

# Future of Mobility: On the Move - But Where To?

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Source: [What is Hyperloop?](#) by Pocket-lint

## ***Executive summary***

*As the Covid-19 pandemic continues to rage, mobility industries need to prepare themselves for new and challenging demands in the post-COVID-19 world. While the constraints imposed by the pandemic on the way people travel have resulted in similar responses all over the world, the future of mobility will look quite different from one region to another, largely determined by the policies various countries adopt. Some countries, hampered by lack of resources or other constraints, will continue to support*

*the old guard automotive industry, even in the long run. Others will make accelerated efforts to transition toward innovative alternatives like autonomous vehicles. As different as these responses will be, all countries share certain imperatives. Above all, it is extremely important to focus on public transportation, as the role of public transit in achieving carbon-free and congestion-free mobility across geographies is unquestionable. Policymakers need to lay the groundwork for a balanced and holistic transition to safe and sustainable mobility systems. In this paper, we look at the short-term and long-term impact of the pandemic – as well as energy efficiency and other issues – on human mobility across different geographies including the US, Europe, China and India.*

## **Pandemic: Speed bump or game-changer?**

Gradual and steady progress toward new mobility models have been underway for about a decade. A future of mobility that is more sustainable, efficient and convenient, driven by rapid innovation, new business models and changing standards, seemed possible and even certain. But the disruptions of the pandemic – social distancing in public transit, plummeting usage of mobility options due to home office and online schooling etc. – have called some of that progress into question.

The rapid growth and integration of modern mobility and transport systems including autonomous vehicles (AVs), private cars, electric vehicles (EVs) and shared-mobility services enable a mobility ecosystem that is more affordable, efficient, user-friendly, environmentally compatible and available to everyone.<sup>1</sup> Options like ride sharing and e-hailing represent a fundamental shift away from personally owned and owner-driven vehicles to usage-based and driverless conveyance in Europe and the United States.

### **The three main emerging human mobility trends across Europe and North America are mobility as a service (MaaS), micro-mobility and electric vehicles.**

Car-sharing or MaaS has become a global phenomenon, led by Europe with 50 percent of the global car-sharing market. Infrastructure varies from one country to another, with Germany leading this segment. The country currently has around 150 MaaS providers and cooperative authorities. France has one of the most active peer-to-peer car-sharing service.<sup>2</sup> In 2019, about two billion ridesharing trips were made in the US, having risen

<sup>1</sup> [The future of mobility is at our doorstep](#), McKinsey

<sup>2</sup> [Transport Trends and Economics: Mobility As A Service](#), United Nations Economic Commission for Europe (UNECE)

from 2013 to 2018 at a compound annual growth rate of about 150 percent. Although the trend toward MaaS is strong in both Europe and the US, there is one significant difference between the regions. As Polydoropoulou et al. (2020) have concluded, mobility service operators/providers are the most prevalent players in Europe, while most MaaS operators in the United States are private operators (Pöllänen, 2018; Buehler and Pucher, 2012).<sup>3</sup>

Micro-mobility is a very widely used service both in Europe and America, and is a way to reduce the footprint of cars and ease road traffic congestion. It is also ideal for short-distance travel. A [report](#) by McKinsey (2019) on shared micro-mobility projected a potential market of approximately US\$ 200–300 billion in the US and US\$ 100–150 billion in Europe by 2030.<sup>4</sup>

EVs have become very popular in major automotive markets such as Europe. The sales of electric vehicles grew at an astronomical rate in 2019, driven by government subsidies and tightening emissions regulations. The US market also nearly doubled to 360,000 EV units, primarily based on strong sales of Tesla's Model 3 in 2018, in no small measure due to EV tax credits.<sup>5</sup>

<sup>3</sup> [Transport Trends and Economics: Mobility As A Service](#), United Nations Economic Commission for Europe (UNECE)

<sup>4</sup> [Micromobility's 15,000-mile checkup](#), McKinsey

<sup>5</sup> [Expanding electric-vehicle adoption despite early growing pains](#), McKinsey



Source: [The Future of Autonomous Vehicles is Shared](#), Bloomberg

Just when the transition to new mobility was in full swing, the pandemic struck. The automotive industry across the world has been hit hard, and newly developed innovative plans have been shelved. Pandemic-related measures have come to define the choice of mode of mobility. Commuters place heightened importance on safety and hygiene alongside cost and travel time.

Even as the vaccine rollouts have given us much reason to be hopeful, the continued challenges of vaccine distribution mean that return to normalcy and economic recovery will take time. The consensus of most observers and experts is that the pandemic will change the face of mobility. Some changes could be only short-term, yet others could be longer-term or even permanent.

