

[IMPACT ON PUBLIC TRANSPORT]

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ABSTRACT:

A consistent pattern that emerged out of the consequences of COVID-19 is that public transport was hit particularly hard compared to private cars and other modes. This raises concern regarding the future of public transport and the sustainability of urban transport. While the current clash of challenges, trends and disruptions makes the future more difficult to forecast than ever, this chapter highlights both long-term and emerging trends that are likely to influence public transport beyond the pandemic. As a foundation for the discussion, the chapter first briefly outlines the state and development of public transport before COVID-19, as well as the immediate effects of the pandemic. Before COVID-19, strong trends included initiatives towards sustainable urban transport, digitalization and automation, and increasingly personalized services. The pandemic induced lockdowns, restrictions to use public transport and anxiety towards crowding, which influenced people to travel less and shift to other modes. There were clear socioeconomic inequalities in the ability to do so and a loss of accessibility. Many agencies and operators suffered financially as a result of lost fare revenues and limited governmental support. Emerging trends such as less commuting and financial struggles are likely to influence public transport for many years to come. However, the pandemic, and the induced behaviour and exposed problems that have followed, can serve as a call for substantial changes in urban transport planning. A continued development and integration of sustainable mobility services, with public transport as a central actor, is widely seen as key in this ambition.

KEYWORDS:

1. Public transport
2. Covid-19
3. Urban mobility
4. Mobility as a Service
5. Equity
6. Trends

Main Body:

Introduction

The COVID-19 pandemic hit the world as it was already struggling with intense challenges, including climate change. The pandemic prompted governments and authorities around the globe to impose restrictions on social activity and mobility of an unprecedented scale and magnitude. A consistent pattern that emerged around the world is that public transport was hit particularly hard compared to private cars and other modes (Vickerman, 2021). This raises concern regarding the future of public transport and the sustainability of urban transport. Will public transport reclaim its former position among the modes, or will the losses to private cars during the pandemic be persistent? On the other hand, could public transport evolve into something new and even better?

While the current clash of challenges, trends and disruptions makes the future more difficult to forecast than ever, this chapter will highlight both long-term and emerging trends that are likely to influence public transport beyond the pandemic. As a foundation for the discussion, the chapter will first briefly outline the state and development of public transport before COVID-19, as well as the immediate effects of the pandemic.

Before the Pandemic

Before the pandemic there were several developing trends regarding the future of public transport. Globally, public transport supply and ridership had experienced slow but steady increases during the previous few decades, although large variations existed between developed and developing countries, urban and rural areas, etc. The mode share of public transport, as a proportion of all motorized transport showed diverging trends in developed and developing cities: in developed cities the mode share increased by circa 16% between 1995 and 2021, while it decreased by 33% in developing cities (UITP, 2015). In many places, affording and driving a private car is still a way of increasing individual accessibility, safety, comfort and status. At the same time, the projected growth of the world population from 7.6 billion people in 2018 to 9.8 billion in 2050 will occur entirely in cities (UN, 2019), putting immense pressure on urban transport systems.

Sustainable Transport Systems

The IPCC report released in August 2021 highlighted the ongoing rapid increase in average temperature, extreme weather events, glacial melting and other adverse effects caused by greenhouse gas emissions from human activities (IPCC, 2021). Current trends in emissions are projected to have catastrophic effects in the coming decades unless radical restrictions are rapidly enforced. This stark reminder of the urgency for change will need to have a major influence on transport policy and planning in the coming years and decades.

The transport sector is responsible for around 23% of energy-related CO₂ emissions world-wide (Sims et al., 2014). Transport-related emissions are expected to increase further in the coming years, which calls for swift and powerful mitigation policies. In addition to avoiding journeys where possible, lowering the energy intensity of each transported tonne km and the carbon intensity of fuels, Sims et al. (2014) emphasize that a shift to transport modes with lower carbon use is required. This move should be promoted through investments in public transport, walking and cycling infrastructure and modifications of existing transport infrastructure.

A modal shift from private to public transport is thus a crucial component of reducing greenhouse gas emissions, but it also has substantial local environmental benefits on pollution, noise, urban

space and safety. The private car has long been at the centre of traffic planning and while improvements for public transport and the active modes are also made, there has been a lingering reluctance to substantially reduce car accessibility. However, an increasing number of cities around the world are now working actively towards more sustainable urban mobility. For example, the C40 network consists of 97 of the world's largest cities, which have committed to take forceful actions against climate change and poor air quality at the local level (C40, 2020).

