Public (it is used to be partly private before bankruptcy) Private (for 51% share in transport it gets 2/3 revenues)	164.883
	Pecs	B	Tüke Busz Zrt.	Public	156.649
	Debrecen	B, T, R	DKV Debreceni Közlekedési Zártkörűen Működő Részvénytársaság	Public	204.124
Slovenia	Ljubljana	B	JP Ljubljanski potniški promet, d.o.o.	Public	282.944
	Maribor	B	JP za mestni potniški promet Marprom, d.o.o.	Public	111.115
	Koper, Piran, Novo Mesto	B	Arriva Dolenjska in Primorska, druzba za prevoz potnikov, d.o.o.	Public (but international)	107.756
Croatia	Zagreb	B, T	Zagrebački električni tramvaj (ZET) HŽ (suburban railway)	Public (Zagreb holding) Public	790.197
	Osijek	B, T	Gradski prijevoz putnika (GPP) d.o.o.	Public	108.048
	Rijeka	B	KD Autotrolej d.o.o.	Public	128.624
	Split	B	Promet d.o.o.	Public	178.102
Bosnia	Sarajevo	B, T, TB	KJKP Gras d.o.o.	Public	275.524
	Banja Luka	B	Autoprevoz A.D.	Private	199.191
	Tuzla	B	Gradski i prigradski saobrać aj d.d.	Public	120.441
	Mostar	B	Mostar bus d.o.o za javni gradski prijevoz	Public	113.169
Serbia	Beograd	B, T, TB, R (under construction)	GSP Beograd Arriva Litas	Public Public (but international)	1.344.814

Country	City	Modes of transport	Urban transport operator	(Majority) ownership of the operator	No. of city citizens as per latest census
	Niš	B	JKP Direkcija za javni prevoz Grada Niša	Integral part of municipality	260.237
	Kragujevac	B	Gradska agencija za saobraćaj	Public agency	150.835
	Novi Sad	B	JGSP Novi Sad	Public	250.439
	Subotica	B	JP Subotica Trans	Public	141.554
	Mladenovac, Aranđelovac, Kragujevac, Obrenovac, Smederevo, S. Palanka, Inđija, Valjevo	B	SP Lasta, a.d.	Majority public	N/A
Montenegro	Podgorica	B	"Gradski saobraćaj PG" Podgorica d.o.o. "Bulatović trgopolje" d.o.o. "Montenegro prevoz Pejović" d.o.o.	Public Private Private	150.977
Macedonia	Skopje	B	JSP Skopje	Public	510.000

Source: Author's collection.

Table 1. Contracted public transport operators in selected cities with majority ownership and modes of transport under management.

The least frequent public transport mode is metro, available only in Prague, Budapest and Belgrade. These are the cities with the largest number of inhabitants and suburban area. The 142.4 km long tram network in Prague is one of the most developed in Europe with about 950 trams in operation. The main operator provides about 4/5 of bus connections, while the rest are rendered by private operators. Bus fleet is also very large with 1.255 buses operating on 148, 1.6783 km long lines. The metro network has three lines over 65.2 km, while the fourth line has been under construction. Other cities have much smaller public transport networks. Maribor with slightly over 100,000 inhabitants is served by about 50 buses only. Useful data on public transport organisation in smaller cities can be found in PROCEED country reports [10] or from CiViTAS project participants [11]. In smaller cities public transport is comprised of buses only that can be sometimes substituted by public bicycles. Although there are counters of bicycles in many areas, the statistics on bicycle usage for commuters changing buses for bicycles at certain points of their trip is not available.

Organisational structure of public city operators differs according to the number and complexity of public transport and related services. Transport operators are commonly responsible for various segments of public transport. There are urban areas that are serviced by several transportation modes such as buses, trams, trolleybuses, light rail, trains and metro. If urban transport operator is organised as a separate company, these organisational segments are often

not separated clearly as they use the same support services such as sale ticket offices, managerial and administrative staff support, public procurement, advertising, etc. It is especially hard to separate physical transport network construction and maintenance costs from the transport fleet costs. Sometimes a couple of public enterprises agree on the provision of certain service as it is the case with intermodal transport operated by various companies. If bus network is operated by one company and the rail network by another, then they often agree to provide the unique fare for regular passengers travelling from suburban to urban areas for the reasons of work and education, i.e. daily commuters. The citizens prefer efficient public services, such as buying fares in one company only. The urban transport operators share revenues and costs arising from the commonly sold fares thereafter according to certain allocation keys. In addition, there are many companies that are responsible for urban and suburban, as well as for regional, national and even international passenger transport (Lasta, Autoprevoz). Such companies can be registered for occasional passenger transport, international passenger transport, sale of spare parts for vehicles, as tour operators or other tourism supporting services. Public transport operators can also offer other services such as central bus station or metro station management, operating stations for technical inspection of buses, provision of advertising places in the public transport network, etc.