## **Different geographies, similar challenges**

No discussion of mobility would be complete without bringing urban planning and infrastructure into the picture. A look at positive and negative examples around the world reveals insights into which development concepts will best support future mobility. Vehicle-centric transport networks in many cities are fragmented, making it expensive,

difficult and inconvenient for people to move between points. The London Ringways program, for example, tore through historic districts of the city, destroying urban fabric and separating communities. This resulted in urban blight adjacent to the new roads. A further example of planning focused on vehicles alone can be found in Dubai, where Sheik Zayed Road separates two developments and makes it impossible to walk or cycle between them. As Senior Transport and City Planning Consultant Mihir Benison wrote in a [recent article](#), Dubai “... appears to have taken the city planning rule book from Los Angeles and injected it with steroids.”

To succeed, infrastructure clearly needs to be designed primarily around people. London's [Mini-Holland](#) scheme offers a positive example, in which roads have been closed or restricted to encourage walking and cycling. A 2019 [study](#) by Aldred et al. revealed that people were cycling or walking for 41 minutes more per week on average than in comparable areas without the measures.

Within the short term, i.e. until the end of 2021, all geographies face and will continue to face similar challenges. These include stiffer fuel economy standards, the shift away from public transit and shared mobility, a slowdown in the investment in innovation around autonomous vehicles and stricter environmental regulations. The change in the US Administration will certainly have a bearing on that country's policy toward dual economy standards, emission regulations and support for electric vehicles. Other short-term impacts across geographies include the reaction of stock markets, temporary closure of automobile plants and a decrease in vehicle miles travelled. These developments should not, however, distract from the mid- to long-term need for public transit options and better integration between transport modes.

China appears to be ahead of other regions in terms of recovery, with ridership in public transit rebounding and car sales picking up. Like the United States and Europe, China was hit by a shutdown of the auto industry and the shift away from public transit, yet both trends have seen a quick reversal. In addition, there is strengthened government support for both the electric vehicles and autonomous vehicles in the country. The crisis, contrary to trends in the United States and Europe, has played a significant role in spotlighting autonomous vehicles as a safer mode of transportation.

Europe continues to witness a shift away from shared mobility and public transit. New passenger vehicles sales are in free fall, due to drastically reduced travel in the face of remote working and closed borders. Strict emissions regulations and government support for electric vehicles in most parts of Europe can be expected to help drive recovery in this area of the automotive industry, but within the short term, there will be a

slowdown in R&D funding for innovation around autonomous vehicles and other innovations.

The auto industry in India, which was already experiencing a significant slowdown prior to the pandemic, was hit even harder. Sales of new vehicles, the shared mobility segment and public transit – particularly bus and rail operators – have been hard hit. However, the intermediate modes of transport such as the two-wheelers and the three-wheelers are likely to benefit given their role in “last-mile” transport.

**Table 1: Short-term Impacts of Covid-19 on Mobility**

	US	Europe	China	India
<b>Macroeconomy</b>	Stock markets fluctuate depending on the introductions of additional lockdowns but remain below pre-crisis levels. Oil prices remain far below the pre-crisis levels.	Stock markets initially plummet, but then gain amid vaccine hopes. Oil prices remain far below pre-crisis levels as additional lockdowns are introduced.	Slowdown in exports due to weakened demand.	Temporary shutdown of the auto industry.
<b>Policy Developments</b>	Strengthening of CAFÉ standards. Potential government incentives to encourage the use of new electric vehicles. Stricter emissions regulations.	Potential government incentives to encourage use of new electric vehicles. Stricter emissions regulations.	Increased government support for electric vehicles and electric vehicle infrastructure.	Increased government support of electric vehicles and electric vehicle infrastructure.
<b>Technology Adoption</b>	Slowdown in VC impacting the innovation around mobility. Growth in digital mobility tools to mitigate the spread of COVID 19.	Pullback in R&D funding slows advance of autonomous vehicles, vehicle connectivity, city operating systems and other innovations. Growth in digital mobility tools to mitigate the spread of COVID-19.	Crisis spotlights autonomous vehicles as an enabler of physical distancing. Growth in digital mobility tools to mitigate the spread of COVID-19.	Continued challenges immobility related tech adoption given population size and complexity.
<b>Market Response</b>	Shift away from shared mobility and public transit. Ride-hail companies diversify into goods delivery. Decrease in vehicle miles travelled due to remote working.	Shift away from shared mobility and public transit. Decrease in vehicle miles travelled due to remote working and closed borders.	Shift away from public transit initially, but gradual increase in ridership, though still below pre-crisis levels. Revival of bike-sharing as reliable, low-carbon mobility mode.	Shift away from public transit causing a severe financial strain –particularly on the bus operators.
<b>Auto Industry</b>	Slow recovery after temporary closures.	Passenger car sales volumes expected to	Temporary shutdown of auto industry.	Slowdown in sales of new vehicles.

