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World Bank

Best Practice in City Public Transport authorities' responses to COVID-19

A Note for Municipalities in Bulgaria

Note: May 05, 2020

EXECUTIVE SUMMARY

The lockdowns, sharp fall in economic activity, and perceived fear that use of public transport may increase the probability of infection, or even official advice not to use public transport, have all led to considerable and speedy falls in its use in cities worldwide. Cities in Bulgaria do not seem to be an exception to that.

This Note covers the issues around this challenge, with its core being how best to support the Safe and sustainable continuance of urban public transport. The fundamental principles of the Public Transport Management Response and Communication around the Pandemic are central here.

The Note also covers the issue of how best to resume Full Public Transport operation but in the context of Sustainable mobility at the city's heart. Another area covered is how to exploit Digital technology and 'Smart' infrastructure to monitor and to help control the spread and withering of the Pandemic.

Lastly there are some specific take-aways from global Best Practice for cities in Bulgaria.

0. Introduction

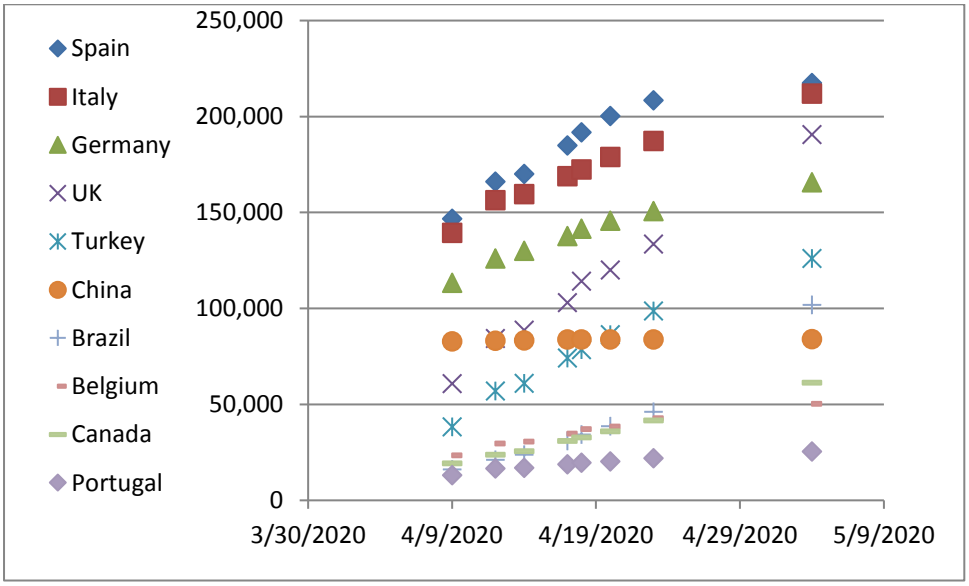
Local governments have been heavily impacted by the COVID-19-induced drop in economic activities in the urban space, and while this has driven many sectors of the local economy to a full stand still, local governments have an obligation to keep vital sectors working, including Public Transport. This sector is especially important not only because it is the means by which staff in other vital and continuing parts of the economy can get to work, but also because it enables access for those without a car to reach those essential facilities for which home-delivery is not possible or is not realistic. However, whilst the frequency of urban public transport has been reduced to meet the drop in patronage and make savings, local governments are facing a serious cashflow problem and are struggling to keep up with the funding of such reduced services. This is the result of a combination of severe reductions in both businesses tax revenues and fares income.

As a response to this severe challenge, this World Bank Note details how Best Practice cities have addressed the issues of how to respond to the public transport aspects of the COVID-19 pandemic, in both Financial and Operational terms. The core of the Note deals with how best to support the **Safe and sustainable continuance of urban public transport;** but the Note also covers the issues of 1) how best to **resume Full Public Transport operation but in the context of Sustainable mobility at the city's heart**, and 2) how to **exploit Digital technology and 'Smart' infrastructure** to monitor and to help control the spread and withering of the Pandemic. It starts, however, with firstly information about **Travel responses** and then some fundamental principles of **Public Transport Management Response and Communication** around the Pandemic.

It is the intention to update this Note at appropriate times in response to further developments as the Pandemic proceeds.

1 City Responses – Decrees regarding travel and behaviour, and Travel Patterns in response to the Pandemic

The spread of the virus is shown in the following graph. This indicates a still upward trend except for China.