Municipal and public transport services often intertwine. Some public transport services such as road or rail infrastructure are commonly financed by local (sometimes central) authorities which often provide transfers to public transport operators for covering the capital costs of the public transport fleet purchase. In addition, municipalities strive to provide quality public service, thus combining the transport fares with other tickets for city sight-seeing spots, museums, libraries, sports facilities, parking lots, cable-car rides, even certain shops and restaurants (Urbana card in Ljubljana, tourist cards in other cities). Most cities purchase new vehicles when coming to the fleet renewal. However, there are some examples of purchasing the second-hand urban transport fleet or using EU funds for both hard infrastructure and urban transport fleet renewal (Szeged). The town of Szeged is one of the rare cities that developed its own fleet by adapting and refurbishing the existing or second-hand fleet in the first decade of twenty-first millennium what was seen before in Ostrava. The benefits of such an approach are counted by [12], consisting mainly of spreading financing term and thus achieving better financing conditions, reallocation of the workforce from service to production work, cooperation with industrial partners, tailoring fleet according to their own needs, better communication with the citizens.

3. Operating performance of city public transport operators

The data on operating performance have been collected by means of the European business registry and the websites of public transport operators. Financial and ownership data have been obtained via Amadeus database, public authority or public transport operator websites. Urban population data have been obtained from the most recent census data available. In the EU countries, the last census dates from 2011, while non-EU countries had it either in the same year (Serbia) or within the next two years (Bosnia and Herzegovina).

Only largest companies disclose their nonfinancial and financial data. Most transparent urban transport operators are Dopravní podnik HL.M. Prahy (Prague) and some local public operators in Serbia and Croatia that are obliged by law to make their annual financial reports public. Due to small number of large cities and old and inconsistent financial data available for different years, Slovakia is represented by only one town—Košice, while the data were insufficient for analysing public transport in Montenegro, Macedonia and Albania.

Even when disclosed, financial data on public city operators are often not comparable. It is explained by different modes of transport (tram, bus, metro and trolleybus), number and age of vehicles, number of urban and suburban lines and areas covered, number of passengers transferred/passenger kilometres passed, passenger structure, pricing policies, frequency of public transport usage by local citizens, different cost structure of public transport operators, etc. In general, public transport operators disclose a couple of general data about themselves: the transport network map with zones, the daily and night timetable and the price of typical fares.

Table 2 provides the data on city operators' indebtedness, fleet value per citizen (tangible assets), sales earned per citizen and per employee, number of citizens served by operator's employees and operating performance per employee. Contrary to expectations, public transport operators are not indebted although many of them end the year in loss. It means that the public transport fleet purchase is primarily financed from the local budgets or other grants. The only city transport operators that have some portion of long-term debt in assets are those of Koper (Arriva), Ljubljana public transport operator and Autotrolej in Rijeka. Since assets are presented net of depreciation, higher assets per citizen imply higher public transport fleet costs/newer fleet. The differences between the city public transport operators according to tangible fixed asset criterion per citizen are very large. It ranges from 1.17 euro per citizen in Maribor to 1.96024 euro in Prague. Average tangible fixed assets in analysed cities are 273.36 euro per citizen. When this indicator is coupled with the fare revenue earned per citizen, it is evident that the cities in which public transport service is used most are Prague, Budapest, Ljubljana and Brno. Publicly owned transport operator in Ostrava has significant asset value per citizen, but revenues earned per citizen are rather small, suggesting inadequate pricing policy of the operator/public authority or small usage of public transport by the citizens. Just opposite holds for Ljubljana, where fare revenue is significant compared to the tangible fixed asset value per citizen. Other public operators, except for Belgrade, are smaller in size. Public transport is to some extent used in Croatian towns of Split and Rijeka, Plzeň, Miskolc and Debrecen, Novi Sad, Belgrade, Sarajevo and Ostrava (Arriva). All public operators having the value of tangible fixed assets per citizen lower than 100 euro will soon have to replace their public transport fleet unless the fleet is too small compared to the number of citizens that use public transport. The citizens of some cities are not used to public transport after they leave school (Mostar), while some cities purchase public transport fleet on operating leasing contract (which might be the case in Maribor). If sales per tangible fixed asset ratio is high, it suggests that the urban transport fleet may be close to the end of its depreciation

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Country	City	L-T debt/ tangible fixed assets	Tangible fixed assets per citizen	Number of employees per 1000 citizens	Sales per number of citizens	Sales per employee	EBITDA per employee	EBIT per employee
Czechia	Praha	0.38%	1.96024	7.76	444.00	57.24147	11.86466	1.32381
Hungary	Budapest	1.55%	1.17650	6.83	247.47	36.21312	7.21849	728.77
Serbia	Belgrade	4.96%	164.17	4.42	87.35	19.76344	1.08209	−950.05
Slovenia	Ljubljana	30.60%	112.65	3.08	160.58	52.11521	5.75182	395.91
Czechia	Brno	0.00%	505.62	7.13	102.46	14.37882	9.26154	2.84076
Czechia	Plzeň	1.59%	365.27	3.99	85.15	21.34820	12.55950	3.10179
Czechia	Ostrava (Arriva)	0.00%	82.15	3.83	70.41	18.36300	6.65116	1.19047
Czechia	Ostrava	0.00%	436.89	6.90	66.13	9.58139	4.65395	−23.12
Czechia	České Budějo-vice	1.82%	185.75	2.43	40.79	16.81539	7.95029	536.23
Slovakia	Košice	5.73%	159.75	6.24	57.96	9.29072	1.02100	−851.98
B&H	Sarajevo	3.98%	185.40	6.08	70.36	11.56691	−5.02872	−6.72550
Croatia	Split	10.31%	107.08	4.47	85.88	19.21495	2.32425	531.65
Hungary	Szeged	5.49%	219.86	3.20	43.19	13.51315	6.75275	1.07305
Croatia	Rijeka	28.75%	53.19	4.76	84.81	17.82362	3.53499	379.54
Croatia	Osijek	18.74%	279.14	3.24	39.53	12.20277	3.40359	579.90
B&H	Tuzla	9.93%	29.50	1.86	42.41	22.80271	2.24603	232.82
B&H	Mostar	11.84%	3.17	0.75	14.58	19.41706	336.85	162.41
Czechia	Hradec Králové	0.00%	228.49	2.58	43.04	16.68437	5.83218	36.55
Czechia	Olomouc	0.00%	141.00	2.32	37.26	16.05940	−3.92207	−9.13162
Hungary	Pecs	22.32%	22.78	2.96	64.38	21.73573	380.65	−29.52
Hungary	Debrecen	0.00%	245.70	3.32	82.77	24.95623	1.88297	−239.16
Hungary	Miskolc	9.05%	477.39	4.62	93.35	20.22125	2.38660	−1.60400
Serbia	Subotica	0.00%	42.57	3.35	56.42	16.84331	1.27759	107.88
Serbia	Novi Sad	6.10%	67.13	5.12	96.81	18.91164	1.08680	−141.48
Slovenia	Maribor	0.00%	1.17	1.48	28.50	19.19590	−72.49	−252.37
B&H	Banja Luka	11.04%	55.73	1.21	19.66	16.24834	−2.52192	−3.67060
Slovenia	Koper	40.44%	72.41	1.98	73.13	36.99545	8.92766	3.72974
	Mean	8.32%	273.36	3.92	86.61	21.46309	3.58675	−246.97