	Increase in used car sales.	experience a loss of 11–17% over the next 3 years.	Restrictions in automotive supply chain.	Slowdown in the shared mobility segment.
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Source: The Digital Economist analysis; Deloitte (2019); McKinsey (2020)

## No one-size-fits-all approach

Policymakers play the leading role in determining the long-term impact of the pandemic on mobility across geographies. Some governments may view the crisis brought on by the pandemic as an opportunity to accelerate efforts to transition toward a more autonomous system while other governments may not yet have the capabilities to move in this direction, but instead may choose to buttress the old guard in the automotive industry, albeit with a focus on new energy vehicles. Irrespective of when the pandemic may end, the impacts will be felt for a long time to come. In some of the regions, physical distancing or social distancing may come to be a permanent part of day-to-day life. In these countries, shared mobility or public transit may be slow to recover, while other governments may redesign their city streets to give more space to micro-mobility solutions. The different flavors of these policies across geographies will lead to various futures of mobility in different countries.

In the United States, policymaking related to the automotive industry can be expected to change in the new administration. Greater penetration of autonomous vehicles fueled by an increase in federal funding, redesign of city streets and a stronger focus on public transit are some of the outcomes we can expect to see in the longer term.

Europe is likely to see a stronger market for electric vehicles relative to the United States. There is also likely to be a greater diversification of the modal split accompanied by consolidation in the micro-mobility segment. Another interesting development will be the emergence of “superblocks” as the new norm in urban mobility planning tool in many European countries. This has already been implemented in Barcelona, Spain, with some degree of success. Since Barcelona introduced its first “[superblock](#)” in 2016,<sup>6</sup> the concept of carving out islands of car-free space by routing traffic around multi-block areas has been influential in cities around the world. Now the Catalan capital plans a major supersizing of the idea. Over the next decade, Barcelona will convert its entire central grid into a greener, pedestrian-friendly area almost totally cleared of cars. One should expect more of the same in other European cities as well.

China will continue to see the recovery of the automobile industry, with new car sales dominated by electric vehicles. Government support for electric vehicles and the charging infrastructure are likely to be strong drivers of the electric vehicle market. At the same time, private car ownership will be restricted through license plate lotteries, which started in 2011.<sup>7</sup> Further, the Beijing municipal government plans to alter the city’s competitive plate lottery policy in favor of new-energy vehicle (NEV) plates. However, the focus is also likely to be on slower modes of transport such as biking and walking with the development of “15 minute” cities that will obviate the need for cars for essential commutes.

India is likely to see a greater role of automation in the auto industry, which could help avoid shutdowns like those caused by the pandemic. Tax incentives for R&D may add impetus to automation of production. More importantly, the government may introduce special funds to support the financial viability of public transit agencies in the country. This could potentially lead to an increase in ridership levels to pre-pandemic levels from around 2025 onward, although there will be some level of variation across cities in this regard as it is also dependent on the measures that need to be taken by the local governments to help people regain confidence in public transport. While autonomous vehicles are not likely to be an option for the foreseeable future, the market for electric vehicles in India will see strong growth, due to a large extent to government incentives already being put in place.

**Table 2: Long-term Impacts of Covid-19 on Mobility**

	US	Europe	China	India
<b>Macroeconomy</b>	Stock markets stabilize barring any other shock event.	Stock markets stabilize barring any other shock event.	Stock markets stabilize barring any other shock event.	Greater reliance on automation and robotics likely to lead to fewer shutdowns.
<b>Policy Developments</b>	Reclaiming of street space by the city authorities. Auto dealerships may be considered as an “essential business”	Implementation of the superblock model for sustainable mobility across more countries. Ban on new gasoline and diesel car sales by 2030.	Licensed private vehicle ownership restricted through plate lotteries.	Reduced tax on R&D activities to encourage more localization. Financial support for public transit agencies through creation of special access funds.