Equity Considerations

It is increasingly recognized that the traditional prioritization of private car mobility in urban transport planning comes with substantial equity effects as car ownership tends to be highest among middle-aged, males, and people with high income. In line with the heightened focus on sustainability issues, equity considerations have been receiving increased attention in transport planning (e.g., Lyons, 2021; Mejía-Dorantes et al., 2021). Expanding public transport is highlighted in Target 11.2 of the UN Sustainable Development Goals as a primary way of providing safe, affordable, accessible and sustainable transport for all, in particular those in vulnerable situations, women, children, persons with disabilities and older persons (UN, 2015).

While studies on the evolution of equity and public transport are scarce for developed cities, some have considered the social equity impacts of improvements and formalization of public transport in developing cities. Informal transport has been an important option for low-income residents, and some authors have seen negative equity effects of the increased costs and lower affordability of public transport after reforms. In contrast, Bocajero and Urrego (2021) monitor the effects of formalization in Bogota, Colombia based on mobility surveys and find an increase in social equity indicators from the improvements.

Personalization of Travel Opportunities

The progressive digitalization and connectedness of the transport sector has created opportunities as well as a demand for more personalized services than those traditionally provided by public transport (Nelson & Wright, 2019). The quickly rising popularity of private ride-hailing services, which offer convenient booking, payment and transportation at the cost of low vehicle utilization and large vehicle fleets, has become a threat for public transport. This has spurred a race to increase the demand responsiveness of public transport services. Particularly in low-demand areas and periods, on-demand services are gaining interest as alternatives to line and schedule-based services to reduce waiting times and operating costs.

Mobility as a Service (MaaS) is an emerging paradigm for personal transport. In a MaaS system, services such as public transport, taxi, ride-sharing and car-sharing, micromobility etc. are integrated in a common, typically app-based, system for booking, payment and real-time information. Through this integration, it is argued that the system can offer door-to-door transport options that may reduce the need for private cars and parking space, and lower emissions and congestion (Smith & Hensher, 2020). Subscription-based packages of transport options are often used to incentivise users to choose the non-private car options (Hensher et al., 2021). For public transport specifically, MaaS is often seen as a way of providing the solution for the first and last mile of journeys.

Automation

Another development enabled by digitalization, advanced sensor technology and vehicle-to-vehicle communication is the movement towards automated vehicles in public transport. In metro systems (with separate right-of-way), vehicles have been operating autonomously for some time (e.g., in Singapore, Copenhagen and Barcelona). Since 2015, however, an increasing number of autonomous bus lines have appeared as temporary trials or permanent services (Ceder, 2021). One example is

the bus line in Barkarbystaden outside Stockholm, which is fully integrated in the regional public transport system (Susilo et al., 2021).

From the operators' perspective, the main allure of autonomous vehicles is the potential reduction in cost that comes from removing the driver as on average, driver salaries constitute around half of the total operational costs of bus services. In addition, automation may also have positive effects on service reliability and flexibility.

During the Pandemic

As the first wave of the COVID-19 pandemic hit the world during the first half of 2020, strategies varied from strict lockdowns in, e.g., China and South Korea to limited interventions in, e.g., the US, the UK and Brazil. After a positive development and relaxed restrictions mid-2020, a second wave hit many parts of the world during the second half of the year. In early 2021, new versions of the virus and a third pandemic wave emerged as lockdown fatigue grew stronger (Rothengatter et al., 2021). Vaccinations started from the beginning of 2021, but while some countries quickly proclaimed victory over the virus, many parts of the world still suffered from low vaccination rates, declining vaccination effectiveness and uncontrolled spreading by the end of 2021. Australia and New Zealand, who initially managed to limit the number of cases by lockdowns and strict border control, were forced to impose new strict lockdowns in late 2021. As new strands of the virus emerged around the world, the longevity of the pandemic became increasingly clear.

Strategies to combat COVID-19

Strategies to combat COVID-19 have involved restrictions on mobility to varying degrees. Many cities and countries put restrictions on who could make a trip (prioritizing essential workers), on trip frequency, or on the purpose of the trip (Zhang et al., 2021). Complete lockdowns or restrictions of public transport services were also common, e.g., in China and India (Gkiotsalitis and Cats, 2021). Depending on legal issues and public acceptance, some countries, e.g., Sweden, opted for strong public recommendations to avoid public transport if possible (Jenelius and Cebecauer, 2020).