EBITDA (earnings before interest, taxes, depreciation and amortisation); EBIT (earnings before interest and taxes), L-T debt (long-term debt).

Table 2. Selected indicators of public transport operator assets, sales, indebtedness and operating results.

period or that the value of public transport fleet is very small compared to the size of the city (Tuzla, Rijeka, Pecs, Subotica, Novi Sad and Koper). Sales per number of citizens reveal the importance of city public transport in certain cities. The highest fare revenue per citizen is earned in the city of Prague, Budapest, Ljubljana and Brno, suggesting that public transport is vital in the largest urban areas. Organisational issue of city public transport is well revealed by the fare revenue, i.e. sales per employee. Well-organised public transport according to this criterion exists in Prague (57.2 thousand euro per employee) and Ljubljana (52.1 thousand euro per employee). Quite well efficient are public transport operators in Budapest and Koper, while least revenue per employee (less than 15 thousand euro) was earned in Sarajevo, Osijek, Ostrava, Košice, Szeged and Brno in 2013.

In most cities fare revenue is the main source of operating revenues. For operators in Bosnia and Herzegovina, operating revenue data was missing; thus, it was estimated that it is equal to fare revenues. However, there are cities is which ticket revenues are well below 50% of the operating revenue threshold. It suggests that public transport operators are heavily subsidised by public authorities. Such cities may be Osijek and all Czech cities except for Prague, Szeged, Koper and Maribor.

Public transport operators typically collect fares on their own. Although it appears simple when public transport is operated by one operator, it can be very complicated when there are more public transport operators in place. Thus, many cities opted for gross contract principle in which operational (revenue) risk rests with the public authority.

Public transport operators should at least cover their operating costs, i.e. their earnings before depreciation, interest and tax should be positive. The average data show that operating result before depreciation is positive, while adding up depreciation turns the operating result per employee into negative area. The most efficient cities measured by operating result accomplished per employee are Brno, Plzeň, Ostrava (Arriva), Koper and Szeged. However, Olomouc, Sarajevo, Miskolc, Belgrade and Košice have substantial negative results. The average number of employees in public transport operators per citizen is four per 1000 citizens. The cities with the highest ratio include Praha, Brno, Budapest, Ostrava (public operator), Košice and Sarajevo.

However, many public transport operators do not even have substantial fare revenues to even cover their staff costs. This happens in Sarajevo, Osijek, Brno, České Budějovice, Košice and Maribor. These cities, despite positive earnings before depreciation, are either transferring certain funds to public transport operators for the salaries or for the fleet or are simply giving them subsidies to earn a positive operating result. In all analysed cities, the portion of sales used to cover staff costs is higher than for covering material costs. In the end of 2013, the loss per employee was the highest in Sarajevo at more than 8000 euro, which was also significant per citizen (over 49 euro). Cities of Olomouc, Miskolc, Prague and Belgrade have sustainable loss per citizen ranging from 10 to 18 euro. Overall, 17 out of 27 public transport operators finished the year in loss, while 10 of them showed positive results.

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4. Financing public transport operators

