D.T1.3.2 WORK PAPER

Typology of possible measures

Version 1.0

08.2018

Typology of possible measures

The work paper "Typology of possible measures" evolved from the conclusions and outcomes from the Work Paper – "Identification and Learning from Key Literature and Good Practices" (D.T1.3.1). It could, therefore, be understood as the sequel in the development of learning sources within the SubNodes project. The present work paper aims to give the implementing partners further suggestions and proposal to shape their action plans and pilot activities. In order to accomplish this, the work paper categorises possible measures to improve public transport and connectivity into four different types. The categorisation of the four types not only derived from the outcome of the literature review and the best-practice–analysis, but also from possible measures or potential actions identified by the partners in the process of preparing the subnodes factsheets.

At the state of the D.T1.3.1 Work Paper, single approaches to improve public transport services stood next to each other. But taking a closer look, these various approaches are interconnected with each other and can be grouped to joint categories. However, as important as a single action might be, a sophisticated strategy towards the development of public transport services should guide the planing process and the implementation of measures.

All projects and intentions aim to improve the quality of the passenger transport service, therefore it is crucial to consider the perspective of the passenger. The perceptions of passengers on public transport quality may differ from the technical indicators used by transport planners. A study of the quality factors in public transport analysed the essential elements of perceived quality and their relative weighting in particular.[1] According to this survey, the perceived total quality of public transport can be divided into seven sectors. The sector perceived to have the greatest impact on total quality is 'Route network, bus intervals, reliability, travel time', thus, has the most significant impact on total quality from the perspective of the passenger (31%), followed by the 'fleet' (17%) and 'access points' (16%) (fig. 1).

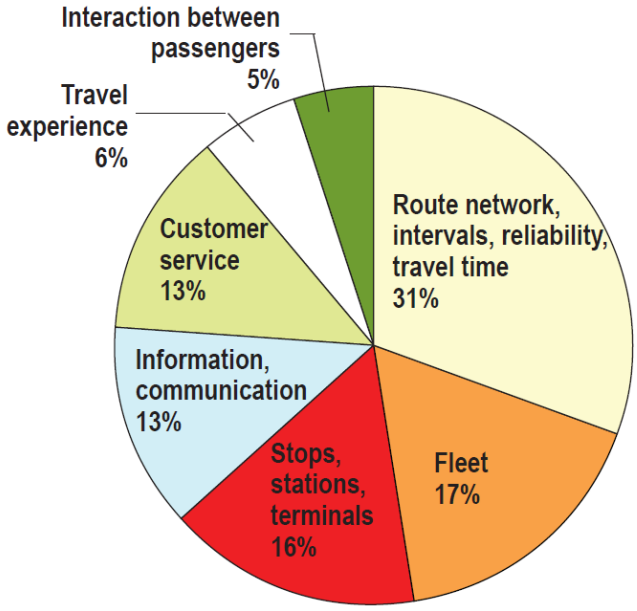

Fig. 1: Weightings of perceived total quality of public transport by quality sectors[2]

[1] Kerkko Vanhanen, Jari Kurri (2008): Quality factors in public transport, avaible at: http://www.best2005.net/content/download/912/4187/file/Quality%20factors%20in%20public%20transport.pdf

[2] ibid., p. 5-2

Put together, the measures as listed in Work Paper D.T1.3.1 and the assumed perceptions of passengers as of fig. 1, we suggest a typology of possible measures consisting of four elements:

- *Type A – planning and monitoring*: this includes the development of plans, political activities, monitoring and participation
- *Type B – Public transport infrastructure, building and upgrading*: e.g. electrification, dual-track capabilities, intermodal terminals, P+R facilities
- *Type C – service, integration and improvements*: with integrated transport, information, communication, rapid transit
- *Type D – digitalisation*: such as data-management, real-time information, system architecture

Type A: Planning and monitoring

The improvement of transport services and transport infrastructure is embedded in a strategic planning process. Concepts or plans are the outcomes of such processes. They should provide the framework for all steps which are taken towards the development of the public transport system in a given area. The strength of a transport plan depends on the political and organisational assertiveness of regional authorities, who are in charge of its subsequent implementation. A strategy includes the direction and aims of the development as well as the specification of measures. Such a policy instrument should guarantee the implementation of improved transport connections and services.