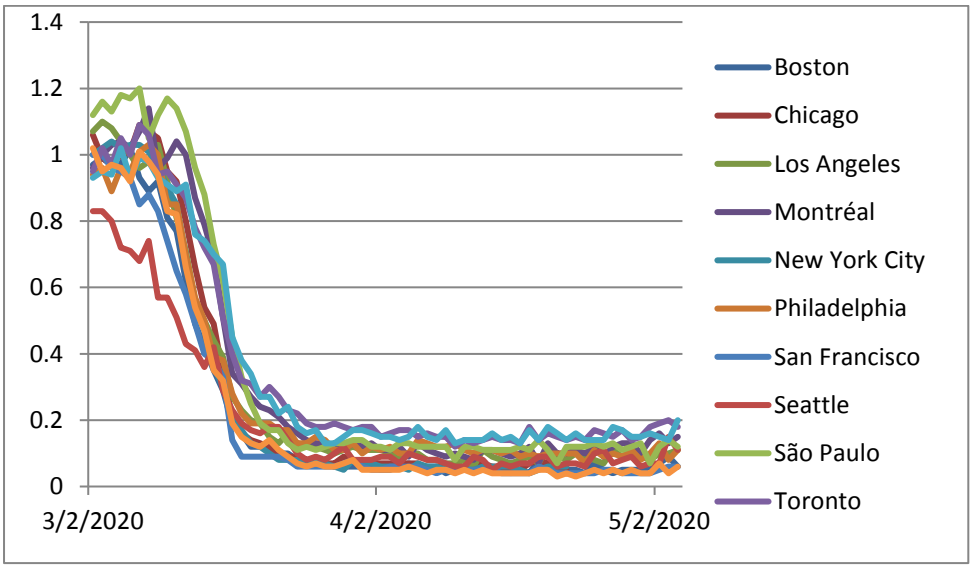
Spread of number of cases of Coronavirus in some major countries between 9th April and 4th May. Excludes USA which is considerably higher than other countries. Cases in Bulgaria rose from 593 to 1,081 over the same period.

The table below shows lockdown orders in various major cities, and instructions regarding behaviour of passengers as at 26th March 2020. In Bulgaria the Health Minister issued an order that *"from 12 to 26 April, all persons, while at indoor or outdoor public places, including public transport vehicles, shopping facilities, parks, churches, monasteries, halls, streets, bus stops, etc., are required to put on a protective mask,……. or some other article covering their nose and mouth ……".* Requirements regarding wearing of face masks vary greatly between different countries.

Country / City	Situation re Lockdown	Requirements for Passengers
Belgium : Brussels	National recommendations from early March, changed at mid-March to national requirement for lockdown	Passengers are required to stand/sit at least 1.5m apart
Denmark: Copenhagen	National recommendations from early March, changed at mid-March to national requirement for lockdown	Passengers are encouraged to spread out on the bus and keep away from driver
Germany: Hamburg	National recommendations from mid-March, changed at late-March to national requirement for lockdown	No access to buses by the front door; tickets also no longer sold by the driver.
Spain: Madrid	National recommendations from early March, changed at mid-March to national requirement for lockdown	Buses advised to carry no more than 25% passenger capacity
UK: London	National recommendations from late March, changed a week later to national requirement for lockdown	Public transportation is only for essential travel. From late April, where the bus has two doors passengers must use only the middle one.
USA: New York City	Lockdown from mid-March	Public transportation is only for essential travel. Passengers must remain 6ft from other passengers

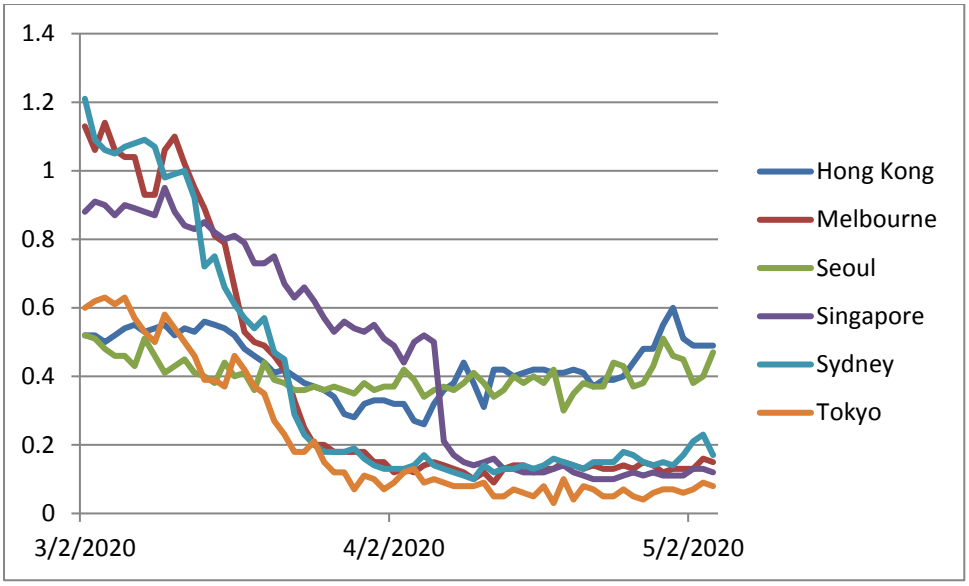
The graphs below show change (reduction) in travel by modes other than a private car since the beginning of March. Cities in America have shown very steep declines, while cities in Asia and Australia have had much more gentle reductions. Europe generally is similar to the Americas, though slightly sharper: of course Milan was starting from an already low base at the beginning of March because the Coronavirus had started there much earlier.