Revenues to public transport operators come from passengers paying either full, discounted or partly subsidised fares. Full fares are calculated for one-time travellers; return fares and fares valid a month or a couple of days are commonly sold at the discount either to frequent passengers or to tourists. In largest cities and popular tourist destinations, public transport fares are bundled to tourist tickets for sightseeing. They can be offered for 1, 2, 3 or 7 days. The longer the stay, the cheaper the ticket. In some cities the fares are more expensive when purchased in the vehicle than when purchased in designated shops or kiosks on stations, while some cities calculate the same price for the fare regardless of the place of its purchase (Zagreb). Fare price are in most cities the same for daily or night ride, but some cities charge more expensive fares for night ride (Košice, Zagreb) [13]. However, night lines are less frequent and on many routes non-existent. Partly subsidised fares are valid for certain groups of citizens such as school children, students, disabled people, the unemployed or the retired. The rest of the costs up to the full fare price is covered from the local or national budget. There are also partly subsidised fares for other end users such as workers of certain companies which are at the level of employer as the subsidy is paid from the corporate entities either to the user of public transport service or to the public transport operator. Monthly or annual fares can be purchased by a certain person, and they are not transferable. There are, however, time tickets, quantity tickets and value cards which are transferrable from person to person. Time tickets are typically valid from 1 to 7 days, while quantity tickets are issued for 2–30 rides. Value cards are prepaid cards with a certain amount of (prepaid) credit that can be used for purchasing the fares. A single fare is typically valid for 60- or 90-minute ride throughout the selected number of city zones. The fares are usually the same for different city transport modes operated by the same company (tram, trolleybus, bus, city metro or city rail). The city of Košice has the fares for 30- and 60-minute ride, and it even has a reduced fare of 0.25 euro for up to four stops of single ride, while Bratislava distinguishes between 15 and 180 minutes of rides at prices varying from 0.7 to 3.6 euro [14]. České Budějovice has 20- or 60-minute ride option, while Ostrava even introduced 10-minute ride ticket. Paper tickets still exist in many cities, while some cities are stimulating electronic purchase. If purchased by SMS, the ticket price is cheaper in Košice for 20 cents, for instance. The Slovakian cities have extra charge for luggage and pets [13]. Some public transport operators stimulate the demand for public transport services by enabling variable fees in non-rush hour time and on weekends (Subotica). Miskolc has introduced weekend family ticket of approximately 9.35 euro. An income census is sometimes introduced in determining fare prices. Such a system exists in Sarajevo and Osijek for senior citizens. Some cities have a gradation between pensioners' age, whereby the oldest citizens pay the cheapest passes. The fares charged to pensioners can be the same as those priced for students (Pecs, Belgrade, Ljubljana, Koper, Piran and Novo Mesto), lower than student passes (Hradec Králové, Osijek, Rijeka, Budapest, Subotica, Tuzla, Banja Luka, Mostar and Sarajevo) or higher than student passes (Split, Brno, Prague, Novi Sad and Maribor). Sarajevo public transport operator also introduced school children and students passes based on the distance travelled, in which students travelling up to 2 km distance subsidise those travelling more than 2 km. Even though Sarajevo public transport operator strived to be fair in pricing, it comes at

the cost of a very complicated public transport pricing policy with many grades of fare prices that is very difficult to control. Cross-subsidies to senior citizens are also very obvious in Osijek, Zagreb, Mostar and Hradec Králové.

Different daily and monthly fare prices among cities are shown in graphs 1–3. **Figure 1** shows single-fare prices bought at the kiosk. The fares bought in the vehicle are usually 10–30% more expensive. The highest single-fare prices have been observed in Croatian cities and Košice. The city of Split has the same single-ride price as Ljubljana, Belgrade and Bratislava, while Prague and Budapest have somewhat lower prices. The average single-fare price is 0.96 euro, whereby all capital cities (except for Sarajevo) and other Croatian cities, Brno, Miskolc and Košice, have higher prices, with ten cities charging lower prices than the average. The lowest single-fare prices are valid in Novi Sad, Subotica and Tuzla.