Usually, measures towards a better-integrated public transport widely concentrate on technical and organisational aspects. Political or governmental issues often are disregarded or ignored. Considerations about the political implication and requirements, as well as about stakeholder concerns and funding opportunities seldom exceed the regional level towards an integrated public transport system in an extended geographical context.

Citizen and stakeholder engagement should be a precondition for transport and mobility planning. At least in a planning process that really aims to improve the mobility conditions for its users and sets long-term strategic aims. The necessity of participation is generally recognised but far less implemented than it would be necessary in order to make it effective. Public authorities and planning bodies need to recognise that involving the general public and stakeholders in planning is a fundamental issue of local authorities to improve decision-making.

Nevertheless, the planning process does not end with the implementation of a measure. Continuous monitoring and evaluation seem to be crucial; for this, authorities, as well as transport companies, need to formulate an adequate set of indicators to be able to take corrective actions on time and to assess the progress. Not only quantitative figures have to be monitored, but also qualitative indicators for soft factors need to be formulated to a given aim of a strategic plan. Monitoring of measures over the course of time is required to assess progress towards reaching the formulated goals.

Fig. 2: Type (A) Planning and monitoring – overview

Type B: Public transport infrastructure – building and upgrading

One of the main cornerstones for improving public transport services is a well-developed infrastructure – an infrastructure which meets the requirements of the users and at the same time provides sufficient capacity to operate a high standard public transport service. Public transport infrastructure can be considered as the hardware in public transport – the tracks, electrification, stations or access points in general. Following the improvement of high-speed connections between rail hubs, the next step is the upgrade of rail and public transport as feeder lines for those main hubs. Park-and-ride facilities for public transportation provide numerous benefits to commuters and communities – new or expanded park-and-ride capacity has shown to increase ridership[3].

Projects to improve public transport infrastructure usually aim at different determining factors for consistent service quality. The most common aims of public transport infrastructure projects are:

- acceleration: less travel time between stations along a track,
- access to public transport services: like new stations or bus stops (proximity) or entirely new lines but also the modification of stations to meet the needs of disabled people,
- track capacity: increasing the capacity of a line to run more trains, like dual-track rail lines,
- general modernisation regarding signalling, safety or reliability as well as the electrification of a line.

Infrastructure projects, particularly within the railway service, are extensive and complex cases. Nevertheless, a well-developed infrastructure is a fundamental requirement for a top quality passenger transport service both on the rail and on the road.