Strategies on the supply side also varied substantially, as some cities (e.g., Stockholm) kept supply at nominal levels in order to avoid crowding while others (e.g., many US cities) reduced service levels in response to lost fare revenues. While Swedish regulations did not allow public transport authorities to deny anyone entering a vehicle, elsewhere ridership was restricted to, e.g., at most 15 passengers per bus in Denver and at least two-meter distancing in the UK (Gkiotsalitis and Cats, 2021). In order to reduce transmission risk, significant efforts were put on cleaning vehicles, sterilising contact areas, improving air filtration, installing protective screens, opening windows in buses when possible, etc. Some bus operators introduced rear-door or multi-door boarding to reduce crowding and protect drivers (Vitrano, 2021).

Face mask mandates were widely introduced to further reduce transmission risk. There is evidence that the use of face masks significantly increases protection from droplet and aerosol transmission (see, e.g., Vitrano, 2021). Some actors, including the Swedish Public Health Agency, were long against mask mandates and argued that the masks are difficult to use correctly, provide a false sense of security, and could be put to better use elsewhere. Other argued that the seriousness of the Covid-19 illness justifies the mask mandate even if the effects are contested (Greenhalgh et al., 2020).

Ridership and Mode Share

Public transport ridership was severely affected by the mobility restrictions and social distancing requirements. As an illustration, Figure 1 shows the relative daily public transport ridership in

Stockholm, Sweden during 2020 and 2021 compared to the pre-pandemic levels of the corresponding days during 2019. The numbers are based on ticket validations at station gates, platforms and on-board buses. From 17 March 2020, bus passengers had to board through the rear doors to reduce the exposure of the drivers. Since ticket validation machines are generally installed at the front door, this means that ticket validations on buses dropped to almost zero (Jenelius and Cebecauer, 2020). Boarding through the front doors was gradually reintroduced between January and June 2021 as protective measures were installed, and since then, ticket validations again reflect actual ridership.

[FIG 1 HERE]

The lowest ridership levels, circa 60% lower than normal for metro and trains, were reached immediately after the first public interventions in March 2020. After a recovery between June and October, the second wave hit Stockholm in late 2020. Between January and June 2021, facemasks were required for travelling during peak hours. Ridership bounced back somewhat again during mid-2021 as vaccination rates increased and regulations were relaxed, but were still circa 30% below normal levels for buses and metro and even lower for commuter trains, trams and light rail transit (LRT).

The trends in Stockholm are in many ways representative of patterns observable around the world. During the first phase of lockdowns, ridership decreased circa 80%-95% around the world, followed by a slow recovery towards 50% of normal levels. The trajectory has varied between regions; while Asian metros had returned to approximately 30% loss of ridership by July 2020, European and American were still 50% and 70%-80% below normal levels, respectively (Vickerman, 2021).

While public transport ridership plummeted, many cities reported increasing numbers for walking, cycling and shared micromobility services. Private car travel, which saw a decline early on, made a considerably stronger recovery than public transport, while taxi and ridesharing services suffered severe customer losses. Overall, the public transport mode share has declined during the pandemic, with the largest share of travellers lost to the private car (Beck et al., 2020; Orro et al., 2020; Molloy et al., 2021). A survey among Canadian commuters found that public transport users were most likely to change commute mode to avoid COVID-19 risk. Around 18% of these continued to use public transport, while 13% shifted to private car and circa 3% each to walking and cycling, respectively (Harris & Branion-Calles, 2021).

Equity Effects

Studies from around the world (e.g., Stockholm, Barcelona, Chicago, Toronto and Vancouver) have found that the effects of the pandemic on public transport use differ substantially among social groups. Women have continued to use public transport to a greater extent than men and have experienced larger accessibility losses when avoiding the mode. The propensity to continue using public transport has been higher among people in lower social groups in terms of income, employment rate, education, etc. (Almlöf et al., 2021; Hu and Chen, 2021; Mejía-Dorantes et al., 2021; Palm et al, 2021). These effects likely arise from a combination of factors, including a lesser ability to work from home and lower access to private car options (Hasselwander et al., 2021). Further, people with disabilities have encountered greater than average challenges, as paratransit services were also reduced (Palm et al, 2021; Ashour et al., 2021).

