

# IMPACT OF INDIRECT USER PARTICIPATION ON PUBLIC TRANSPORT FINANCING

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## Abstract

The regional public transport performs with around 11 billion passengers a part of approximately 16.3% of all passenger transports in Germany. It is financed from tariff revenues (user financing) and, for the most part, through public subsidies. The costs for the regional public transport are only covered by 50% by direct users. Further 50% are covered by public funds. The demographic development in Germany and with it declining passenger numbers, legal changes at European and national level as well as the over-indebtedness of public authorities result in a significant change of the framework conditions for the regional public transport. The aim of the paper was to draw up reform proposals for public transport in Germany so that it could continue to meet the four main objectives set. The results of those proposals for reform are transferred to a defined project area enabling to measure specifically the monetary impact. By forecasting the results of the project across the country, we want to verify whether the four main public transport objectives can be achieved using possible additional financial instruments involving indirect users, even under changing conditions, provided the proposed reforms are applied.

**Keywords:** regional public transport; funding; reformation; quality

## 1. Introduction

The public transport in Germany is with around 11 billion passengers amounting to approximately 16.3% of all passenger journeys in Germany. The service performed here by about 94.5 billion passenger kilometers correspond with 8.7% of all passenger kilometers [1]. This service can't be provided cost-covering in general therefore considerable public subsidies are required. The expertise of the Friedrich Ebert Foundation to fund public transport calculates a total value added in 2008 in the amount of approximately 25 billion €, hereof results ca. 9 billion from tariff revenues (user financing) and approximately 16 billion € from public compensation [3].

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The overall performance of public transport in Germany as well as the necessary financial expenditure reaches a considerable economic dimension of high practical relevance [4]. This will arise in the following years due to the demographic development in Germany along with probably declining passenger numbers, legal changes at European and national level as well as the over-indebtedness of public authorities [16]. These changes influence considerably the public transport in Germany, main objectives until now are as follows :

- ***Overall economic use of the financial resources***

The achievement of the main objectives of the public transport defined here shall take place by the cost-efficient use of necessary funds [21].

- ***Adequate operation***

The second major objective of public transport follows from § 1 Public Transport Regionalization Act. According to this, it is a task of existential provision to ensure adequate operation of the public with transport services.

- ***Socially acceptable tariffs***

Article 20 of the Basic Law regulates the promotion of social justice, for example, regarding to the participation of citizens in community life in a welfare state. Socially acceptable tariffs are therefore a major target of public transport in order to serve the mobility needs of low-income households [21].

- ***Reduction of external effects***

The increasing urbanization and with it related challenges of regional planning for the densely populated cities result in additional demands on public transport to avoid traffic congestion. Furthermore, it is necessary to avoid additional parking places needed by the land requirements of the motorized public transport. These have to become more attractive and must be freed from emissions and immissions of motorized public transport. The reduction of external effects is therefore a fourth main objective of public transport [5, 12].

The main objectives defined for the public transport in Germany are conflicting with the changed or changing conditions mentioned at the beginning. The aim of the paper is to verify whether it is possible by means of funds from indirect users to achieve the four main objectives of regional public transport. The contribution will also provide funding proposals for indirect participants to verify the main objective of the contribution.

## **2. Analysis of the current state of public transport funding in Germany**

The funding of regional public transport in Germany is very complex. That is the reason why in scientific literature is often spoken of a variety and complexity of individual financing flows as well as the lack of a consistent statistic reflecting all relevant positions.

The financing sources of the regional public transport, resulting in the financing instruments mentioned, are:

- income of transportation companies from the fares;
- internal company transfers such as the local combination utility;
- municipal budgets;
- the budgets of the countries and
- the federal budget [4, 24].

The expertise of the Friedrich Ebert Foundation to the financing of public transport calculates a total value in 2008 amounting to about 25 billion €, of which about 9 billion € come from tariff revenues (user financing) and approximately 16 billion € come from public compensation [1]. The 12th coordinated population forecast by the Federal Statistical Office expects a decline in population of approximately 82.002 million people in 2008 to between 79.914 million and 80.831 million people in 2020. Depending on the factors "birth rate", "life expectancy" and "migration balance", the prognosis fluctuates by approximately 914 thousand people [20].

