



► Urban Mobility in a Post-Covid-19 World

Impact and recovery of urban mobility
using Berlin as an example

INSIGHTS

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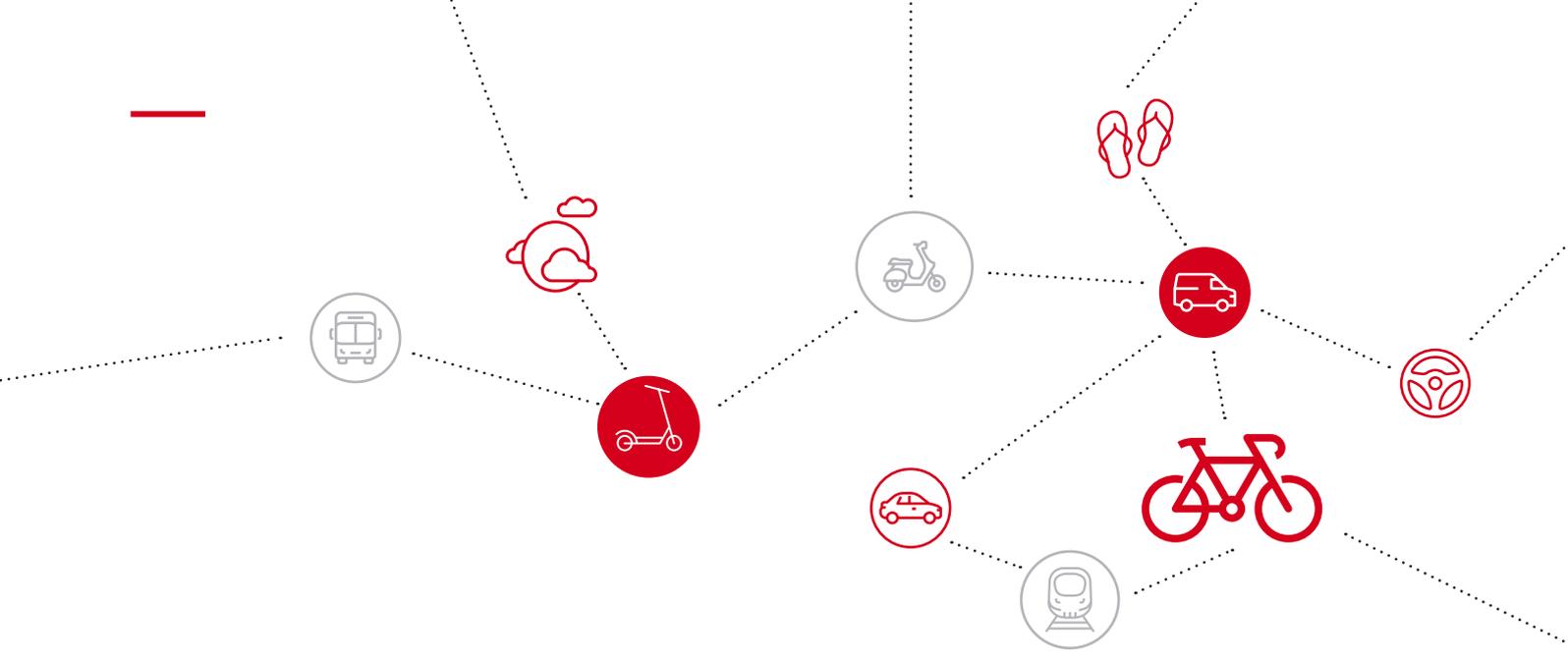
The urban mobility ecosystem adapts quickly and flexibly to changing customer demands.

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The normalization of mobility behavior occurred almost as quickly as the initial curtailment—
"Life as usual" returns.

