PTA Design and Rail Transport Quality

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The more centralised the design of a PTA within the federal states is, the better the rail transport quality. This is the brief result of a cross-sectional analysis of the full population of the 28 PTAs in charge of short-distance rail services in Germany.

I. Introduction

Public transport authorities (PTAs) play a key role in the transformation process from traditional intramodally segregated transportation realms into intermodal mobility services. They have the capacity and the legitimacy to serve as the neutral platform and steering authority required by any integration process of fragmented public mobility providers. In modern terms, a PTA can be the administrative counterpart of the often proclaimed ‘Mobility as a Service’ (Hietanen 2014) model.

Before politicians start to award PTAs new competencies with regard to future mobility, we should examine how well they are doing with their current obligations. Let us start with PTAs in charge of short-distance passenger rail services. The evaluation contains two major obstacles. The first is how to compare existing PTA designs across Europe without being confronted with incomparable national contexts. Second, what is actually to be measured and what is ‘rail transport quality’?

Section II addresses the first question and delivers the results of a study conducted in Germany. Due to its federalism, Germany offers a variety of institutional designs, also with regard to PTAs. Those PTAs represent a pool from which cross-case analyses within the same national context are possible. Section III addresses the second question and reports the measurement procedure applied in the above-mentioned study. It builds on DIN EN 13816 and develops it for the realm of railways. Section IV provides an overview of the design of the study, after which Section V discusses the data sources and results. The study is meant as a policy evaluation of the different institutional settings of PTAs in Germany. Although it only covers the situation in short-distance services in one country, the mechanism behind it is of general interest for both countries and other divisions of rail transport. Since all EU member states have to open their markets for short distance rail services, pursuant to the 4th European Railway Package, best-practice knowledge of key variables for successful PTAs will be valuable. Other divisions of rail transport can be provided similar benefits; particularly when tendering models for long-distance passenger services, open freight services or infrastructure maintenance come on the agenda. The discussion of the results is to be found in Section VI.

II. PTA Design

The structure of PTAs in Germany is very heterogeneous, so the present study focuses on Public rail transport authorities (PRTAs) in particular. After the country’s major Railway Reform in 1994, the federal states were given the competency to plan and fund the services in the realm of short-distance passenger rail transport. All PRTAs installed since have been genuinely new, because no explicit PRTA had been needed for this kind of rail services before the reform – the former German Federal Railways just provided the service on behalf of the federal administration (Grandjot & Bernecker 2014).

The legislation process left a lot of leeway for the federal states in terms of how to fulfil their new competency for short-distance passenger rail transport (Wachinger & Wittmann 1996). The German Constitution just assigns the federal states the competency (Art. 143a III GG) and the accompanying federal law is only as precise as to prescribe the states to name ‘institutions’ that manage this competency (§ 1 II RegG).

Consequently, the federal states have followed their own ideas of what a ‘good’ PRTA should look like (Eckstaller 2001). The PRTAs were created between 1994 and 1996 and then set into force in the context of the ‘regionalisation’ that is still in place, with minor modifications of the PRTAs in some states only. The design of those PRTAs differs in three dimensions: (1) the degree of autonomy of the PRTA from their state, (2) the degree of centralisation, and (3) the scope of tasks of the PRTA.

The first dimension (degree of autonomy) arises from the fact that some states decided to take on responsibility for rail planning on their own, without creating a new institution. Others, however, decided to form a separate insti-

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stitution and – again a sub-differentiation – equipped them with different degrees of autonomy, either as a dependent body or as an institution that is largely allowed to make decisions on its own. The latter clearly comes closest to the ideal type of an ‘agency’ in the sense of Giandomenico Majone (1999), while the former represents the ideal type of core administrative action. The dependent body represents the intermediate solution.

The second dimension (degree of centralisation) addresses the phenomenon that some states founded more than one PRTA for their territory. In those cases, the composition of the managing board can vary substantially – starting with models where only the state has a say in the PRTA and ending with a system where the counties and the communities also have decision making power.

The third dimension (scope of tasks) reflects the fact that some PRTA are not only in charge of short-distance rail services, but also in charge of other branches of public transport. The latter competency had already been with the states before the ‘regionalisation’ was set into force. Some states then decided to merge both competencies in a single institution in 1996, but others did not.

Currently, 28 PRTAs have been established in Germany, all shaped differently on each of the three dimensions (Figure 1). Although they were founded on the basis of conjectures (since no best practice was available at that time), they never had to give proof of their performance (Aberle 2004). Differences in terms of performance are either negotiated ex ante (Wewers 2004) or claimed to be ignorable due to a general increase in quality (Holzhey et al. 2014). The present study steps into this gap and examines the performance of the PRTAs on a cross-sectional basis.