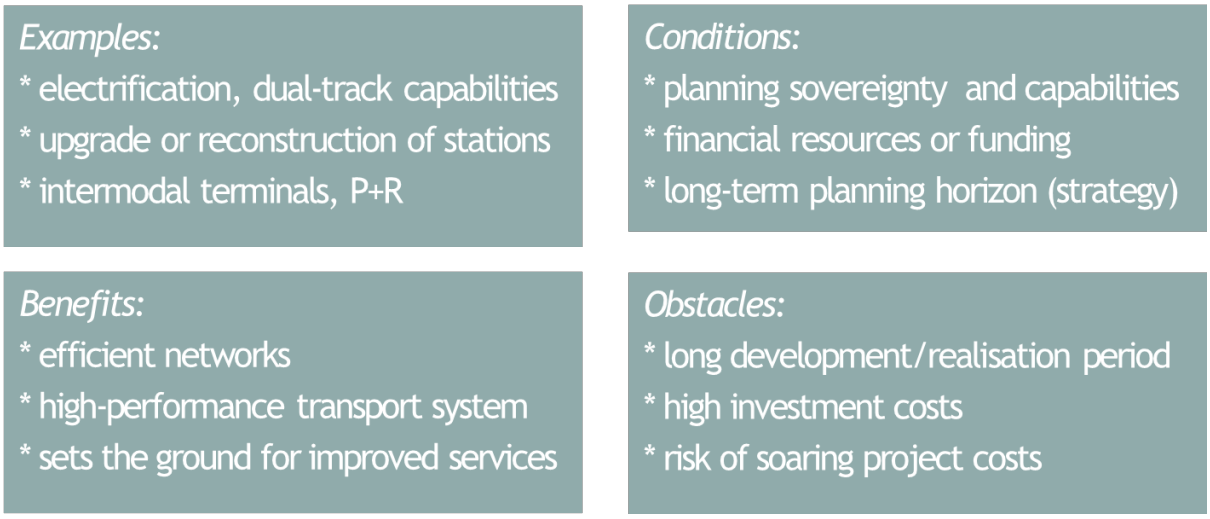

Fig. 3: Type (B) Public transport infrastructure – building and upgrading – overview

[3] Engel-Yan J, Rudra M, Livett C, Nagorsky R. Strategic Station Access Planning for Commuter Rail Balancing Park-and-Ride with Other Modes. Transp Res Rec. 2014;3(2419):82–91.

Type C: Service, integration and improvements

Intermodality, interconnectivity and accessibility are the key terms in most transport plans to achieve a sustainable public transportation system. Especially intermodality needs the integration of both, networks and services. Improving services is not only a matter of transport planning and operation, but the complexity in the realisation is also closely linked to political dependencies. The co-operation between authorities and providers is absolutely necessary to find appropriate solutions, e.g. for attractive interchange stations, improved transport services or pricing and ticketing systems.

The upgrading of public transport services can aim at many enhancements or improvements. It is nearly impossible to list the approaches which are frequently used to improve public transport services. However, general characteristics of Service quality in public transport are:

- reliability of service and the reduction of negative critical incidents (e.g. a delay or no free seats),
- simple information and communication, the variability of communication channels (e.g. print media, mobile communications), ease of getting information (pre- and on-trip),
- service frequency and length of trip time (speed, directness),
- passenger satisfaction, staff and assistance (drivers' and other staff friendliness),
- ride comfort (seat availability and comfort) as well as
- integration of different transport modes, fare and timetable integration, ticket accessibility.

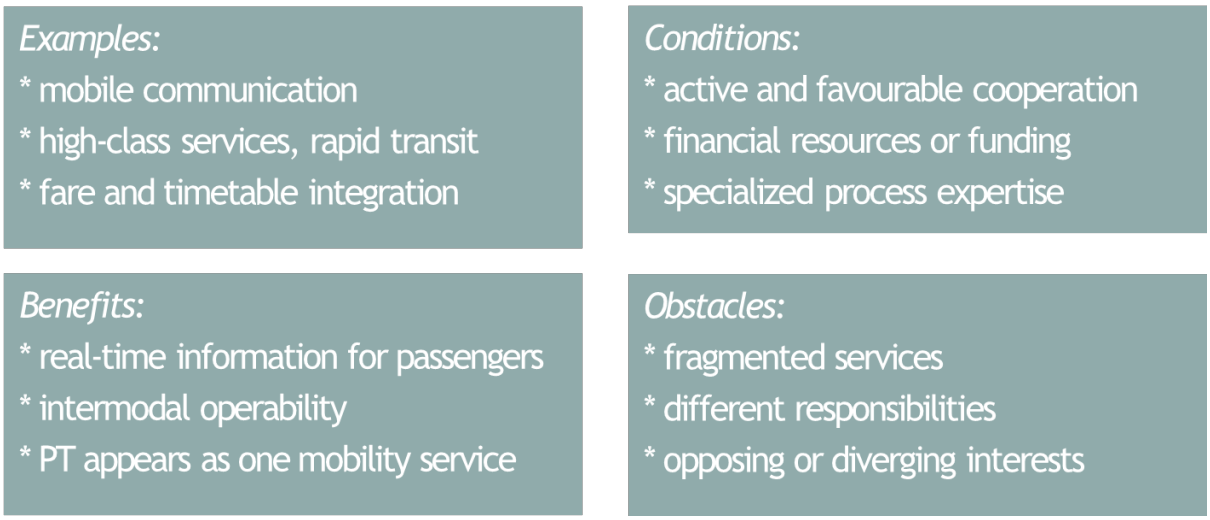

Fig. 4: Type (C) Service, integration and improvements – overview

Type D: Digitalisation

To enhance the quality and reliability of public transport through real-time tracking and digital passenger information, passenger information systems have been developed for most public transport services. In the course of the growing market diffusion of smartphones, more and more applications provide users with real-time information about public transport, e.g. the location of vehicles or their delay in times of disruption. Such applications usually link given information and add open data sets[4], so that passengers can get Real Time Passenger Information. All of this is due to the increased digitalisation of the public transport sector.