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"Fully integrated mobility" is on the rise—the post-pandemic urban mobility ecosystem will be based on data and customer preferences



Urban Mobility in a Post-Covid-19 World

As public life starts to move into the post-Covid-19 phase, the question remains how urban mobility will adapt to this “new normal.” From today’s perspective on the weeks and months behind us, the trajectory for the future becomes clearer. The urban mobility ecosystem adapted quickly and flexibly to changing customer demands. In fact, this ability to match overall supply of mobility modes with individual preferences on the demand side will be a key success factor for cities from now on. The modal split will look different in a post-Covid-19 world and will be even more fast-moving.

In this paper, the example of Berlin was used to compare direct implications of the pandemic on urban mobility behavior, especially the relative use of different modes of transportation before and during the lockdown phase. Moreover, indirect consequences of a changed mobility behavior, such as changes in air quality and in the parking situation were analyzed. Four different scenarios are presented, analyzing in which direction future mobility might shift. Findings are backed by data from the public transportation provider in Berlin (BVG), Mobility as a Service platform provider Trafi, as well as mobility analytics companies MotionTag and Blig.

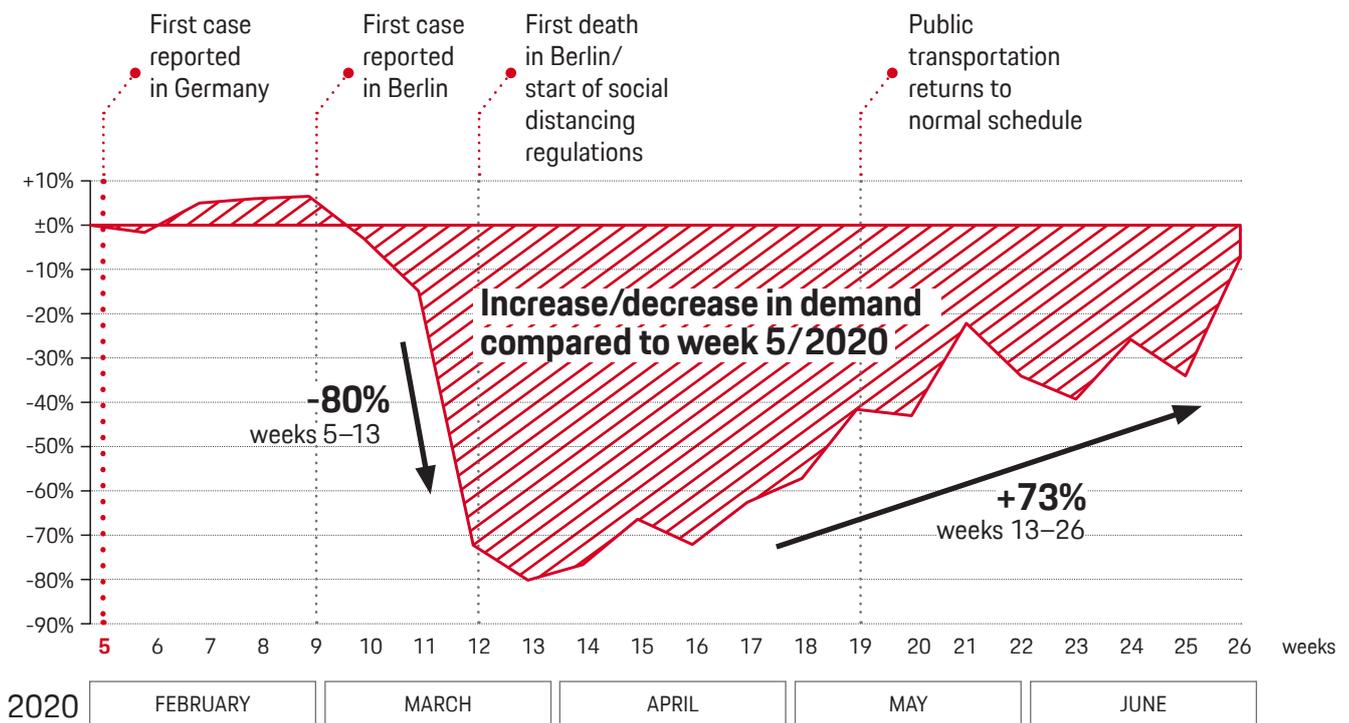
Impact

PUBLIC AND SHARED MOBILITY

After the first cases in Germany were reported in week 5/2020, the absolute mobility demand in Berlin dropped significantly. As social distancing rules were relaxed, mobility demand recovered steadily, indicating that public life is unfolding to a "new normal." Demand¹ for public transportation and shared mobility modes (e.g., car sharing, ride sharing, etc.) decreased by the considerable amount of 80 percent between