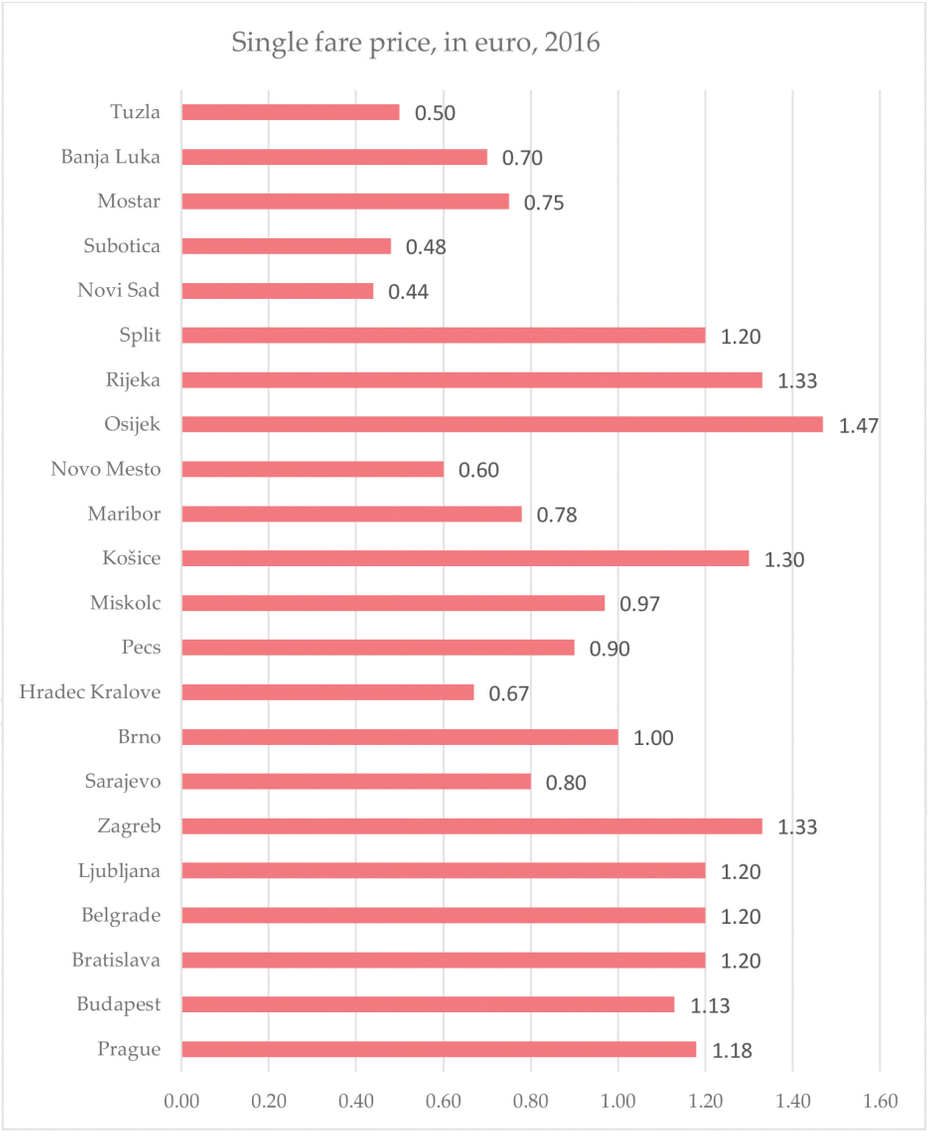

Figure 1. Single-fare prices in selected cities, in euro, 2016. Source: Author's collection.

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As illustrated in **Figure 2**, Zagreb has the highest prices of monthly adult passes at 48 euro, followed by Ljubljana (37 euro) and Budapest with 33.87 euro. The average monthly pass price for an adult in capital cities is 29.61 euro. Contrary to expectations, Prague has the cheapest public transport with monthly pass price of only 11.10 euro. This fact sheds some light on the losses made by Prague transport operator, which are not at all too high when fare prices are taken into calculation. The profit and loss account data show that each citizen of Prague has to give up about 10 euro for making up for the losses in public transport. That is actually a price increase of public transport by less than one euro monthly. Even with this increase in price, Prague public transport would still be well below the comparable prices in other cities.

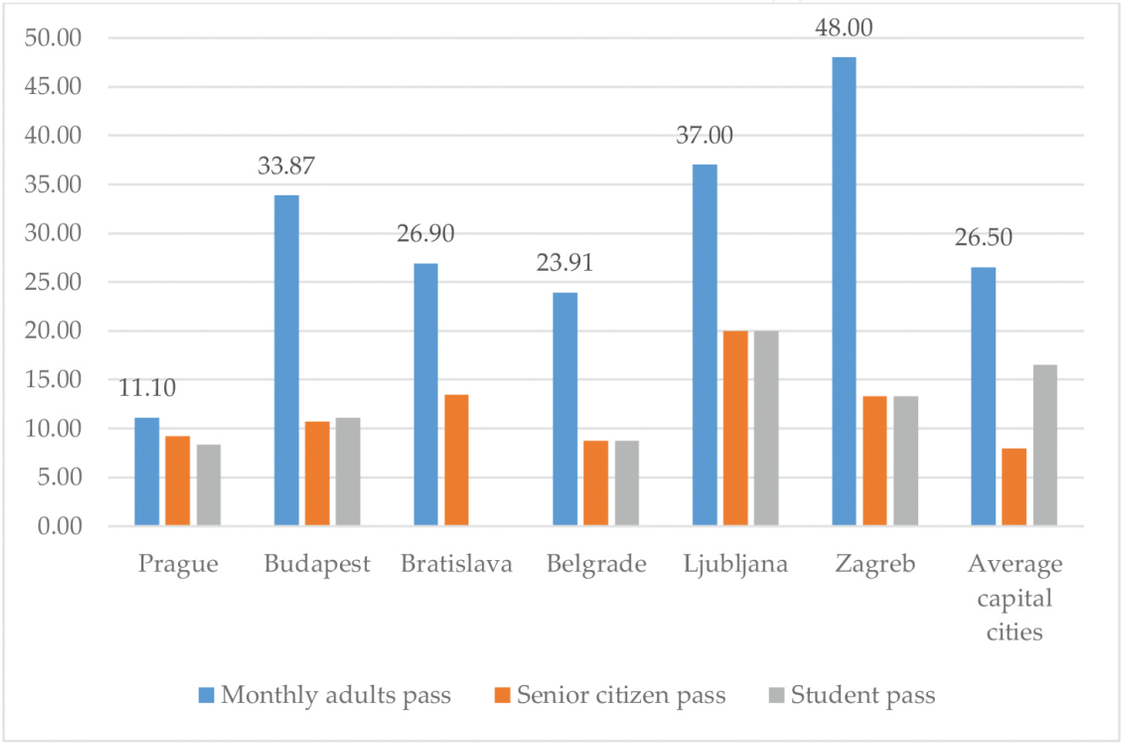

Figure 2. Monthly prices of fares in capital cities, in euro, 2016. Source: Author's collection.