We know that Sofia has had similar reductions in usage to other cities in Europe, although perhaps slightly smaller (usage has only fallen to about 20% in Sofia, compared to the 15% of normal use experienced elsewhere).

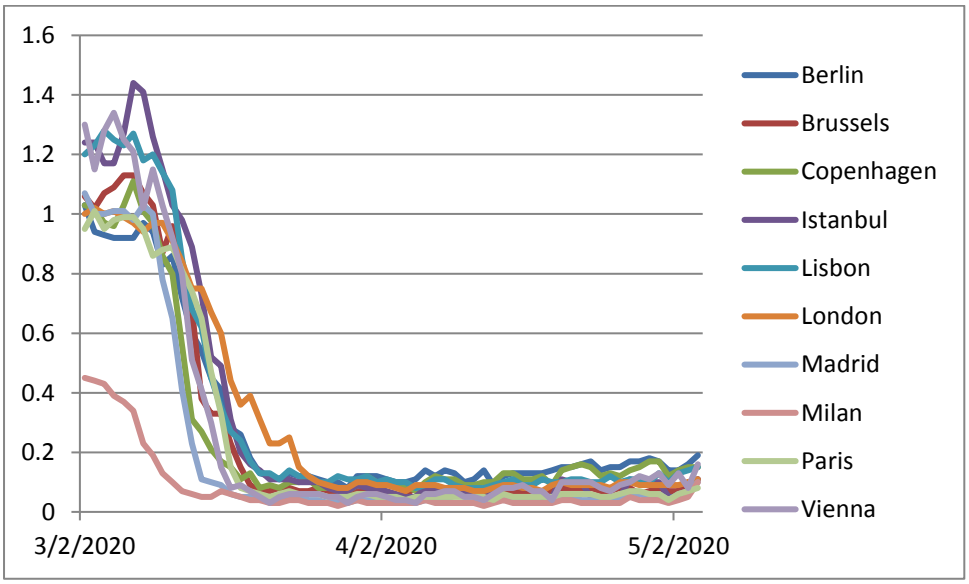


***Cities in the Americas**: Citymapper Index of Public Transport Travel, Walking, Cycling & Taxis compared to a typical 'average' 4-week period. Data obtained from www.Citymapper.com/CMI*

What is interesting in the figures for Seoul, where the authorities have been relatively successful in controlling the spread of the virus, and in Hong Kong, is that while public transport use has increased slightly at the end of May its growth has been very uneven and variable. This perhaps gives some indication of trends in urban public transport use as countries emerge from the pandemic.



Cities in Asia and Australia: Citymapper Index of Public Transport Travel, Walking, Cycling & Taxis *compared to a typical 'average' 4-week period. Data obtained from www.Citymapper.com/CMI*



Cities in Europe: Citymapper Index of Public Transport Travel, Walking, Cycling & Taxis *compared to a typical 'average' 4-week period. Data obtained from www.Citymapper.com/CMI*

Regarding congestion generally, there is still congestion at peak periods in Sofia, although it is much reduced compared to this time last year. Peak period levels of congestion are running at about 30% compared to 70% in 2019.[i]

General travel changes in Bulgaria during the Covid-19 crisis are shown in reports by Google.com, the latest at the time of writing being for April 26th.[ii]

2. Public Transport Management Response and Communication

The **integration of pandemic planning with existing crisis management structures and procedures** is fundamental in order for it to be effective. This is stressed by UITP in its *'Management of Covid-19: Guidelines for Public Transport Operators'*.[iii] In the USA, APTA recommends both a Contagious Virus Response Plan (CVRP) and, once an outbreak reaches pandemic proportions, the implementation of a Continuity of Operations Plan (COOP) to provide comprehensive response planning.[iv] The CVRP should include the following elements:

- Identification of alert phases that trigger specific action
- Information and education program
- Disinfection program

- Sanitary aid to limit spread
- Vaccine/antiviral medications, and
- Service reduction, shutdown and restoration