**Tab. 1. Forecast of the fare revenues by 2020 [12]**

Years	Development of the population Best Case in million €	Development of the population Best Case in %	Forecasting of the passenger fares in million €	Development of the population Worst Case in million €	Development of the population Worst Case in %	Forecasting of the passenger fares in million €
2008	82.002	100	8.999	82.002	100	8.999
2009	81.904	99.88	8.988	81.828	99.79	8.980
2010	81.807	99.76	8.977	81.654	99.58	8.961
2011	81.709	99.64	8.967	81.480	99.36	8.941
2012	81.612	99.52	8.956	81.306	99.15	8.923
2013	81.514	99.40	8.945	81.132	98.94	8.904
2014	81.417	99.35	8.941	80.958	98.73	8.885
2015	81.319	99.17	8.924	80.784	98.51	8.865
2016	81.221	99.05	8.914	80.610	98.30	8.846
2017	81.124	98.93	8.903	80.436	98.09	8.827
2018	81.026	98.81	8.892	80.262	97.88	8.808
2019	80.928	98.69	8.881	80.088	97.67	8.789
2020	80.831	98.57	8.870	79.914	97.45	8.770

The Table 1 shows a demographically induced decline in the revenues in the period from 2008 to 2020 between 1.43% (best case) and 2.55% (worst case). In the above mentioned analysis it is further assumed that annual tariff price adjustments compensate the inflation and it is supposed that demographic-related fare reductions cannot be compensated additionally by tariff price increases, as these are hardly feasible in line with the market.

The member companies of the Association of German Transport Companies (VDV) transported about 9706 million passengers yields amounting to 11 964 million € [3].

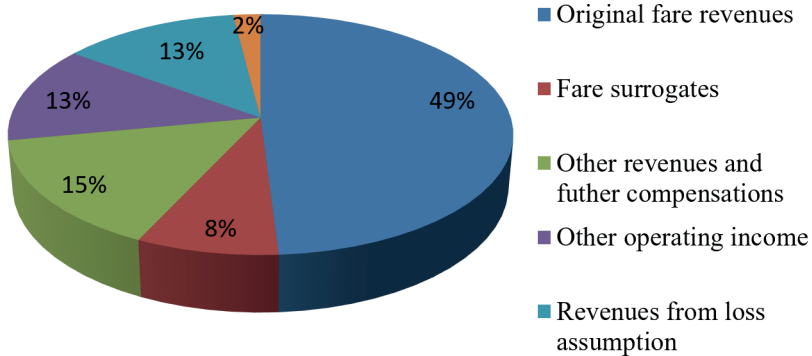


Fig. 1. Revenues of passenger traffic of the VDV companies [22]

Figure 1 shows that 50% of the costs of regional public transport are covered by the direct users (passengers). Still not included are the indirect users, for example, the residents of the regional public transport infrastructure.

### 3. User and benefits of the regional public transport system

The principle of user financing is that the costs of service are covered by the groups of persons using the services directly [2]. This is due to the subsidiarity principle implying that the responsibility of financing and provision of a good lies on the lowest level (individual) and allows a higher level (municipality, local administrative unit, federal state or government) only in case of non-fulfilment of the subordinated level or if the superior level fulfil the task demonstrably better [8, 16]. The user financing can also be justified by the principles of equivalence and congruence demanding for coverage by users, paying passengers or controllers as far as possible.

The scientific advisory board of the Federal Ministry of Transport, Building and Urban Development defines the indirect users as follows:

- First, there is an indirect demand, for example, people willing to pay for a regional public transport connection because they reach a favorable connection to goods and/or persons.
- And second, people get the possibility to use the regional public transport at any time representing an option benefit considered synonymous as monetary benefit which leads to a higher payment reserves.

An additional consideration of the direct and indirect users of the regional public transport is made as follows. Then it follows a comparison of chosen European countries financing the regional public transport by indirect users [13, 18].

### **Land and property owner – profiteers from regional public transport**

Studies confirm that the value of properties of private domain as well as the commercial area rise by a good regional public transport development. International analyses show a connection between the spatial proximity of the infrastructure and the value of the property developed by this. For example, the property prices along the suburban train line in Munich are comparable with the prices downtown indicating the high attractiveness of a well extended short distance traffic system. In comparison with European and non-European countries different regulations to absorb the land and property owners for the financing of regional public transport arise [11, 15].