Figure 3 shows the oscillations around the average price of monthly adult pass among smaller public transport operators of 24.02 euro. Hereby, Croatian cities and Brno are at the levels higher than 30 euro. It can be easily spotted from **Figure 3** which city has lots of pensioners, where pensioners are assumed to have a decent living standard (Brno and Novo Mesto) and where pensioners rather belong to a social category of citizens (Osijek, Banja Luka and Hradec Králové). The average difference between adult and senior fare monthly pass is significant, ranging from 18.5 euro in capital cities to 6.19 euro in non-capital cities. Such huge difference warns of heavy cross-subsidisation of public transport in favour of pensioners in capital cities. However, the discounts offered to students are much smaller, ranging from 10 euro in capital cities to only 2.36 euro in non-capital cities on average. Herby, Croatian non-capital cities and Novi Sad have over 50% price reduction for monthly student passes compared to adult passes, while the largest reduction for student passes exists in Zagreb (over 72% of the adults pass).

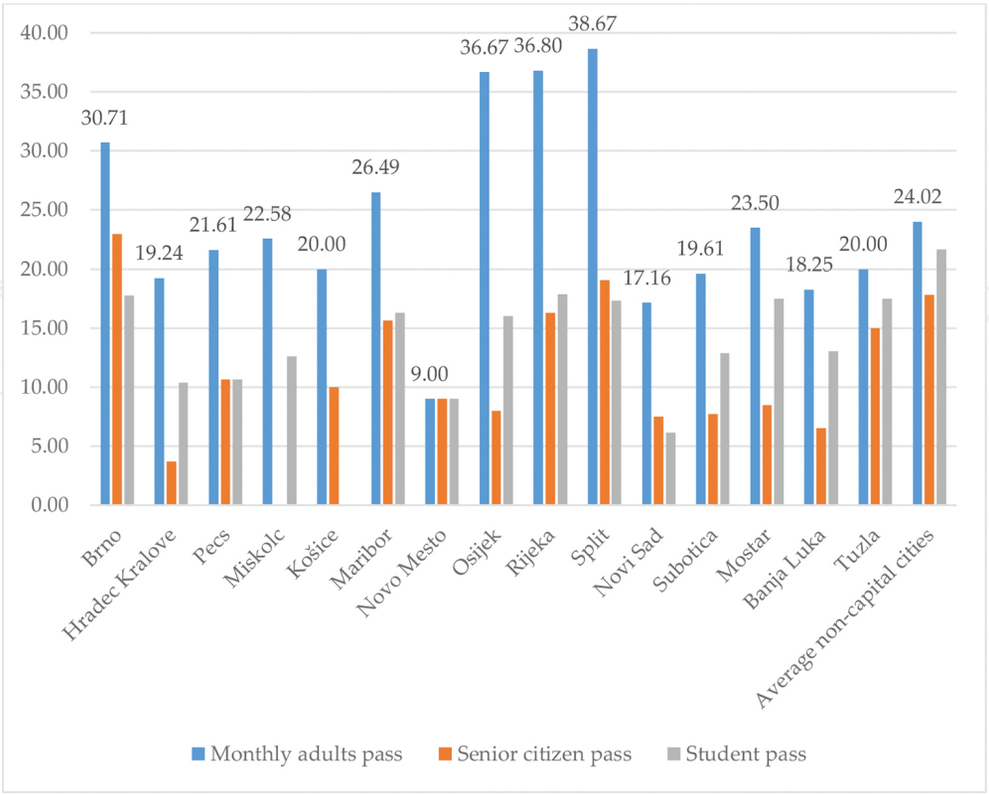

Figure 3. Monthly pass prices in selected non-capital cities, in euro, 2016.

The financial inflows and outflows for public transport are shown in **Figure 4**. Apart from fares, other revenues of public transport operators come from local or national taxes whose portion is allocated for transport infrastructure, special taxes for funding transport infrastructure, local administrative and other fees (cross)-subsidies/grants and loans. Subsidies and cross-subsidies are more specific as they may and may not come from the direct beneficiaries of the transport infrastructure. Subsidies occur when the funds from local budget are transferred directly to public transport operators, usually for covering their deficits. Cross-subsidies occur when revenues in excess of variable costs for one group of passengers are used to finance deficits incurred for other groups of passengers [15]. This situation is common for financing fares of school children, students, the disabled or senior citizens. Cross-subsidies can also occur when funds from other profitable activities, but public transport, of either local municipality or public transport operator are used to make up for the difference (deficit) in public transport operations. There are cases when taxes imposed to the direct users of transport infrastructure serve as general rather than tax revenues for transport infrastructure financing, which often happens in highly centralised and highly indebted countries. Funds are commonly available for transport systems funding from international financial institutions either in form of one-off grants or in form of the loans with more favourable interest rate or various kinds of technical assistance for public transport system planning, operation and maintenance. In all these cases, funds come from indirect beneficiaries of transport infrastructure. International institutions find their interest in connecting the regions and people for the purpose of equal development and easier transfer of goods, services and people.