Unlike other studies (for an overview, see Finger 2014), the present study not only measures performance – which is hard enough, as will be shown in Section III – but also regresses performance on the three above-mentioned dimensions of institutional design.

III. Rail Transport Quality

The ‘quality’ of a service is a latent construct that has many pitfalls when trying to measure it. On the one hand, some aspects of quality are accompanied by a highly subjective overtone. On the other hand, the quality of rail transport depends on the viewpoint of different stakeholders involved in this business.

First, I address the viewpoint issue. The PRTA is the ‘advocate’ of the citizens as passengers of and taxpayers for public transport (Schnieder 2015). It should be in the PRTA’s interest to plan its services with regard to the passengers’ needs and to fund the services with regard to the taxpayers’ bearing capacity. The other actors involved in the rail business – mainly train operators, infrastructure managers and train manufacturers – are not politically related but, if at all, contractually related to the PRTA. They settle service and purchase contracts and in case of any dispute, private law is usually applied. With respect to passengers, however, the PRTA is politically accountable, although it is legitimated only very indirectly (usually via the appointment of managers through a political actor, such as the transport minister of the state). It is important to note that parameters of the demand or ‘success’ side, such as the ‘modal split’ or the ‘number of passengers carried’ are not to be taken into consideration for a definition of service quality here. Doing so would be misleading because legislation only assigns the states the duty to implement a supply of rail transport, and does not, of course, assign the citizens the duty to use it.

Second, ‘quality’ must be defined from the viewpoint of the passenger and the taxpayer. DIN EN 13816 provides some criteria that give hints for how to measure quality of public transport from this viewpoint: accessibility, availability, punctuality, consumption of resources, comfort, service and information are listed there (Richter 2014). The former four of these seven criteria are quite manifest in themselves. The present study suggests employing the variables ‘train kilometres’ (Y1) and ‘train stops’ (Y2) in...
order to measure accessibility and availability. ‘Punctuality’ can be directly used as a variable (Y3). Variables Y1 to Y3 are of particular interest for citizens as passengers. However, ‘consumption of resources’ is rather affiliated with the citizens’ viewpoint as a taxpayer and is represented by ‘need of subsidy per km’ (Y5).

The latter three of those seven criteria (comfort, service, information) touch on a rather subjective matter. This problem can be solved when attention is directed not so much to the results that PRTAs achieve content-wise in any of these criteria. Instead, attention is paid only to the number of criteria that PRTAs consider in order to measure comfort, service and information. Therefore, this study looks at the meta-level and ‘counts’ indicators that the PRTAs apply in order to measure quality from the perspective of the passengers. To achieve this aim, a quality score (Y4) is constructed that simply counts the criteria of the PRTA. Additionally, the score counts the number of ‘styles’ they use to gather information (such as relying on self-reports of the train operators, employing own evaluation staff and others). Last, it values the accuracy of information that PRTAs seek to have for their own quality reports (network-wide, per train category, per train line or per each single train; see Klein 2007).

Finally, the requirement of comprehensive ‘information’ includes not only information about the journey, but also information on a meta-level regarding the performance of a PRTA. As a public entity using taxpayers’ contributions, PRTAs must record their work and present it to the public. This rule is fixed at the European level via EU Regulation 1370/2007. Nevertheless, the levels of documentation vary a lot among PRTAs, so ‘documentation’ is introduced as a variable (Y6) in order to satisfy the right of the taxpayer to transparency of public action.

These six variables (Y1 to Y6) serve as performance indicators in order to measure rail transport quality from the viewpoint of the citizen and in the realm of responsibility of the PRTA. The six variables are designed in such a way that they are in the sole responsibility of the PRTA. For ‘train kilometres’, ‘train stops’, ‘quality score’ and ‘documentation’, this is clear from the nature of the variable. However, it is not so clear for ‘punctuality’ and ‘subsidy per km’. The infrastructure manager influences both criteria, too, through making operational decisions on which train to prioritise in case of congestion and through imposing fixed infrastructure fees that increase the need for a subsidy. To assign ‘punctuality’ to the PRTA only, the study emphasises the bargaining power of the PRTA. It is the PRTA’s choice to avoid contracts that offer untrustworthy timetable calculations and to demand additional standby trains in order to reduce delays. To address varying infrastructure fees as a non-negotiable part of operational costs, the study controls for districts with different levels of infrastructure fees.