the baseline of week 5 and week 13 of 2020. Thereafter, the demand recovered slowly but steadily and was back to 93 percent of the baseline level as early as week 26.

While mobility in total was subjected to a decrease in demand amid social distancing rules, there have been differences depending on the mode of transportation.



Source: Trafı, BVG, Porsche Consulting

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Figure 1. Public Transportation and Shared Mobility

¹ Measured by the absolute number of rides with particular modes



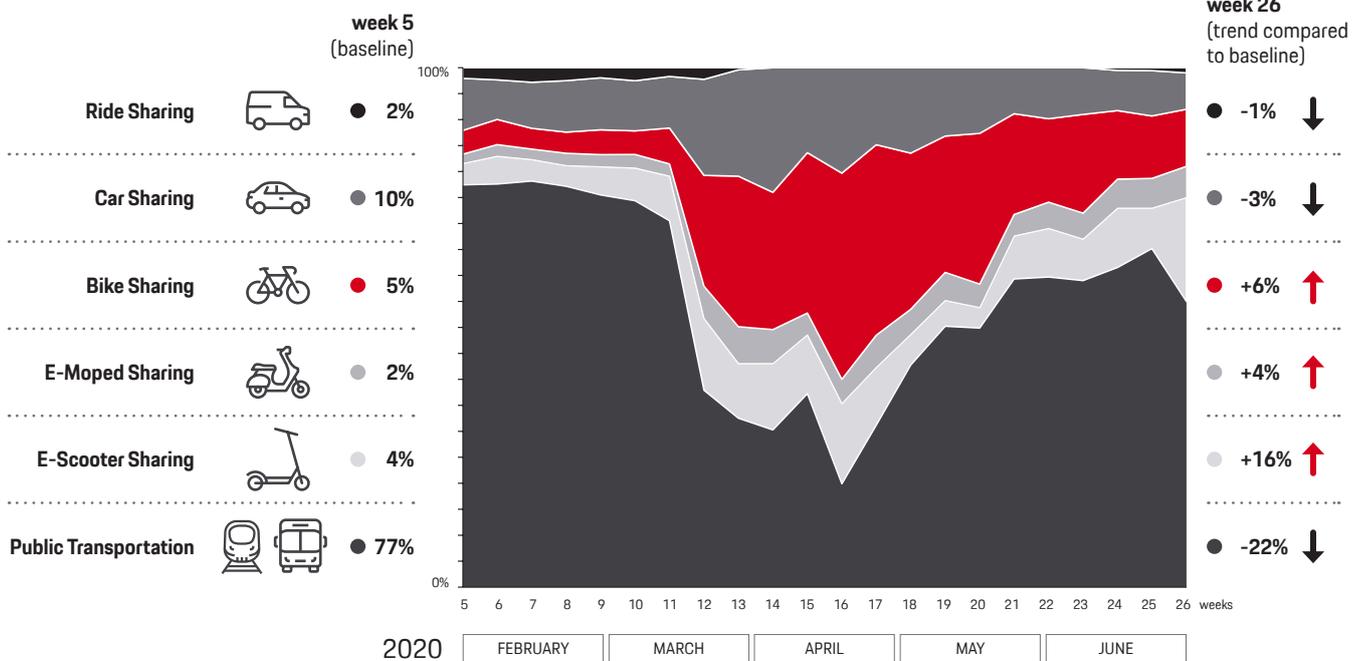
Fabien Sauthier
COO MotionTag



Time spent traveling is catching up to pre-corona levels and is in line with national data from previous years, with an average of one hour and ten minutes spent traveling. Interestingly, there has been a modal shift from cars and public transportation to more active modes of traveling like biking and walking.

