



Conclusions for future transport policy based on lessons learned from the COVID-19 pandemic and its management

Board of Academic Advisers to the Federal Minister
of Transport and Digital Infrastructure

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1 Introduction

The COVID-19 pandemic with its health and socio-political reactions has reminded society of its vulnerability but also of its ability to respond. The effects can be felt in all parts of society, including the transport sector. The impact of the corona crisis on transport has many facets. Public transport has been hard hit because it has not been serviceable for a while or only to a limited extent; in addition, demand strongly decreased and, in some cases, still is very low. Demand for local public transport caved in when places of work and educational institutions were closed and hygiene rules were prescribed. Many long-distance journeys were cancelled because of travel warnings, travel bans or hygiene rules related to possible infections. The decline in passenger car traffic was lower and has almost completely recovered in the meantime. Cycling increased in the field of leisure activities. As regards the international movement of travellers, borders were temporarily closed and self-isolation or testing obligations were introduced, reducing demand as well. Freight transport with its international orientation has been hard hit by

international restrictions, too. Moreover, hygiene rules have reduced the efficiency of production processes in logistics centres, terminals and at the ramps of consignors and consignees. These changes have a corresponding impact on transport operators. While municipal public transport operators are most likely to benefit from public financial support, many private operators risk their existence as the crisis continues.

With this brief opinion, the Board of Academic Advisers to the Federal Minister of Transport and Digital Infrastructure addresses the crisis' long-term effects on transport as well as the potential consequences for transport policy. The focus is thus not on the acute effects and the current crisis management. In the long run, the following questions will be of interest:

- How will the novel experiences made during the pandemic and the measures taken influence the future mobility behaviour of the population?
- How do the measures introduced as a result of the crisis influence the transport



sector and how can costs and benefits be balanced?

concrete transport policy needs for action will be pointed out.

- How did the measures taken during the pandemic affect private and public transport operators in passenger and freight transport as well as their strategies and what will be the effect in the future?
- Should transport policy objectives be adapted in the light of the long-term effects of the pandemic?
- What transport policy measures have to be taken to achieve the “new” transport policy targets?
- What lessons can be drawn from this crisis and the current crisis policy for future crisis situations which might also be of a completely different nature?

The Board of Academic Advisers considers it very important that corresponding scientific examinations be initiated. Research should lead to transport policy recommendations or options, going as far as the development of concrete measures or tools.

It will not be possible to completely address or even solve the aforementioned issues in this brief opinion. Instead, some thematic fields considered to be particularly important for transport policy by the Board of Academic Advisers will be highlighted. By formulating research and development questions, possible



2 Policy decisions in the event of a pandemic and their effects on transport

Many of the policy measures taken in the course of the COVID-19 pandemic have a strong effect on the transport sector. However, most measures were not adopted by the Federal Ministry of Transport and Digital Infrastructure but by other ministries, federal state governments and local authorities. Therefore, the general question arises whether the effects of these measures on the transport sector have been sufficiently examined and balanced with other transport policy objectives before their entry into force. Moreover, it is not clear whether – measured against the respective stage of the crisis – the policy measures have been adequately evaluated regarding their effect on the transport sector.

Political communication presented especially drivers of heavy goods vehicles as “heroes of logistics”; this reflected the finding that freight transport was considered to be particularly “relevant to the system”. When measured against this claim, the question arises whether appropriate precautionary measures were taken for freight transport in the different stages of the crisis. For passenger transport, there were only few explicit discussions about

“systematically relevant” needs for transport; nevertheless, decisions have to be taken in this field, for instance on privileges for employees in the supply and disposal sector. As a consequence, a research field of “governance and crisis management” opens up for future pandemics as well as for continuing the current crisis management. In this context, it must also be determined what transport services should be upheld in which stages of a crisis. This will have to be addressed in view of possibilities for cooperation between private and public players of the transport chains in passenger and freight transport as well as by taking account of the substitutabilities between the different modes of transport.