Revenues and Costs

Public transport agencies and operators around the world have suffered severe economic losses during the pandemic because of declining ticket sales (de Palma & Vosough, 2021; Vickerman, 2021). In some cases, mandatory rear-door boarding have caused additional fare losses as ticket validation machines have not been moved, and fare evasion has increased. Systems that rely on fares to a

larger extent have been particularly vulnerable. On the other hand, increased costs for health care and needs in other sections have strained authorities' ability to maintain subsidies to public transport services. Some governments have provided short-term funding support to public transport.

In Stockholm, for example, the drop in ridership and ticket validations led to a 39% decline in fare revenues during 2020 compared to 2019. Despite a governmental support grant of 1,325 MSEK (approximately 150 million USD) and other temporary income sources, total revenue including subsidies decreased circa 6%. Meanwhile, service levels and costs remained at pre-Covid levels, which turned a net profit of 569 MSEK (approximately 60 million USD) in 2019 to a net loss of -1,087 MSEK (approximately 120 million USD) in 2020. Revenue losses occurred also in 2021 and are expected for the next few years (Hultén et al., 2021).

Beyond the Pandemic: Emerging Trends

Rather than being a short parenthesis, the pandemic and the imposed restrictions on human mobility have lasted multiple years in many parts of the world. Consequently, the fear of the virus itself as well as the countermeasures have had a long time to influence people's preferences, behaviour and choices. Many of these effects can be expected to last long after the pandemic has subsided and restrictions are lifted.

With the help of surveys, researchers have investigated people's expectations and intentions for their own travel behaviour beyond the pandemic. In a multinational survey, Bin et al. (2021) find that the self-reported likelihood of maintaining new online shopping habits is higher among females than males. The likelihood for keeping remote work habits is lower among females than males, but higher among individuals that are full-time employed or have children. Similarly, Conway et al. (2020) find that behavioural adaptations among highly educated people in the US may persist after the pandemic, including a shift from physical to online shopping and from public transport to walking and biking. In Australia, Beck & Hensher (2020) report that many intend to continue working from home to a greater extent than before the pandemic.

Zhang et al. (2021) conducted a world-wide survey among experts regarding the long-term changes in lifestyle and society. Most experts agreed that remote work (work from home, satellite offices, cafés, etc.) and online shopping will remain popular and that car dependence will increase (in particular in the US and India), although there also some who disagreed. Most experts also expected that both inter- and intra-city business trips for meetings will be increasingly replaced by online meetings. Only about one out of five experts expected migration out from the major cities. Small majorities of the experts forecast that lessons from the pandemic will lead to significant changes in cost structures and policy-making, and to strengthened interventions from governments, in the sector transport.

Virus Anxiety and Travel Regulations

The risk of being infected by the SARS-COV-2 virus while using public transport has been and is still a subject of debate. Several studies have found correlations between public transport ridership or transport accessibility on the one hand, and new Covid-19 cases on the other hand (Carteni et al., 2021; Fathi-Kazerooni et al., 2021; Gaskin et al., 2021; Hu and Chen, 2021; Zhang et al., 2020). However, while these studies indicate that higher mobility leads to greater spreading, only few studies have identified a higher infection rate during the public transport journey itself (Shen et al., 2020). After analysing air and surface samples from buses in Italy during May 2020 and not detecting any SARS-COV-2 virus present, Di Carlo et al. (2020) concluded that the imposed mandates on wearing facial masks and hand washing had been effective.

Nevertheless, anxiety for Covid-19 has been common among public transport users during the pandemic, and also a reason for avoid the mode among car users (Dong et al., 2021; Elias & Zatzmeh-Kanj, 2021; Musselwhite et al., 2021; Rothengatter et al., 2021). Negative perceptions of public transport, in particular in crowded conditions, and social distancing restrictions can be expected to remain for some time and lead to a loss of travellers to private cars, walking and biking (Batty, 2020). On the other hand, evidence from earlier crises for public transport, including the terrorist bombings in Madrid and London and the SARS pandemic, suggests that the fear is prominent only circa 4-8 months past the event (Prager et al., 2011; Hultén et al., 2021). The long-term impacts of virus anxiety may thus be small, and other adjustments made during the pandemic to avoid the virus may be more influential.