Users seem to be becoming increasingly selective about their choice of transportation and are paying more attention to safety, while providers can differentiate themselves with new criteria like hygiene concepts. In general, a shift in mobility behavior from public transportation towards shared mobility modes (e.g., ride sharing, car sharing, bike sharing) could be observed. While the initial split between public transportation and shared mobility modes was roughly three quarters to one

quarter in favor of the former, the situation reversed temporarily with shared mobility taking up to 80 percent market share in week 16. The situation is currently bouncing back and public transportation is taking the lion's share again with 55 percent in week 26, but in the long term, shared mobility could gain market share compared to the pre-pandemic situation and the concept of sharing could become a cultural asset.



Source: Trafi, BVG, Porsche Consulting—data is based on Jelbi user behavior

© Porsche Consulting

Figure 2. Modal Split: Public Transportation and Shared Mobility



► Public transportation

Public transportation suffered most significantly, as social distancing in trains, buses, and trams is challenging due to high passenger densities. In Berlin, the relative share of public transportation rides compared to the total number of inner-city rides saw a decline from 77 percent modal share in week 5 down to 20 percent in week 16. Subsequently, the providers reacted adequately: cadences of vehicles were reduced and other protection measures were deployed. For example, passengers were prohibited from entering buses at the

front and from purchasing tickets on board in order to protect drivers and reduce the risk of infection due to handling cash. From week 19 onwards, the public transportation service in Berlin returned to normal operations and has undertaken a remarkable recovery since then. In week 26, 55 percent of rides were again carried out by public transportation, which—despite losing market share to other modes—will have to be the backbone of urban mobility in a Post-Covid-19 world.



► Car sharing

Car sharing saw an increase in the relative share of inner-city rides. While car sharing accounted for approximately 10 percent of rides in week 5, the share went up to 24 percent in week 16, before renormalizing at 7 percent again in week 26. Like other modes of transportation, car sharing suffers from an overall reduction in mobility demand due to telecommut-

ing and social distancing; however, car sharing is still perceived by most customers as a safe option for unavoidable routes. Subsequently, operators responded by increasing their radius of operation or offering attractive price packages, especially addressing the needs of essential workers.



► Ride sharing

Ride sharing has been among the most impacted transportation modes during the pandemic. As it inevitably requires sharing a car or van with at least one driver and potentially other passengers, the demand for ride sharing decreased considerably. The initial share of 2–3 percent of urban rides before the pandemic dropped to only 0.4 percent in week 13. Subsequently, providers suspended or limited operations,

e.g., by focusing on subsidized nighttime transportation for essential workers. In week 24, ride sharing in Berlin returned to operations and had approximately 1 percent relative share in week 26. For the return, safety measures were implemented, like limits on the number of passengers or shields between drivers and passengers.



► E-scooter sharing

While e-scooter sharing in normal times accounts for approximately 4 percent of rides, the relative share increased to up to 15 percent in week 16. After some variations in the following weeks, e-scooter sharing took a solid 20 percent relative share in week 26. Due to the overall reduction of mobility demand during the lockdown, this increase in relative share does not result in an increase in absolute numbers of rides.

In fact, all but one provider suspended operations due to lack of demand and concerns about contagion. With regulations loosening, several providers restarted their operations in May and June. Additionally, the improving weather conditions and a slight recovery of tourism promoted an increase of demand leading into the summer, which is traditionally the main season for e-scooter sharing.



► E-moped sharing

The effect of the lockdown on e-moped sharing was comparable to e-scooters, as e-mopeds also gained relative market share from 2 percent in week 5 to approximately 5 percent in week 16: a level that could be maintained until week 26. This is comprehensible, as e-moped and e-scooter sharing are

largely comparable in terms of customer journey and operations. However, the approach of providers was noticeably different, as Berlin's major e-moped sharing provider continued operations during the lockdown, while most e-scooter sharing providers did not.