IV. Study Design

The preparatory work pictured in Section III makes it possible to establish a ranking of the 28 PRTAs with regard to their performance on each of the six variables. This could be done via six different rankings but not via one total score ranking since the variables are about to measure very different things. Therefore, the study refrains from establishing single score rankings and instead applies regression and matching methods. This procedure makes it possible to analyse the causes of diverging performance patterns.

It is clear that PRTA design is not the only explanatory variable for every performance indicator. Socio-geographic differences among the PRTA territories also play a role, as well as the amount of money available for a PRTA. An exploratory process to detect other possible explanations of performance variance (that is, the covariables) led to a single variable that covers them all: the number of inhabitants of a PRTA territory is the only variable that must be controlled for. The number of inhabitants is highly correlated with other possible covariables, such as the territory size, the existing railway network and the funds a PRTA can employ for its work, provided according to the German Constitution (“Regionalisierungsmittel”, Art. 106a GG). The latter correlation is no surprise since those funds are mainly distributed in relation to the number of inhabitants (Dziekan & Zistel 2018).

Based on the assumptions of this study, there are no common causes of PRTA design and performance output; that is, there are no confounders. PRTA design was determined by conjectures (see Section II), so there is no prior variable to this and all other circumstances of the tendering process or the contract modalities are consequences of the actions of PRTA, temporally after the design had been fixed. Those variables serve as mediators (temporally between PRTA design and performance output) and are therefore not to be controlled for (for a statistical explanation, see Morgan & Winship 2015).

V. Data and Results

Section IV allows to establish a regression of rail transport quality (measured by the six performance indicators) on PRTA design as the variable of interest and on the number of inhabitants as a control variable. Data for the regression is collected on cross-sectional basis for 2015. Sources were reports from PRTAs due to EU Regulation 1370/2007,
state budget documents, publications of the national statistical office and direct requests for data to the PRTAs and their umbrella organisation, the “BAG-SPNV”. In addition to the cross-sectional approach, it was possible to gather longitudinal data for Y1 and Y2, covering 1996, 2010 and 2015. Regression, matching and the longitudinal approach follow a hierarchy of methods, with regression as the main method and the two other methods providing supporting or objecting evidence.

Since the study is conducted over the whole population of the 28 PRTAs, statistical significance is not the main criterion for quality of results here. Instead, correspondence in the results across methods plays the most important role (for further justification, see Loftus 1996 and Behnke 2005).

Table 1 shows that the three dimensions of PRTA design each have a different impact on performance output, especially in terms of unambiguity across methods. Only the ‘degree of centralisation’ dimension has an effect that is concordant for all performance indicators and is positive throughout. It can be concluded that a more centralised PRTA leads to higher levels of rail transport quality on all indicators. Results for Y1, Y2 and Y6 are also significant at the 5 per cent level.

The effect of the ‘degree of autonomy’ dimension is mainly not concordant across methods, except for Y2 and Y5. It has a negative effect throughout but not a significant effect on either of the indicators. The effect of the dimension ‘scope of tasks’ is concordant for Y1, Y2 and Y5 and has a positive effect throughout, but also a non-significant effect there.

VI. Discussion

The degree of centralisation proved to be the most unambiguous dimension of PRTA design in this study. Note that ‘centralisation’ only denotes the degree of centrality within a federal state. Hence, it is not possible to propose that a single PRTA on the federal level of Germany would lead to higher levels of service quality as well. Furthermore, it is not possible to draw any conclusions about the ‘importance’ of one dimension relative to another since only the direction of effects is considered. Effect sizes are not meaningful here and need further standardisation in measurement of input and output variables in order to be comparable. Concerns about omitted ‘third’ variables are welcome and might stimulate the debate.

PRTA design does not explain the lion’s share of variance in performance outcomes for almost all of the indicators (except for Y6, documentation). For Y3 to Y5, the coefficient of determination is quite low. For Y1 and Y2, however, the design variables explain a considerable part of the variance. Considering the high amounts of train kilometres and of taxpayers’ money that are employed here, explaining ‘just’ additional variance is also reasonable. Criticism stating that PRTA design is just the least important element in the causal chain between state action and rail transport quality must acknowledge the substantial effect of centrality of design on the ‘hard facts’, namely train kilometres (Y1) and train stops (Y2). Admittedly, however, criticism seems to be accurate for the scope of tasks and the autonomy of a PRTA.

Is this result valuable as a policy recommendation for other PTAAs? Yes it is, as long as a country follows a tendering model for public transport; that is, a ‘competition for the market’, not a ‘competition in the market’. When this precondition is met, the study can serve as a guideline not only for PTAAs dealing with short-distance passenger rail transport.
References