Policy responses at European level included the closure of many borders during the months of March and April without international coordination. For future pandemics, the introduction of a mechanism at European level for imposing regional movement restrictions, if imperative, according to uniform rules and differentiating between passenger and freight transport would be desirable. This would enable a more



locally targeted response to the
infection situation. Establishing such a
mechanism should be aimed for at
the political level.



3 Demand in passenger transport

During the current crisis, the mobility behaviour of the population has changed. Some changes correspond to the transport policy objectives of environmental sustainability and congestion relief in cities (e.g. the increased use of bicycles), others are contrary to these objectives (e.g. the increased use of passenger cars instead of public transport).

The observed short-term **changes in mobility patterns** are primarily induced by a reduced number of journeys (because of confinement measures, closures of businesses and institutions, mobile working and also travel warnings), the fear of contagion as well as the partial decline in the range of mobility services. In some cases, short-term infrastructure measures were implemented in order to respond to or support changes in behaviour, e.g. the designation of additional cycle lanes.

Sustaining the short-term behavioural adaptations could lead to long-term effects on mobility patterns. Which changes will last to what extent can be influenced through transport policy interventions. For this purpose, the reasons for the changes have to be understood as well as possible. In

particular, it has to be analysed how the currently applied, as well as other conceivable crisis-related measures influence the demand for passenger transport in the medium and long run, differentiated by mode of transport.

The detailed **recording and analysis of mobility patterns** during the COVID-19 pandemic enables a socially differentiated quantification of the effects of concrete transport-relevant measures and thus a balancing of costs and benefits. Other impacts include changes in the rate of accidents and in emission levels as well as health effects, in a broader sense, caused by changes in physical activity.

Quantitative changes in motorized traffic are generally well recorded throughout the country by means of **permanent count sites** of infrastructure operators and floating car data from commercial providers such as Inrix or TomTom. Recording of individual mobility patterns, which provides significantly more background information, is less well covered. The required **surveys**, in most cases through GPS tracking or interviews require much more effort than pure traffic counts. Currently,



several national and international projects are already in progress. Some of them were specifically initiated during the crisis, others had been launched even before the outbreak. The aggregated long-term changes in mobility patterns are regularly measured by national mobility surveys commissioned by the Federal Ministry of Transport and Digital Infrastructure (Mobility in Germany, Mobility in Towns and Cities, German Mobility Panel). These surveys are to be expanded and, if necessary, complemented to trace and understand the development of mobility patterns as exactly as possible. In addition to interviews, movement profiles created from mobile communications data and navigation applications as well as data on the availability and usage of local public transport are helpful (which can, of course, only be used if data protection rules are complied with). To enable a correct interpretation of the mobility behaviour found, the legal conditions, i.e. the restrictions applicable in the federal states during the pandemic, have to be recorded in parallel.

In transport planning, it has been discussed for decades to what extent physical changes in location can be replaced by the use of telecommunications. During the COVID-19 pandemic, the use of **mobile working** (“**working from home**” in the wider sense) and **video conferences** has reached previously

unknown dimensions. As people got used to the digital tools, the technical conditions for their use were improved and demand for digital user equipment massively increased. It can be expected that, in the future, these possibilities will be used more often than before, also when mobility restrictions will have been lifted. In the interests of crisis preparedness and a long-term reduction of the need to travel, it is necessary to keep available these possibilities and further improve the technical conditions.

Mobile working and video conferences can have a relevant impact on at least two aspects of transport demand. In **long-distance transport**, long journeys to meetings can be avoided by holding video conferences. Long-distance transport accounts for a significant and growing share of passenger transport; in addition, a small part of the population is responsible for a large part of all long-distance journeys. By replacing some of the professional meetings that require long-distance travel by video conferences involving high-quality technology, passenger-kilometres can be reduced without significantly restricting the activity spectrum of the persons involved.