► Bike sharing

Bike sharing benefited significantly from a customer churn in nearly all other modes of transportation. The data shows that the bike-sharing proportion of total inner-city rides rose from 5 percent in week 5 to a peak value of 39 percent in week 16 before settling at 11 percent in week 26. Bikes provide a simple form of individual transport and are perceived as a safe and convenient alternative during the pandemic. As bike traffic increased, public authorities took action and installed pop-up bike lanes by closing parts of the roads to car traffic. While

these bike lanes were initially planned as preliminary installations, the public authorities in Berlin already pointed out that parts of the newly created bike infrastructure might last in the long term. Ahead of the coronavirus situation, a trend towards new land-use policies could be observed globally as metropolitan areas announced plans to close parts of their inner-cities to cars and increase bike infrastructure (e.g., Paris, Barcelona, Bogota). It can be expected that such schemes will be expedited and reinforced during the course of the pandemic.

INDIVIDUAL MOBILITY



► Walking

Walking experienced a revival as a popular activity—not only in order to travel from one place to another but as an act of freedom. While the average person walked only fourteen kilometers per week as of week 5, the average weekly distance increased by 42 percent to twenty kilometers a week in

week 26.² This might not be solely attributable to the pandemic but moreover, dependency weather also interferes with the observed increase—similar to all other outdoor modes of transportation (e.g., e-scooters).



► Cars

At the same time, the use of private cars in general decreased considerably. While the average distance per driver per week was 215 kilometers in week 5, the weekly distance dropped by 67 percent to just 71 kilometers in week 14. Since then, the weekly distance has seen a steady increase and was at 203 kilometers per driver per week in week 22, which is

equivalent to 94 percent of the pre-pandemic level.² In light of social distancing rules, the public perception of cars has been upvalued as an enabler of individual mobility, but also as a cultural asset (e.g., in drive-in cinemas). As society adopts a more distant behavior (“cocooning”), even a short-term increase in car ownership could be the consequence.

² Source: MotionTag

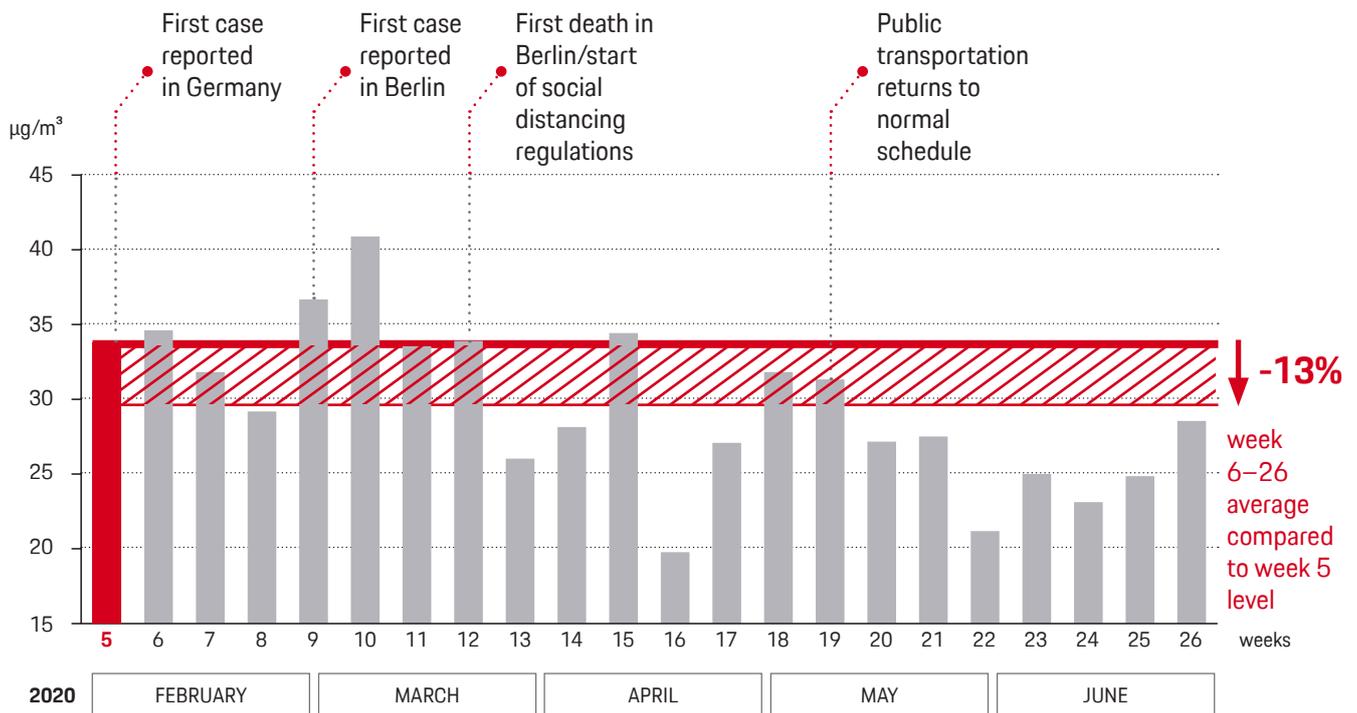
COLLATERAL EFFECTS OF CHANGING MOBILITY BEHAVIOR