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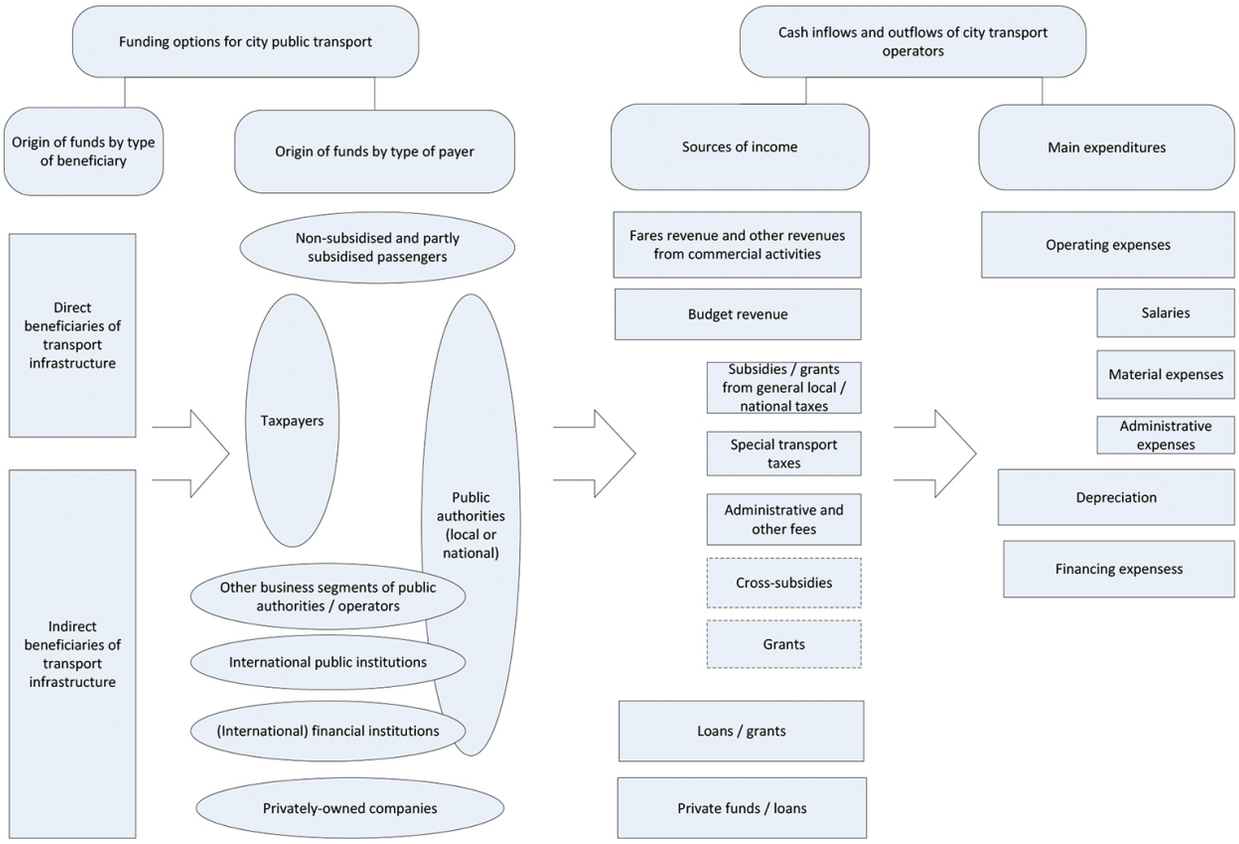

Figure 4. Urban transport operators financing mechanism. Source: Author's illustration.

Most public transport operators do not have sufficient commercial revenues to operate the system in a sustainable way. Local and sometimes national governments provide funds for loss coverage. The size of loss is directly linked to the size of the city and suburbs' population, fleet size, quality and age, fuel consumption and pricing policy. The costs per vehicle vary depending on the type of vehicle (tram, train and bus), fuel type, producer, size, carriage, number of seats and number of standing places and special characteristics such as access to disabled people, spare parts, service costs, etc. These costs are generally disclosed for the urban transport fleet when financed from the loans/grants of international financial institutions or on news portals in national languages only. The public transport operators are more ready to disclose the data on emissions and type of vehicles they have in their fleet, which is beneficial for sharing technological know-how in public procurement [16]. Besides technology, spatial and institutional problems the cities are faced with, financial problems with public transport renewal are most frequently cited among the cities. Thus, financial affordability of the cities influences very much the choice of public transport technology and hence the quality of public transport fleet. Not many Central European cities have prepared projects for urban transport fleet renewal during the 2007–2013 period, while Southern European countries have not done it at all. An exemption is Bratislava that purchased 15 monodirectional and 15 bidirectional trams for 220 passengers each, for 91.26 million euro, of which 61.41 million was co-funded by the European Regional Development Fund (ERDF) [17]. Szeged also prepared a good plan for

urban transport renewal which consisted mainly of physical infrastructure renewal that included new and old vehicle refurbishment. However, European cities benefited significantly for transport infrastructure renewal and construction, mostly for cross national, national and regional, but also for urban transport (metro line extension in Prague, metro, tram and suburban railway infrastructure in Budapest). If the private sector is involved in public transport fleet renewal, it generally assumes the licence to hold a certain route(s) for a specified number of years. However, there are examples of urban transport fleet financed entirely by the private sector at no cost for the citizens. The latter occurs in Plzeň for route towards a shopping centre of which the shopping centre has direct benefits [12].

Capital costs of urban fleet, though high, are smaller than its operational costs during the fleet expected lifetime. Public transport fleet can be funded from a number of sources. Litman [18] counts 18 sources of funding city public transport: 15 belong to direct or indirect taxes related to either fuel consumption, gas emissions, road or property taxation, full price and discounted fare revenues and advertising revenue. In practice there are much more of them.

Determining a sustainable pricing policy for public transport operators is very challenging as it includes both commercial and social (politically sensitive) component. Real cost of service is for this reason often not disclosed or hidden. It can be explained by various factors such as company structure of city transport operators, organisational structure of city transport operators, intertwining of municipal and public transport operators' services, deliberate data intransparency, etc. Very few cities such as Ljubljana, Belgrade and Prague disclose some general information on public city transport like average age of public transport fleet, structure of fleet, urban and suburban area covered by public city lines, etc. However, even such operators may not update such information regularly.