Digitalisation is becoming a standard within the public transport sector. It is not only the precondition for improved passenger information but also an essential requirement to connect different modes of services, to plan integrated timetables or for quick interventions in case of critical incidents. Digital content, pay services, real-time information are by now integral part of the passenger experience. In order to facilitate the different digital services, the transport operators needs to implement and provide an advanced digital background system. As soon as the services exceed the own area of responsibility, which regularly happens through intermodal connectivity, the digital systems need standardised application programming interfaces and exchange platforms as well as standardised data format.

The disadvantage of the digital conversion is a new kind of vulnerability due to cyber crimes and data breaches. The development of digital systems has increased the complexity of the relationship between technology and risk. This does not only include efforts to avoid potential cybercrime and data loss but also increased dependencies on the unobstructed operation of the systems. Along with the digitalisation comes the requirement to work toward a state of digital resilience.

Besides the advantages of the technology for passenger information and service integration across different providers, another aspect is gaining more and more attention in transport planning: Big data analysing allows new insights into travel behaviour. The extended understanding of the passenger requirements enables more tailored services for target groups.

Fig. 5: Type (D) Digitalisation – overview

[4] An overview of and examples for open transport data: Portal Europeo de Datos, https://www.europeandataportal.eu/es/highlights/open-transport-data

Typology of possible measures – relationships and interdependencies

Despite the value of every single measure within one of the suggested types, the improvement of the overall quality of public transport service is most successful, if the elements are regarded as components in a multifaceted operating area.

In this respect, a single measure should be part of a larger and coherent framework involving close cooperation and coordination with all the other activities towards improving public transport. In such a model, the planning process and strategic goal-setting functions as the reference framework, whereas infrastructure, service and digitalisation are related and interdependent fields of activities (fig. 6).

Therefore, a possible measure could generate relevant impact, if it was integrated into the framework and positively influenced the further development of all other fields of activity. In this respect, every possible measure could be seen as a part of interconnected actions. A possible measure could, therefore, be evaluated according to its contribution within the reference framework of the typology concept.

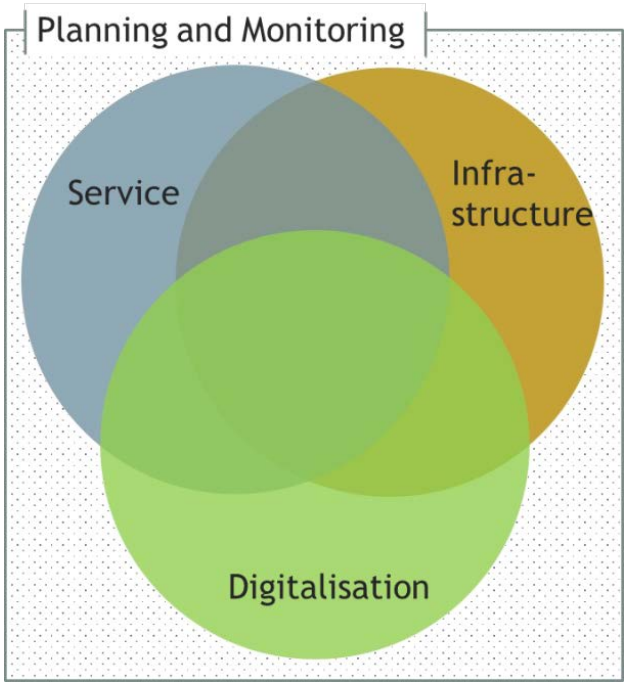

Fig. 6: Typology of possible measures – relationships and interdependencies