► Air quality

Besides these direct consequences of the pandemic on mobility, indirect changes could also be observed, as for example a positive impact on air quality in Berlin, as the Senate Administration for Environment, Transport and Climate protection reports. Based on seven measuring stations in Berlin, emissions of nitric dioxide (NO₂), which is emitted by diesel engines in particular, fell significantly. From week 5 to week

26, an average decrease of 13 percent of NO₂ emissions was observed as shown in figure 3. This decline correlates to a reduction in traffic over the same period; however, the weather dependency of measurement values has to be taken into account, leaving a residual level uncertainty regarding the interrelation of traffic volume and emissions.



Source: Berlin Senate Department for the Environment, Transport and Climate Protection, Porsche Consulting

© Porsche Consulting

Figure 3. NO₂ Emissions



► Parking situation

Moreover, the aforementioned decline in traffic affected the parking situation. In all of Berlin's twelve districts, parking pressure declined drastically, beginning in week 6 with an average parking pressure over all districts being 45 percent lower in week 13, compared to week 5 as shown in figure 3. A similar level was retained until week 16, before parking pressure saw a rebound. By week 26, it was roughly at the

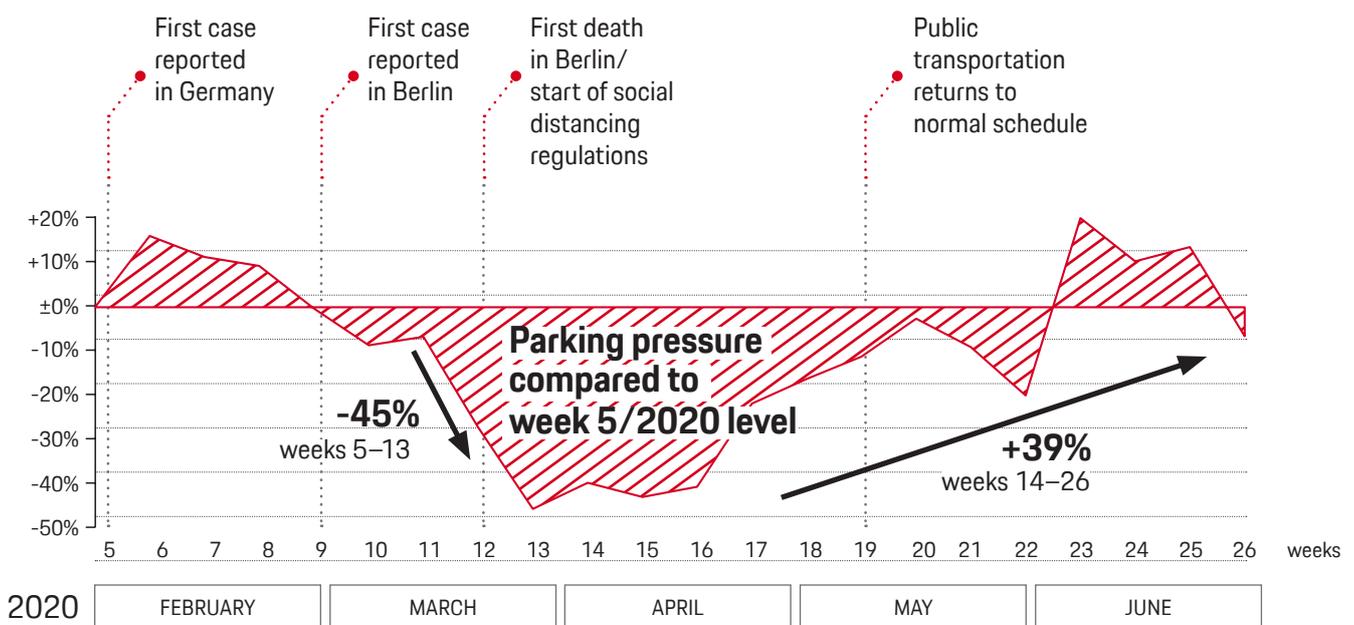
initial level of week 5. Beside temporal variations, regional differences could be observed. In particular, central districts like Berlin-Mitte or Friedrichshain experienced a larger decline (up to 60 percent) in parking pressure than the Berlin average. These findings were also explained by Julian Glaab, Co-founder and CEO of Mobility Analytics company bliq.



Julian Glaab
Co-Founder and
CEO of bliq