In USA this is called "value capture" allowing the infrastructure financing by a participation of third party users. A similar financing was realized in Portland, the tram was financed to the extent of one fifth of the investment sum by land and property owners [14].

Also in Germany an extension of a city railway in Cologne was realized by the co-financing of tradesmen. About 28% of the total investment sum of about 18 million € was paid by these third party users. Barcelona realized such continuous absorption by an allocation of the regional public transport costs with the property tax what seems to be, in consideration of the regulations in Germany particularly suitable [5].

Summarized there are different methods for absorption of the third part using of the regional transport by property and land owners [1]:

- consideration of the regional transport system costs in the development of building areas
- participation of the land and property owners in the development of regional transport systems
- proportional consideration of the regional transport system costs in the calculation of the property tax
- proportional consideration of the regional transport system costs in the development costs for road and supply infrastructure

### **Tradesmen and employers as profiteers of the regional public transport**

Similar to the property and land owners also tradesmen and employers benefit from a (good) transport connection. The absorption of these monetary advantages takes place by a so-called versement transport tax as for example in France. All employers with more than nine employees are taxable.

The versement transport tax is calculated in dependence of the payroll and the size of the city. A similar form of financing exists in Vienna, however, earmarked for the operation

of the metro. The projection of the tax amounts to an annual sum of 104 € per employee corresponding to about 0.4% of the payroll of 25,000 €. So the employer tax is similar to the French regulation of the versement transport tax due to form and height [23].

### **Metropolitan areas as profiteers of the regional public transport**

Welfare and social and political reasons justify the transfer payments for the regional public transport. Congestion avoidance and less environmental pollution, for example, are high objections of the city development of the metropolitan areas mentioned above. A mobility offer from the perspective of social sustainability results in the need of socially acceptable tariffs. In consideration of proposals for reform that are to be compiled it is further noted that until now there is no financing of the traffic infrastructure by the polluters [9]. These so-called external costs are assigned to the ecological follow-up costs and the resulting costs of accidents caused by individual traffic.

According to a financing study of the VDV, the Association of cities and the federal countries the macroeconomic benefit of the regional public transport already exceeds the used funds by a factor of 3.8. Another study determines a multiplier effect of 2 to 2.5. For metropolitan areas were determined clearly higher values of more than factor 4. So it can be determined as result of this chapter that subsidies for transport companies in metropolitan areas can be economically justified as they are serving for the avoidance of higher general costs. It can further be noted that the infrastructure costs cannot be covered directly by their users. So it is not possible to generate the total demand for subsidies for the regional public transport by a participation of the users. Car drivers pay annually around 50 billion € by VAT, motor vehicle tax and tax on oil. On the opposite are the follow-up costs by cars in the amount of around 88 billion € resulting in a deficit per car of around 2.100 € in Germany (around 1.600 € per car in Europe). A co-financing of the regional public transport can be possible if the users of the individual transport are charged by the additional costs. This would also lead to an ecological effect: environmentally worrying traffic finances environmentally friendly traffic [19].

### **Citizens as profiteers of the regional public transport**

Similar to the advantages of land and property owners and the employers mentioned in this chapter there are also advantages for the citizens connected with the regional public transport net as they get a so called "option use" by the available public transport network. Due to this knowledge there are ideas for absorption of all citizens connected with the regional public transport system based on the model of the "semester ticket". From the example of the semester ticket [7], the principle can be extended to the citizens as it considers traffic area-relevant aspects as for example:

- the validity area
- the regional public transport offer
- further regulations of special use
- etc.

## 4. Proposals of participation of indirect users for the financing of the regional public transport system

The condition in terms of acceptance by introduction of a local traffic duty as proposed in the following chapter is a connection between performance and consideration. In Switzerland a model focused on the demand which defines the number of trips per day as well as the intervals exists. The guidelines for the local traffic planning in Germany define similar standards which, however, differ between the different regional authorities. Table 2 shows the framework directive for local transport planning in Germany. Therefore it is proposed to regulate also uniform framework directives for the local traffic planning in Germany.

**Tab. 2. Framework directive for the local traffic planning in Germany**

Cities	Quality of the local public transportation	Service Quality	Offer Quality	Journey time to the main Destination
Up to 30.000 inhabitants	Accessibility of the next bus stop, railway station and subway station in meters	Intervals of the lines categorized in peak-, secondary- and off-peak traffic times and categorized in main lines (centrum or outskirts)	Daily service times from early in the morning to late in the evening Monday to Friday as well as Saturday and Sunday	Number of the necessary changes to the main destinations (0/1/2/more than 2)
30.000 – 150.000 inhabitants				
150.001 – 500.000 inhabitants				
> 500.000 i.				