Deliberate data intransparency assumes hiding the data from the public due to numerous reasons such as subsidies from municipal authorities and other public institutions, underperforming operating indicators due to high number of the employed, obsolete public transport fleet, huge material costs, hiding the data from the competitors (in the areas where there are several concessionaires and/or a public and private-operated public transport service), etc. Undeliberate data transparency is common for many municipal services. One explanation may be that public transport functioning is taken for granted by the citizens who do not need to get bothered by statistical data. The news on purchase of new vehicles is regularly provided by public transport operators, while other data are scarcely found. Luckily, the public transport operators are obligors of the public procurement which forces them to take account of the public transport fleet costs. The data on the costs of urban transport fleet replacement for some public transport operators are shown in **Table 3**.

Private operators are obliged to keep costs under control as they are requested to renew the contract with new fleet or fleet in good condition. They sometimes do it at the cost of higher operating costs as gross cost contracts do not stimulate them for cost reduction. Practically, all cities, regardless of the ownership structure of the operator, cover the difference between the operating costs set in the contract and fare box revenues.

City	Timing	Type of fleet renewal	No	Total price in million euro	Average price	City budget participation	Way of financing
Belgrade	2009–2013	Trams	30	81.3	2.71	75%	
		Trolley buses	83	18.6	0.22	100%	
			16	3.8	0.24	100%	
		Fare collection and fleet management	-	12.5		N/A	
Zagreb	2008	Trams	70	N/A	N/A	100%	Leasing
	2009	buses	214	N/A	N/A	100%	Leasing/later sale and lease back to public authority
Bratislava	2007–2013	Trams	45	115.35	2.56	20%	Budget/ERDF
Prague	2015	Trams	34	81.4	2.39	N/A	EU funds/ municipality
Szeged	2004	Second-hand trams	14	4.6	0.33	100%	Bank loan
	2003–2004	Refurbishment of the trams	10		0.00		
		Trolleybus	8		0.00		
	2011–2012	Trams	9		0.00		EU funds/ municipality
		Articulated buses	10		0.00		
Košice	2010	CNG buses	19	9.12	0.48	100%	
	2013–2014	Trams	23	48	2.09	100%	
		Buses	127	28.6	0.23	100%	
Osijek	2009	Buses	12	N/A	N/A	100%	Financial leasing
Rijeka	2013	Buses	11	3.33	0.30	100%	Loan
		Minibuses	10		0.00		

Table 3. Collected data on urban transport fleet financing.

5. Conclusion

Comparing public transport operation financing in different cities of the transition economies of Central and Eastern Europe and Southern and Eastern Europe turns out in many aspects to comparing the incomparable. Not only public transport operators differ in size,

organisation, ownership, number of employees and fleet characteristics (various modes of transport, varying condition of infrastructure, different public transport fleet quality measured by manufacturers, age, capacity, energy consumption and congestion, accessibility, comfortability) but lots of behavioural and political elements are always involved in city public transport pricing and functioning. Citizens may be reliant on urban public transport to lesser or greater extent, which very much depends on the city organisation, average time necessary for transfer over a particular route by public or private transport and price of public transport. There is no unique statistics on city public transport functioning, so the data shown very much depend on city public transport operators, local authorities, countries, case studies done within the scope of certain international transport projects (PROCEED and CiViTAS) or international studies. Not only city public transport data are coupled with the regional and national numbers in national statistics but some basic data are not available at all on regular basis or are available for local citizens only. The data collected from various sources suggest that urban transport statistics should be more comprehensive and the data unified across the countries. Disclosing the data on approximate time of public transport in one direction, the number of passenger kilometres passed by transport modes, the revenue by type of passengers, operating costs, the amount of revenues, subsidy size, number of employees and fleet book assets and age would contribute very much to the international comparison of public transport operators' efficiency.

Public transport operations are in a nutshell always financed by the citizens. However, they may be financed either directly through fare revenue (which is the fairest approach) or indirectly through various taxes collected from both those who use it regularly and from those citizens who do not use it at all. The portion of direct and indirect user financing is dependent on the decision of the local public authorities. The typical way of financing public transport operators is to cover at least operational costs by fare revenues, while budgets make up for the rest. Only regular disclosure of the data on public transport funding in local budget would reveal the level of public transport sustainability. Larger cities, although faced with the much greater complexity of public transport organisation, have a privilege of disposing with much larger budget that can hide public transport operator inefficiencies. Even if the funds are not sufficient, rare public transport operators end up in loans. Rather, the local authority borrows funds to keep the quality of either transport fleet or physical infrastructure. The international financial institutions can help very much in covering occasional costs related to public transport fleet renewal. Although many cities opt for applying for transport network co-funding, the projects can combine investments in fleet renewal. The competition of private sector is very limited in the analysed countries, but it gradually emerges. All public transport operators, regardless of their ownership structure, generally operate on a gross contract basis, whereby the city makes up for the losses. However, only few cities have introduced penalty-reward mechanism to encourage the efficiency of private partners. Overall, there is some awareness on growing importance of energy efficiency of public transport evidenced in purchase of quality transport fleet, but there is a lot to do in integrating public transport modes (including the bicycles) and public transport promotion, especially in the countries of the Southern and Eastern Europe.

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