It is also possible that increased travel regulations such as mask mandates have a negative impact on peoples' travel experiences and perceptions and reduce ridership as a result. Furthermore, discussions are emerging in some parts of the world about vaccine mandates for public transport users. While potentially reducing transmission risk and virus anxiety, this would impose further barriers on travel, increase dwell times and exclude users without valid vaccination passes, which could have considerable negative efficiency and equity effects.

Working from Home

Closed offices and mobility restrictions have forced many to work from home during the pandemic. On the one hand, this has been associated with health problems due to, e.g., poor work environment, isolation, and spill over between work and leisure time (Wright et al., 2021). On the other hand, many people with favourable work conditions at home have experienced positive sides such as avoiding the daily commute, which has freed up more time for work or leisure (Beck & Hensher, 2020). Remote meetings through various digital platforms have become common practice for many people (Nathan & Overman, 2020).

As people adapt their life styles and the technology for online communications continues to improve, telecommuting will likely remain common even after restrictions are lifted. Barbour et al. (2021) find that nearly 50 % of respondents in a US-wide panel conducted in July-August 2020 who started working from home during the pandemic are willing to continue work-from-home. Of course, the possibility to work-from-home also depends on to which extent the employer allows it, which will vary significantly among work cultures and industries.

While public transport traditionally has its strongest market segment among commuters, sustained telecommuting would lead to a long-term loss in ridership especially during peak hours. However, other types of trips could increase during off-peak hours (Trafikanalys, 2021). The traditional sharp morning and afternoon peaks in public transport demand is major challenge for financing, since the resources needed to serve the peaks are redundant and underutilized during off-peak hours. A flattening of the peaks from fewer commute trips and more off-peak leisure trips can thus lead to a more efficient use of resources and considerable savings in subsidies.

De-urbanisation

In some parts of the world, the increased time spent at home has given rise to a demand for more spacious housing, such as an extra room to use as home office. Furthermore, the extra leisure time from avoiding the commute has spurred a demand for houses with gardens and closeness to nature. At the same time, the removal of the commute and the negative perception of crowding have decreased the desirability of living close to the workplaces in the urban areas. These factors together have led to a de-urbanisation movement and a surge in demand for suburban and periurban neighborhoods that may continue for some time (Kleinman, 2020).

Since home location choices are long-term decisions, they will have long-lasting effects on public transport ridership. As people move out from the city centres and commute less, ridership on central lines, where public transport is traditionally most competitive and cost-effective, may decrease. Meanwhile, low public transport supply in remote areas may further shift demand towards private car use (Hultén et al., 2021). The geographical shift in demand patterns means that the design of the transport network will be an important consideration, with a potential redistribution of supply from central to more remote areas.

Financial Challenges

The loss of fare revenues has put many operators in financial difficulties, which are likely to continue as long as ridership remains low. Further, calls for lower crowding levels and higher cleanliness could increase operating costs. In the context of the deregulated, competitive UK market, Vickerman (2021) notes that it becomes the responsibility of the local authority to provide socially necessary services if private operators withdraw from commercially provided routes. Given limited government budgets and other pressing needs for support, it is unlikely that the funding required for maintaining the same level of service will be available. Thus, Vickerman (2021) argues that not only short-term financial support is required, but that more fundamental changes are needed to keep operations viable in the long term. This involves comprehensive, self-financing urban transport plans including road pricing, investments in walking and biking infrastructure, and the implementation of MaaS systems.

In Sweden, the national government has become an important funder of public transport during the pandemic, which is typically a responsibility residing at the regional level. The subsidies have been conditioned on a requirement that service supply not be reduced. Hultén et al. (2021) note that continued government funding may be needed to keep up service levels if demand remains lower than before. This shift in roles would create a new power balance between the regional and national institutions. The regional public transport authorities will struggle to manage the financial deficits on their own without implementing large ticket price increases, which would in turn reduce ridership (Andersson et al., 2021).

One way of adapting to new commuting habits is to introduce new ticket products (Hultén et al., 2021). During 2021 several Swedish regions have introduced tickets that allow ten trips within 30 days at a lower price than a conventional 30-day pass, with the intention to attract people that work from home a few days per week.