In the field of everyday **commuter traffic**, mobile work can relieve the pressure on transport systems. One aspect is the possible reduction of the overall traffic level. An even larger effect can be achieved by more



flexible presence times at the work place as this leads to a flattening of the morning and evening traffic peaks during which the roads and also public transport are generally congested. However, in the long term, the lasting increase in possibilities for mobile working could influence choices of the place of residence or work and encourage people to accept larger distances. This could at least counteract the gains in the number of passenger kilometres travelled.

On the basis of the experiences made during the past few months, the quantitative potential of mobile working and video conferences to avoid journeys and flatten traffic peaks have to be analysed and obstacles hindering their use have to be identified. The long-term effects on the choice of the place of residence and work and on transport demand have to be considered, too. Moreover, the social and psychological effects of mobile working and the impact on productivity have to be taken into account for political decisions.

An obstacle already identified is the lack of data security of most of the available video conferencing tools as well as a legal situation that still requires physical presence for certain processes. In this context, platforms and cloud services have to be designed in a way that complies with **data security and legal certainty** requirements. Moreover, it would be desirable to give telepresence the same legal status as physical presence. **Digital citizen services** of authorities that do not require the physical presence of citizens should be expanded.

In terms of their communications capacities, **administrations** in municipalities, ministries, federal state and state authorities are less well prepared to the new requirements than private enterprises, higher education institutions and private households. The reasons are, on the one hand, lack of technical equipment (microphones, webcams, VPN connections) and, on the other hand, restricting rules or a lack of rules (e.g. due to concerns of the staff council).



4 Public transport services

Public transport services are in most cases characterized by the joint carriage of many passengers in large vehicles. This regularly implies high passenger concentrations in the access areas, which is contrary to infection control measures that require people to keep a safe distance. During the first stage of the pandemic, demand for public transport strongly declined because people chose other means of transport or avoided journeys at all. As demand is rising again, temporary measures to ensure infection control in public transport have to be taken.

Attention should be paid to **stabilize confidence in public transport** since it has to be assumed that public transport will be considered as relatively unsafe by the population in the future, also regarding other infections such as influenza. This could counteract the objectives of environmental sustainability and congestion relief in cities as the intended shift from private motorized transport to public transport is hindered, in particular for groups of persons who have not used public transport very intensively so far. It must thus be determined to what extent the **objective of infection control** can be integrated into the

general set of policy targets. This objective would certainly conflict with the aforementioned environmental goals, in particular if financial implications are taken into account.

In this section, some ideas on how the objective of infection control in public transport can be pursued more intensively in the future will be presented. Infection mechanisms in public transport systems have not been sufficiently examined. **Research on infection routes in public transport vehicles and facilities** is a pre-condition for making public transport safe in terms of infection risk (which is to be adequately defined, but can, of course, never be perfect). The influence of air condition technology used in vehicles, stations or waiting areas has to be analysed as well. A particular challenge is to examine infection routes for various pathogens, in addition to those responsible for COVID-19.

The subsequent question is: How can **public transport services be made safe in terms of infection risk**? As for many other technologies that come with risks and dangers, a standardization of countermeasures should be initiated for the general infection risk in public transport, taking into account the costs. The



result could be recommendations for new air conditioning systems or air cleaners, special materials for seats and handrails, seat spacing, cleaning strategies, rules of etiquette and their enforcement. To prove the effectiveness of the measures and to push forward a solution-neutral industrial development, new test strategies will have to be developed that enable the verifiability of compliance with the threshold values. These should cover common transmission mechanisms in the public realm (droplet, aerosol and smear infection) to enable the development of corresponding prevention measures. Experiences gained through comparable challenges (for instance in the field of accident research with crash test dummies, which have been developed over decades) demonstrate that this way is going to be long and cost-intensive.