<b>Technology Adoption</b>	Autonomous vehicles gain public support as use cases in personal mobility and goods movement become clearer. Increase in R&D funding of mobility innovation and autonomous technology solutions.	Autonomous vehicles gain public support as use cases in personal mobility and goods movement become clearer. Increase in R&D funding of mobility innovation and autonomous technology solutions.	Autonomous vehicles gain public support as use cases in personal mobility and goods movement become clearer. Consolidation of market with healthy market winners emerging.	Electric vehicles become more popular and gain acceptance thanks to government incentives.
<b>Market Response</b>	Consolidation in the shared micro-mobility space. Increased federal funding for mass transit. Increase in road trips.	Consolidation in the shared micro-mobility space. Greater diversification of modal split.	Greater reliance on slower modes of transport. 15-minute cities emerge as the new urban planning "normal".	Increase in micro-mobility services such as Yulu. Uneven reduction in travel demand across the country.
<b>Auto Industry</b>	Sales of new cars recover to pre-crisis levels.	The car fleet in Europe is expected to peak by 2025 due to increasing penetration of shared mobility. Post-crisis EV sales will rebound strongly.	Sales of new vehicles expected to reach 30 million by 2025. Electric vehicles to dominate new car sales.	Adoption of small-format mobility will increase. Greater role of AI, and digitalization in the auto industry.

Source: The Digital Economist analysis; Deloitte (2019); McKinsey (2020)

## Long-term effects point to churn

A recent trend in many cities worldwide has been multi-polarity, where smaller communities in the periphery of the original city center of the central business district have started to flourish and become self-sustaining, reducing the need to travel to the city center on a regular basis. The pandemic could accelerate the shift toward multi-polarity in coming years. Pendular cities, which have made investments in heavy radial mobility infrastructure, may need to make changes to accommodate reduced commuting demand and the shift toward multi-polarity.

Cost and convenience have traditionally been the key factors when consumers choose transport modes. Currently, reducing risk of infection is the top choice driving the choice of the transport mode for both the private and the business trips. Consequently, transport modes that enable greater social distancing are the top choice for the travelers today. Cycling and simply walking have become very popular options, along with private car ownership, with public transit falling behind. In the UK, for example, 1.3 million electric bicycles were sold from January to May 2020,<sup>8</sup> compared to only 508,000 cars (some 20 percent of which were electrified). While the ridership of public transit and

shared mobility may recover to some extent in the long run, what is certain is that the share of the slower and safer modes of transport such as the cycling and walking will increase.



Source: [Mobility and COVID-19: The Present and the New Future](#), ISGlobal

The preference for the cleaner transport modes is also going to play a part in how travel patterns evolve over the next several years. There is expected to be some repurposing of trips (fewer trips to work and more for personal needs), respacing (more local but shorter trips) and retiming (staggering during peak hours across modes). This evolution of trip patterns is likely to differ across geographies depending upon the extent of multi-polarization and the proportion of white- and blue-color jobs.

The expanded definition of safety – which now includes reducing the risk of infection due to travel – has resulted in a growing reliance on e-commerce and home delivery. This is likely to intensify focus on innovation around supply chain optimization, long-haul tracking and last-mile freight movement with deployment of automated delivery through robots and drones. This new definition of safety is also likely to lead to acceleration of intelligent transport systems such as integrated ticketing, real-time passenger and trip information and devices that enable contactless transactions, as they become central to managing safety-related aspects of mobility.

Telework, telemedicine and e-learning are going to be permanent for some sections of the population across different geographies. The need for effectiveness of client interaction, the personalization of client interaction and need for operational resilience are going to accelerate over the next several years.

These changes in the mobility segment will affect virtually all players. Some will exit, while new players will emerge. The business models will change, and the investments will ebb and flow. The mobility segment will remain fluid for a long time to come.

## **Looking Ahead: Trust in Public Transit and Shared Mobility is Key**

While there is currently a perceptible shift away from public transit and shared mobility across geographies, it is important that commuters regain their trust in public transit and shared mobility once there is a semblance of return to normalcy. This will require greater coordination between local governments and the transport authorities and, in turn, greater accountability and division of responsibilities between the local government authorities and the transport authorities for sound implementation of the measures that need to be put in place.

At the same time, the pandemic-related trend toward more cycling and walking should be encouraged in the post-COVID era, not least because of the many associated health benefits. Beyond individual wellbeing, which is in itself more than enough reason to encourage fitness, enhanced physical activity also positively impacts healthcare systems. Here, cities can incentivize more walking and cycling not only by providing people-friendly infrastructure, but also through public awareness campaigns, maps and signage.