*Source: processed by authors according to [3]*

Resulting from the Swizz model the achievement of a minimum of efficiency should be defined as further criteria for the local traffic planning [6]. The number of passengers per line and day is suitable to adapt the operating quality and the service quality upwards or downwards [10]. The introduction of a local traffic duty is accompanied with defined qualities which can be an adequate consideration [14].

### Proposals of participation of Land and Property Owners

The following proposal for reform is made:

- Land and property owners in cities with up to 30.000 inhabitants are exempt from taxation as the regional public transport system costs there are usually insignificant.
- For land and property owners in cities with between 30.001 and 150.000 inhabitants should be calculated a comparatively small contribution of the system costs to the rate of assessment. This system costs include mostly bus systems operating with a comparatively high degree of cost recovery. Nevertheless, an offer of mobility ensuring a basic offer of mobility also in off-peak hours should be guaranteed in cities of these sizes.

- Land and property owners in cities with between 150.001 and 500.000 inhabitants have to pay a higher part from the rate of assessment. The regional public transport system costs are here comparatively high as bus systems cannot ensure the required capacities necessitating trams and city railways. The degree of cost recovery is considerably lower than the system costs of pure bus services.
- Land and property owners in cities with more than 500.001 inhabitants have to pay the highest part from the rate of assessment for the system costs, which are the most expensive due to the required underground systems.

### **Proposals of participation the Employers and Tradesmen**

The following proposal for reform is made:

- Employers and tradesmen in cities with up to 30.000 inhabitants are exempt from taxation as the regional public transport system costs are there usually insignificant as shown in the previous chapter.
- Employers and tradesmen in cities with between 30.001 and 150.000 inhabitants pay an annual subscription of 100 € per year and employee.
- For employers and tradesmen in cities with between 150.001 and 500.000 inhabitants the local rate increase to 180 € per year and employee.
- Employers and tradesmen in cities with more than 500.000 inhabitants pay a local rate in the amount of 250 € per year and employee.

Revenues from sold job tickets reduce the tax burden for employers and tradesmen. So, they can reduce their tax burden by that amount which will become direct proportion of revenues for the regional public transport system.

### **Proposals of participation of the centres**

There are results in two approaches:

1. Investments in the regional public transport are economical for centres as they avoid required higher investments for the motorized private transport.
2. The financial requirements of the centres for the regional public transport should be covered from revenues of the private transport as it finances only a part of the costs caused by it.

Therefore the following proposal for reforming the first approach is made:

- Revenues from the participation of land and property owners as well as revenues from the local rate for employers and tradesmen are allocated to the budgets of the municipalities and are used for the delivery of unprofitable public transports.
- These transports will be assigned in competitive procedures to avoid inefficiencies. When the above doesn't take place, it will be determined, if transports can be produced at comparable favorable costs.



To realize the second approach in form of the participation of the private transport in the costs caused by it the following possibilities are considered.

- The costs resulting from the motorized individual transport are preferably to be borne completely by the motorized individual transport. The participation of the private transport in the costs caused by it only to an annual fee of 60 € per car is therefore proposed. To reach the push and pull effects the diminished additional revenues should be only used earmarked for the regional public transport [17].

With this proposal for reform environmentally friendly transport is directly financed by environmentally questionable transport.

### **Proposals of participation of the Citizens**

The following proposal for reform is made:

- All people living in the catchment area of a local transport system and older than 18 years should have the tax liability. For a socially acceptable intervention the German state can take over the contribution of people in need.
- The charge in form of taxes, fees or contributions must be realized in dependence on the validity area and the regional public transport offer. It must be a clear connection between performance and consideration.

Deriving from the local rate for employers and tradesmen the local rate for citizens should be charged with the following basis amount:

- Citizens in cities with up to 30,000 inhabitants are exempt from the local rate as the regional public transport system costs there are usually insignificant.
- Citizens in cities with between 30,001 and 150,000 inhabitants should pay an annual subscription in the amount of 100 €.
- For citizens in cities with between 150,001 and 500,000 inhabitants the annual subscription increases up to 180 € per year.
- Citizens in cities with more than 500,000 inhabitants should pay a local rate in the amount of 250 € per year.