In parallel, the development of systems **that provide passengers with information on the current and expected occupancy rate of vehicles in public transport** should be funded. Even without a pandemic, it is an advantage for passengers if they can avoid crowded vehicles.



5 Freight transport and logistics

Initially, the lockdown in China caused a **stopping of delivery chains** from the Far East to Europa. This phenomenon became more widespread and intensified with every other country that closed its borders and ordered a lockdown. Other crisis-related changes in freight transport and logistics included the temporary closure of borders, the temporary stoppage of some modes of transport such as aviation and thus the elimination of belly capacities. The lockdown in Germany caused panic buying of pharmaceutical and hygiene products and a surge in online trade, all adding to the problems in the supply of industry, trade and consumers. The interruption of supply chains had many reasons, including closures of production plants in Germany and abroad. In some cases, while the phenomenon became apparent in the logistics sector, it was not a pure logistics problem. Freight transport and logistics were at the same time affected by a supply and demand shock.

A typical characteristic of freight transport and logistics is the **exposed position of delicate process chains** in all modes of transport; in addition to road and rail freight transport, this also concerns air cargo transport,

inland navigation, short sea shipping as well as the related terminals and warehouses. With regard to institutions, logistics service providers (haulage contractors and transport operators), logistics facilities of industry and trade businesses, digital platforms (freight exchanges and digital haulage contractors) as well as operators of infrastructure facilities (e.g. terminals, nodal freight centres) were affected. Even the temporary closure of a central cargo cooperation hub can paralyse several hundreds of logistics service providers. This then affects in waves almost all sectors that transport general cargo.

Following this line of thought, the question of what has to be regarded as **critical goods** arises. On this basis, new, specific logistics strategies for “critical” goods can be elaborated, if necessary in combination with precautionary government measures for events of a crisis (“centres of crisis logistics”). International freight transport and logistics systems have to be re-evaluated regarding their vulnerability against external interferences and their level of supply security.

Another severe long-term problem becomes apparent as the measures taken against the pandemic are



maintained: the continuing and massive **collapses of demand** in many sectors. Freight transport and logistics serve a derivative demand and provide reserve capacities for a planned level of demand. For months, these capacities have been massively underexploited, in some cases by 40-50% and more. In combination with the generally low margins of the freight transport and logistics sector, a massive wave of insolvencies must be expected in the near future that will result not only in high unemployment numbers but, in the long run, also in the withdrawal of logistics capacities from the market. In view of the aforementioned systemic relevance of the sector, the transport policy question arises whether the state should let this development take place without taking cushioning measures. Irrespective of possible phenomena of scarcity, this could otherwise significantly reduce the intensity of competition in special market areas.



6 Competitive situation in the transport sector

The COVID-19 pandemic and the resulting restrictions of social life have far-reaching economic effects that, in themselves, entail drastic economic policy measures. Not all sectors and companies are affected in the same way; in particular **company-specific recovery measures** are not competitively neutral.

The Board of Academic Advisers is concerned that important providers of transport services could disappear from the market, leading to the diminishing of entire modes of transport. Moreover, market concentration could significantly increase in some segments. It is therefore important to observe the economic effects of the crisis on companies and the competitive situation in the transport sector. If required, suggestions for political measures are to be elaborated that are appropriate to secure the survival of companies and **prevent market concentrations** or counteract them later. This research could begin soon with data collection and incident tracking but should mainly be carried out in the years ahead when the long-term effects become apparent.

One or more **research projects** should focus on creating an overall picture of the economic and competitive effects

of the crisis and the economic policy measures on the transport sector. What bankruptcies, mergers and shifts in market shares have taken place? Have new players entered the market? Have platforms (apps) gained increasing acceptance? What were the impacts of the temporary border closures?