City authorities must work closely with transport authorities to accelerate digitalization of both the service offerings and operations for preference and resilience. Digitalization should be expanded to cover virtually all functions, including ticketing and payment, handling of passenger information, operations and deployment of MaaS (B2C and B2B) as well as frontend applications allowing users to conveniently plan their multimodal journeys according to their preferences and prevailing circumstances.<sup>9</sup>



The need for hygiene in public transport modes is going to be permanent. Transport operators in New Zealand have come up with a novel way to address this issue, while also encouraging the public to use buses for daily travel. They have issued an app to inform passengers whether an approaching bus or train has space for the recommended 2m of physical distancing. Once a bus is at capacity for safe physical distancing, the app will show that the bus is no longer taking passengers, and the driver will only drop off passengers until it is safe to resume pickups. Customized variations of this example could be adapted by city authorities in other geographies.

There are certain shifts in mobility that appear permanent, regardless of the pandemic. For the first time, ride-sharing data became publicly available to study its impact. In this situation, [data](#) made available in 2019 on ride-sharing for two years that preceded was released for the city of Chicago. Ride-sharing resulted in increased congestion, increased VMT (or Vehicle Miles Traveled, a closely studied metric for city, environment, traffic and related public planning disciplines), and decreased use of public transportation. Separate from the above situation, observations have shown complete new behaviors in mobility. In particular, rides that were oddly short (roughly, less than 10 minutes) or long (roughly, more than 45 min) in distance and thereby duration and not typically requested by taxis, became more frequent occurrences with the advent of ride-sharing.

To encourage passengers to use public transit, ticket prices should be synchronized to the volume of traffic. This would require city authorities to work with transport authorities,

as in the case of data from Chicago and move towards an integrated fare system for public transit. An integrated fare system should dynamically link ticket prices to the (actual or forecast) flow of traffic at 15- or 30-minute intervals. Technologies are currently being developed to forecast the passenger flow in stations and traffic flow on roads using big data and data analytics. Based on the traffic volume that is forecast, ticket prices should dynamically adjust to an appropriate low price that will incentivize the commuters to shift to public transit. Emergence of smart apps that predict the volume of traffic on roads may also act as an enabler of such pricing policies.

Transport authorities should leverage AI, blockchain and advanced data analytics to devise innovative loyalty programs that benefit not only public transit but also the micro-mobility or shared mobility ridership. For instance, by walking or biking to a distant public transit station (or alternatively using ride-hailing services) commuters could earn more loyalty points, which could be immediately redeemed against the ticket price at the station. Innovative loyalty programs can be an effective strategy to encourage passengers to use public transit.

Cryptocurrencies can increase the ridership of public transit by making payments faster and more secure. Every transaction made using the cryptocurrency is stored in a large public ledger, a decentralized database that makes fraudulent activity difficult. In addition, crypto payments and decentralized data storage would provide anonymity to passengers and individual travel plans. Simplification and ease of ticket payment processes promise to help attract more passengers to public transit, which in turn would enhance the cost-effectiveness of transit systems. Savings could be passed on to passengers in the form of lower ticket prices.

There are already examples of rails services adopting crypto. The fully owned Swiss Federal Railways has been accepting cryptocurrency for ticket sales since 2016. Russian Railways Company RZD is looking at the possibility of using cryptocurrency for ticket payments. In addition, there are platforms like Destinia, where train tickets are already sold for crypto in many countries regardless of whether railway companies accept digital currencies or not. In the United States, current regulations stand in the way of cryptocurrency being used for public transport.

The financial impact of the pandemic on the transport operators has been particularly hard in Europe. This is due to the nature of the contracts transport operators have with the transport authorities. Operators with “net cost contracts” whose revenues relied heavily on passenger fares (as is the case for some contracts in the UK and the US) or with “gross cost contracts” with significant incentive schemes (as is the case in Sweden)

have been severely hit by the crisis. Other operators with gross contracts paid out on a per-kilometer basis regardless of the number of passengers carried were less severely impacted. To avoid such effects, transport authorities must introduce more service flexibility or more dynamic governance mechanisms that enable real-time decision-making. The inclusion of insurance in contracts to mitigate the financial impact of risk of collapses at times of crisis should also be considered.

As the post-COVID world will dictate that the public transport modes are clean and always sanitized, more frequent cleaning may be required. This may need to be supplemented with other measures such as rephrasing of traffic signals to give preference to public transit, dedicated parking facilities for car-sharing etc. To enable such measures, public transit subsidies within the city's control should be maintained or increased to provide stability to transit operations in the short and medium term.

To conclude, although COVID 19 is a crisis in terms of its health and economic impacts on millions of people, it also opens up a unique window of opportunity for authorities and operators to significantly reshape mobility systems. They can do this by taking “no regret” actions to address established trends and deliver major improvements. Even if recovery is fast and life does return to something like the pre-COVID world in the near future, more efficient, convenient and environmentally friendly mobility will benefit society and the planet for generations to come.

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