Effects on Long-term Trends

The question currently on many operators', planners' and politicians' mind is whether, and how, the trends emerging from the pandemic will change the long-term future for public transport. In other words, what will be the "new normal" that society eventually settles on?

Rather than making precise forecasts, some researchers and analysts identify a number of possible future scenarios and discuss the implications in case each scenario would come true. Hultén et al. (2021) sketch four scenarios with respect to the demand and the institutional frameworks for public transport: In the "Return" scenario, travel demand soon return to pre-pandemic levels, and public transport maintains its position. In the "Downward spiral" scenario, demand persists at low levels compared to before the pandemic, whereas the framework is characterized by business as usual. Here, reduced fare revenues force supply to be reduced while increased subsidies are needed to fill the deficits. As there is little development of MaaS systems, public transport loses mode shares to private cars, biking, walking and e-scooters.

In the “New mobility system” scenario, Hultén et al. (2021) foresee a similar reduction in demand, but the introduction of MaaS solutions maintains the overall market share for the shared modes. Finally, the “Public transport as backbone” scenario involves a return of passengers coupled with innovative thinking, political ambitions and increased funding for shared modes. Here, people travel less, but public transport is the core of the transport system and owning a car is less common.

Sustainability and Shared Mobility

Many studies indicate that the shift from public transport to private cars will continue for some time after the pandemic (Hultén et al., 2021; Trafikanalys, 2021; Zhang et al., 2021). This creates a clash with the development towards sustainable urban transport. On the other hand, the disruption of the pandemic creates a unique window of opportunity for actions such as allocating more urban space to walking and biking (Gutiérrez et al., 2020).

As long as social distancing is enforced and crowding anxiety persists, investments and subsidization of shared micromobility modes such as shared bikes and e-scooters can encourage sustainable travel (Pase et al., 2020). Kanda & Kivimaa (2020) remark that the anticipated reduction in travel and increased work from home could reduce the need for private car ownership in favour of MaaS solutions. Hensher (2020) considers two future scenarios when it comes to the post-pandemic role of MaaS. In the first scenario, travel with all modes returns to pre-COVID levels within a few months. Under this scenario, he expects MaaS to recover in a similar way. In the second scenario, staggered work hours and home-based work is widely implemented across sectors. Here, new types of service bundles are required to align MaaS with the new demand patterns, such as a micromobility option for short trips, and higher flexibility in subscription period (Hensher, 2020).

Equity

The pandemic has brought inequalities among public transport users into focus by clearly separating captive from non-captive travellers. The ability to work from home will continue to differ substantially among job segments and depending on housing and family conditions. A reduction in overall public transport demand followed by reduced services or increased fares risk having a negative effect on social groups who depend on public transport, such as predominantly working-class neighborhoods (Gutiérrez et al., 2020). Several studies highlight the need to adjust service levels based on socioeconomic needs in different geographical areas to maintain high level of service and limit crowding for vulnerable travellers (Hu & Chen, 2021; Almlöf et al., 2021).

Automation

By removing the driver, autonomous vehicles have the further advantage of reducing health risks of staff and passengers, which could make them more popular (Kanda & Kivimaa, 2020). The need to reduce operating costs in the face of lower fare revenues could advance the implementation of autonomous and on-demand public transport services. On the other hand, short-term budget constraints could put such investments on hold and delay the development.

Discussion and Conclusions

This chapter has sought to outline some of the dominant trends within public transport, the most significant effects of the pandemic, and scenarios for the future. While the chapter has approached the topic at a general level, it is important to note that the conditions that shape the future of public transport vary considerably between different parts of the world (e.g., between developed and developing countries, and between towns and mega-cities). Hopefully, the concise overview here can give the reader a starting point for delving deeper into the topic in a specific context.

The pandemic has been more persistent than most authorities foresaw at its beginning. The longer that virus anxiety, mobility restrictions, mask mandates etc. are in effect, the more persistent the changes in behaviour, preferences and attitudes can be expected. Emerging trends such as less commuting and financial struggles are likely to influence public transport for many years to come. The sector is at risk of entering a downward spiral where lower ridership leads to lower service levels or higher fares, which further reduces ridership, and so on. This, in turn, is likely to have negative effects on social equity in mobility and ecological sustainability.