Particular account should be taken of market segments where there is some degree of competition but where it tends to be endangered, or could in fact be endangered, namely, aviation, rail freight transport, local public transport as well as intermodal long-distance passenger transport (railways, long-distance coaches, aeroplanes, ride sharing). Furthermore, market segments with many family-run microenterprises (HGVs, inland navigation vessels, taxis), whose existence may be particularly threatened, should be monitored, too.



7 Looking ahead: crisis resilience in the transport sector

The current crisis confronts the transport sector with many and varied challenges. Thus, in the long run, addressing resilience in passenger and freight transport has to be a central field of research.

In passenger transport, the main question is: What services can public transport provide in which crisis situations and how can this be achieved?

- Precautionary crisis plans: **What range of passenger transport services** is envisaged for which foreseeable crisis situation and how can this offer be organized under the conditions assumed? Depending on the crisis situation, the consequence can be an overload or underload of the public transport system's capacity.
- To guarantee carriage in case of shortages of personnel and material resources, strategies on how to quickly adapt capacity to the required needs have to be developed. For this purpose, it should be examined how the coupling of public transport with other fields, for instance the private coach sector, could make it possible to tap additional

potential for a short-term expansion of capacity in crisis situations.

- If capacity is underloaded, **economic resilience** has to be considered. Ultimately, the question to be answered is: How can transport operators and local authorities maintain the desired services over a longer period of time despite lower numbers of passengers? The answer to this question can also influence fare pricing schemes in normal times.
- In crisis situations, it may be necessary to take **precautionary measures** for on-board staff and other operational and service personnel; this could lead to unpopular restrictions or conditions. Ideally, these measures should be defined and the conditions for their implementation and enforcement be secured **before a crisis situation**. Research in the fields of medicine and traffic organization, but also psychology and sociology, should accompany the process of defining these measures, thus helping to adapt plans for



precautionary measures to the current state of research.

For freight transport, the following research fields should be analysed:

- **Flow of goods** perspective: Do we need new **storage, deployment and stockpiling strategies** (scope, timeframe, location) for defined product groups that take into account the risk of breakdowns? How can we identify and dimension logistics nodes and freight transport nodes as crisis-relevant hubs in freight transport systems? How can we even better protect “critical infrastructures” whose failure or disruption would result in sustained supply shortages, major disturbances of public safety or other serious consequences?
- **Organizational** perspective: From an organizational point of view, economic research on **coopetition**, i.e. the temporary and partial cooperation between competitors, plays a vital role. The objective is a better control of freight transport and logistics systems enabling them to respond to shortages and demand disturbances. This is to be achieved through a conscious and intended collaboration of the stakeholders in crisis situations. As a consequence, research has to address appropriate cooperation and coordination forms in freight transport and logistics systems. Among other things, appropriate **governance structures** and control processes for collaborative schemes, also taking into account regional competitors, and communications arrangements of private sector freight transport and logistics operators in crisis situations have to be identified. Research activities should finally cover the new economic-financial instruments of supply chain finance, which can ensure the prevention, mitigation and management of crisis situations.
- **Decision-making policy** perspective: The general question arises how to shape the structure and control of political decision processes as well as the decision-making powers in breakdown situations. This has to take into account the typical tensions between federal state and federal regulation on the one hand and the freedom of action of businesses on the other hand. It also touches on the tension between **government interventions** in the sense of the obligation to provide public services and **negotiated market solutions** in the business sphere. Research should address the potential and shaping of obligatory crisis management systems in freight transport and logistics systems as precautionary instruments for the safety of staff but also for the maintenance of supply security.



- **Digitalization** perspective: As a condition for efficient freight transport and agile logistics, resilient as well as clear communication and decision-making processes are essential. For this purpose, research on **digital platform organizations** for demand-oriented freight distribution, automation of the data provision through digital communication sensors as well as AI-based pattern recognition for the prevention of bullwhip effects in supply chains using demand chain management and data analytics should be carried out. This should result in digitalization-oriented research projects to initiate, assist and support a **digital test bed for crisis management in freight transport and logistics**.



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