With the payment of this basis amount, the citizens are entitled to a discount on the regional public transport ticket. The height of the discount is determined by the local authorities as this enables direct steering possibilities.

## **5. Impacts of the proposals for reform of participating the indirect users in the financing of the public transport**

### **Impacts of the proposals for reform of participating land and property owners**

Therefore it is proposed to charge a financing contribution for land and property owners that correspond with an increase of a flat rate of 15%. The application of the proposals

leads to participation of the land and property owners in the regional public transport system costs of around 8.910.000 €.

### Impacts of the proposals for reform of participating employer and tradesmen

To apply the proposals for reform on the project area, first, a definition of the cities concerned has been done. The application of the proposals for reform leads to annual revenues from the local traffic duty amounting to 30.887.040 €. In comparison with the participation of the land and property owners it becomes clear that significant higher revenues from the local traffic duty are possible and these could be a considerable financing instrument.

### Impacts of the proposals for reform of participating centres

The stock of cars accounts for 594.513 vehicles on 01.01.

$$594.513 \text{ vehicles} \times 60.00 \text{ €} = 35.670.780 \text{ €/year}$$

These costs only cover the deficit for climate damages and the negative impacts on the CO<sub>2</sub> balance. 60 € per registered car as mentioned in the proposals for reform will cover only a little share what must lead to an accordingly acceptance of the car driver.

### Impacts of the proposals for reform of participating citizens

The application of the proposals for reform results in annual revenues from the local traffic contribution of 35.207.400 €. It is to be assumed that due to reasons of the social compatibility deductions of this sum are necessary. As the mentioned revenue amount forms only a basis leading to a reduced or free use of the regional public transport accordingly reductions in revenues must be set off. The calculation reveals that also without additional payments for the use of the regional public transport additional receipts amounting to annually around 6.227 million € are possible. Granting discounts of 50% for the regional public transport result in further additional receipts of 20.710 million € and granting discounts of 20% result in additional receipts of 29.411 million € for the regional public transport. The following table shows the application of the proposals for reform in an overview and the development of the available funds.

**Tab. 3. Application of the proposals for reform**

Financing instrument	Revenues after reformations (million €)
Participation of land and property owners	8.910
Participation of employers and tradesmen	30.887
Participation of centres	35.671
Participation of citizens	6.227 to 29.411
Sum	81.695 to 104.879

Source: authors

Table 3 lists revenue after the reforms. The participation of indirect users in the regional public transport system costs result in additional revenues of 81.695 million € up to 104.879 million €. Ceasing public subsidies could be partly compensated by higher fare revenues as totally by the participation of indirect users in the regional public transport system costs.

## 6. Conclusion

The demographic development in Germany leads to a decline in revenues by up to 2.6% for the period of time until 2020. This decline differs from region to region and will be considerably stronger in economically undeveloped rural areas. In view of the threatening climate change as well as the foreseeable rising costs of the private transport the holding of the status quo in the regional public transport offer is not sufficient. A considerable change in mobility requires further quantitative and qualitative improvements from the perspective of the users. With the participation of indirect users in the co-financing of the regional public transport system proposals for reform were made creating a clear connection between performance (financing) and consideration (regional public transport) as basis for the acceptance. Table 2 shows the framework conditions for operation standards offering qualities in development, offer and operation for conurbations as well as for rural areas in return for the participation of indirect users in financing the regional public transport. With the participation of land and property owners, the participation of employers and tradesmen, the participation of conurbations and the participation of citizens' further means amounting to 104.879 million € can be realized for the regional public transport. By the participation of the indirect users in the co-financing of the regional public transport further important financing instruments can be realized enabling a qualitative and quantitative improvement. With regard to the climate development and the social change in mobility required by this a further development of the regional public transport is necessary. The share of the passenger trips of 16.3% in the regional public transport in Germany mentioned in the introduction can be increased significantly. Additional financing means required for this result from the participation of the indirect users. The compiled proposals to possible additional financing instruments by the participation of indirect users enable the achievement of the four main goals of the regional public transport. In spite of declining numbers of user and lower public subsidies the tasks of the regional public transport due to changing mobility behaviour of the people in Germany and Europe can be perceived completely.

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