Parking pressure was down by up to 60 percent during peak lockdown, meaning less time was spent searching for an available spot by car drivers in the city. However, many areas of Berlin were already back to the pre-pandemic normal by the beginning of May. We see this as a sign that members of the public continue to value individual mobility over mass transit due to the reduced infection risk.



Source: bliq, Porsche Consulting

© Porsche Consulting

Figure 4. Parking Pressure

LONG-TERM IMPLICATIONS FOR POST-PANDEMIC URBAN MOBILITY

While the short-term implications for mobility demand, modal split, parking pressure, and emissions can be analyzed using data, the long-term trend is unclear. Traffic is picking up again as restrictions are being relaxed. Should social and economic life be restored to the pre-pandemic situation, one can likely assume that traffic, parking pressure, and emissions will also return to earlier conditions. In some cases (e.g., parking pressure) this can already be observed.

As economic stimulus programs and social welfare are currently being prioritized on the political agenda, sustainability and innovation must not be disregarded. The momentum towards less traffic, fewer emissions, lower parking pressure, and a more homogeneous modal split could ultimately have a positive impact if cities act now. In order to predict potential long-term developments in urban mobility, four scenarios for the post-pandemic future were elaborated:

01

LIFE AS USUAL

As social distancing rules and telecommuting policies begin to wind down, mobility demand might soon return to the 2019 level. Road traffic capacities will soon reach their natural limit as congestion and parking pressure reach pre-pandemic levels. Out of necessity, the majority of people will use public transportation, which will again be the backbone of

urban transportation, covering approximately 75 percent of inner-city rides. Necessary measures will be undertaken to protect passengers, e.g., frequent cleaning, increased ventilation, or protective shields for bus drivers. Despite residual risks, passengers will accept the situation and return to the mobility behavior they displayed before the pandemic.