Of course, the future is not just subject to forecasting but is influenced by our actions. Attention should now be turned to what society can do to restore and develop the public transport option. In terms of governance, the call for more adaptive and context-aware approaches by Hirschhorn & Veeneman (2021) is highly relevant. On the more practical side, innovations in the management of supply, demand and crowding can help increase the efficiency of the system while respecting physical distancing restrictions etc. (Hörcher et al., 2020; Gkiotsalitis & Cats, 2020; Tirachini & Cats, 2020). To limit the loss of fare revenues, Andersson et al. (2021) propose bundles of policy changes and other actions at the national, regional and local levels in Sweden. Actions at the local and regional levels include increased fares, moving supply from low-ridership to high-ridership lines, traffic planning actions to increase mobility, time-differentiated ticket prices, changed start times for schools and workplaces, increased advertisement revenues, increased manual ticket validations, new ticket types and increased tax financing of public transport. Actions at the national level include removing the benefit tax on public transport passes, removing the VAT on public transport tickets, increasing fuel taxes earmarked for public transport and increased tax financing.

Several researchers see the pandemic, and the induced behaviour and exposed problems that have followed, as calls for substantial changes in urban transport planning (e.g., Lyons, 2021). Earley and Newman (2021) remark that the negative perception of public transport during the pandemic can be a spark for governments to rethink current strategies and develop the quality, business models and services of future public transport. Budd & Ison (2020) call for a new “responsible” agenda for policy, planning and operations, involving safe, secure and equitable mobility that brings social, economic and environmental wellbeing to the front and enables individuals to make considered transport choices. A continued development and integration of sustainable mobility services, with public transport as a central actor, is widely seen as key in this ambition.

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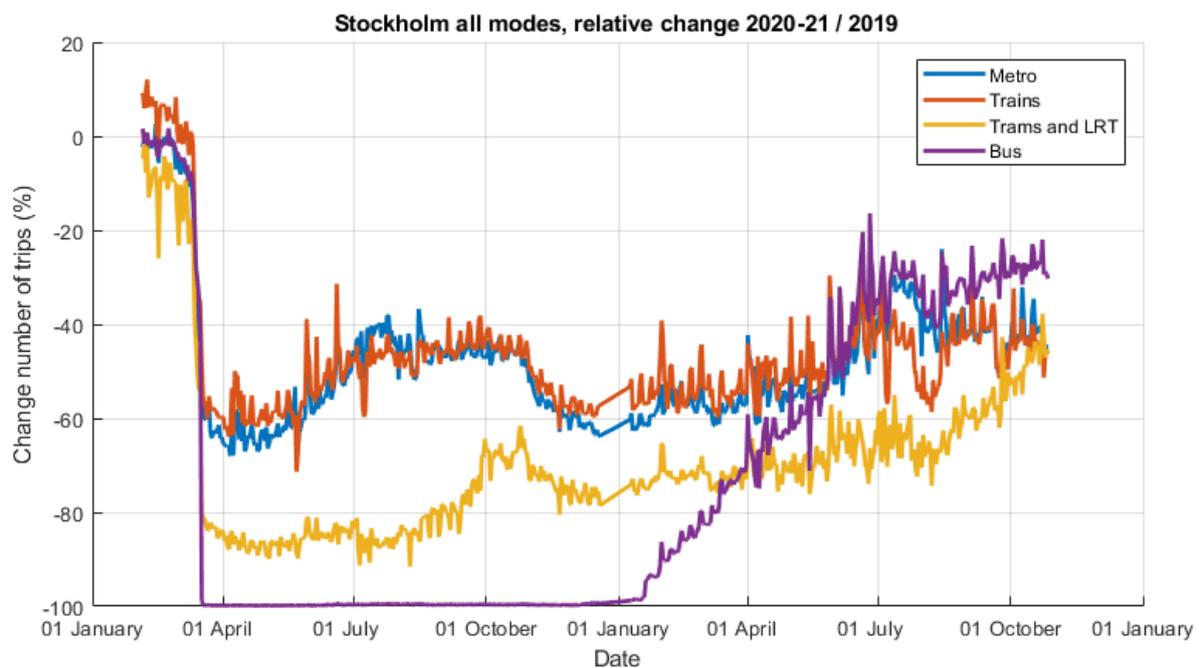


Figure 1: Daily ridership in Stockholm, Sweden for different public transport modes. Relative change from 2019 to 2020-2021. Data from Region Stockholm Transport Administration.