02

MASS TRANSIT LOSES—INDIVIDUAL WINS

Contagion concerns will have a long-lasting impact on mobility behavior. People will be cautious and display behaviors such as social distancing and cocooning. Modes of individual transportation—in particular, private cars—will see a comeback as the predominant form of urban transportation. Private bikes will become increasingly important as well and an

increase in walking will be observable. Those who are not able to afford their own car or who do not want one will use car sharing or bike sharing for unavoidable routes. Public transportation and ride sharing will plummet to the same levels as during the lockdown—with substantial economic implications for the providers.

03

PROMOTED SUBSTITUTION

Given the large density of people in buses and trains, cities intentionally limit public transportation and incentivize other modes of transportation in order to contain infection risks. Measures to scale back public transportation include lowering bus and train frequencies, skipping districts or single stations, as well as suspending night operations. On the other hand, the use of other modes—in particular ride sharing—will be encouraged by subsidies (e.g. low cost or free of charge trips for holders of a monthly public transportation pass).

Some of these measures have already been demonstrated by cities during the lockdown, e.g., New York City. In doing so, people are provided with a cheap, decentralized alternative to high-capacity public transportation. Ride-sharing vehicles will become a normal sight in urban areas; the taxi industry will experience a comeback as well. An increase in the overall number of vehicles on the road will have to be accepted to cover mobility demands of the public.

04

FULLY INTEGRATED MOBILITY

During the coronavirus crisis, numerous providers and technology companies published data on how they were positively or negatively affected by the shift in mobility demand. This openness will continue, and data sharing alliances as well as operating platforms will be built up (with the respective license and data protection models behind it) in a close collaboration between cities and Mobility-as-a-Service providers. Furthermore, city governments will actively push for data transparency to optimize urban traffic, as has been done by the

Los Angeles Department of Transportation (LADOT) with the Mobility Data Specification (MDS) in a pioneering move that is now being adapted globally. This availability of multi-operator and real-time data will in turn lead to the creation of better mobility services for customers as well as economic stability for the providers. In addition, users could be incentivized to use more sustainable or efficient modes of transportation, as the Mobility-as-a-Service providers have full transparency on all available options.

SUMMARY AND OUTLOOK

It is undisputed that the Covid-19 pandemic has had and for the near future will have a considerable impact on urban mobility, as the data from Berlin shows. Telecommuting policies and social distancing rules led to a drastic decline of mobility demand of more than 80 percent, which recovered only slowly in the weeks after. Those customers who still continued to ride have used different modes of transportation such as individual modes like walking and biking, as well as shared modes like car sharing, bike sharing, and e-moped sharing—which took considerable relative market share from public transportation and private cars. Collateral effects of this change in mobility behavior included the improvement of air quality and parking pressure, yet only temporarily.

Cities like Berlin are paying close attention to providing the right transportation options for changing customer demands, which was demonstrated with measures like creating pop-up bike lanes or limiting public transportation. In doing so, the authorities not only promoted the use of specific modes of transportation, but also paid particular attention to mobility data in the process.

The pivotal question now is if and how city authorities will channel the current momentum in order to maximize customer value. We believe that in the short term, scenario 1 “Life as usual” is likely to return in the case of Berlin, especially when looking at the BVG transportation contract approved in the beginning of 2020, which, for instance, includes plans for larger and electric buses. However, we simultaneously believe that scenario 4 “Fully integrated mobility” is on the rise with a more liberal approach towards data sharing and data analytics. Thus, cities and mobility companies will be able to plan and orchestrate their post-pandemic urban mobility ecosystem based on data in accordance with customers’ needs and public well-being.

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Trafı

Founded in 2013, Trafı is a Lithuanian tech start-up. Trafı is working shoulder-to-shoulder with cities, countries, and companies worldwide to create the best in class Mobility-as-a-Service alternative for congested cities. Trafı offers cities the possibility to connect all mobility services into one single platform where users can check itineraries and also book their tickets and trips.

Trafı's mission is to empower cities' urban transportation with technology and know-how and encourage citizens to use more sustainable modes of transportation by accessing all services from one single platform. Trafı is currently live in 4 continents around the world and 7 cities.

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