Service reduction planning should identify indicators that will be monitored with regard to ridership and employee availability and include the strategies for a service reduction. There should be clearly stated and understood objectives regarding the corridors over which the maintenance of service should be prioritised. UITP (in an Open Letter - joint with POLIS, CER, IRU and Eurocities)[v] also states that cities should **adapt the level of service according to the reduction of travel demand** in line with regular business procedures and with decisions taken by public authorities, and should **provide dedicated services to healthcare personnel and any other category of personnel falling under essential services.** Examples of such policies include:[vi]

- San Francisco Muni, which is prioritizing equity and access to medical facilities during the pandemic.
- Pittsburgh Port Authority which maintains an off-peak service, preserving frequency on routes that serve medical facilities and essential workers
- Boston's MBTA, which prioritizes medical facilities and routes experiencing crowding, trimming its service on routes serving commuters who can work from home
- Brighton & Hove bus company, the operator for the city of Brighton, UK, which has added earlier journeys to the standard Sunday service being operated on some routes, particularly for key workers going to the Royal Sussex County Hospital.[vii]

The UITP's *'Management of Covid-19: Guidelines for Public Transport Operators'* also states that it is crucial to involve business units directly into this planning, as they know best themselves which are critical supplies, personnel or functions, and that is also advisable to involve unions into the planning and decision-making process at a very early stage. Shenzhen Bus Group (SZBG), in China, established an Emergency Health and Safety Working Group, an Emergency Human Resources Working Group and an Emergency Property Management Working Group in response to the epidemic. It also set up a 24-hour emergency monitoring room for epidemic prevention and control which covers all operations.[viii]

Another aspect of management response is **on-demand solutions**, which have been welcomed by UITP. Its secretary-general, Mohamed Mezghani, is quoted as saying: *"On-demand services offer the needed flexibility to optimize the use of bus fleets and the occupancy of vehicles while keeping social distancing. Combining the experience of a public transport operator with the expertise of an urban mobility app provider is very helpful.*" Moovit's solution in this space is an Emergency Mobilization On-Demand service, created for public transport operators, which is claimed to turn road-going vehicle fleets into an on-demand service to get key workers to their destinations. Riders, using Moovit's smartphone app, request an on-demand or pre-scheduled ride, as well as selecting pickup and dropoff locations. Algorithms then create a journey allowing multiple riders to share the ride, with dynamic routing and scheduling".[ix]

A key element of management action in response to a pandemic is **Communication and Training**. Shenzhen Bus Group has established a clear and unified information and communication media platform. This involves the establishment of an Emergency Media and Information Working Group, the publication of reliable information about the proper usage of PPE and of other materials used against the virus, and publishing daily information on the general media platform related to the virus and its own various SZBG media platforms.

SZBG publishes for its staff various Online Training Courses on Virus Prevention and Control, including '*Mobilisation Measures against Covid-19'*

Communication has also been a central feature of the response of Seoul Metro which has a number of Wider Public Campaigns for the Public Awareness.[x]

3. Extra financial support provided to Public Transport State-Owned Enterprises and Private companies

In China certain **financial regulations have been specifically rescinded for transport enterprises** that have performed emergency transportation tasks during the epidemic prevention and control period as part of the public services procured by the government.

In Europe the European Commission has indicated that **direct compensation for damages suffered due to the covid-19 outbreak for companies active in sectors that have been particularly hit (e.g. transport, tourism and hospitality or organizers of cancelled events) would be authorized** even though they are state aids, which are typically prohibited in the EU.

In the UK the preference was for adhering to the Chancellor's first principle about cross-economy solutions rather than sector specific ones, but the Department for Transport (DfT) has recognised that the public transport industry has been particularly badly hit by the pandemic. While a case has been prepared by the DfT for emergency support for Light Rail systems and is awaiting a response from the Treasury development of a package is problematical because of the different financial regimes under which the different systems operate.

Regarding bus in England, UK (outside London), where the market is deregulated and nearly all operations are run by private companies) a single national system has been agreed (covering both urban and rural services). Bus Service Operators Grant, equivalent to a rebate on fuel duty of around £251m, will continue to be paid based on estimated pre-pandemic service levels. In return, the government has requested that all bus operators allow use of concessionary passes (for elderly and disabled people) all day; previously this was limited to travel after the morning 'peak'. The government will also urge local authorities to continue payments for tendered bus services and concessionary fare reimbursement at pre-pandemic levels.

The additional UK pandemic funding package, agreed with bus operators, will see £167m paid over three months to keep key bus routes running, in the form of a **COVID-19 Bus Service Support Grant (CBSSG).** As a condition of the money, bus operators will need to maintain services at 50% (a level deemed as enough to meet reducing demand, while allowing space for passengers to practice self –distancing). Local authorities will also have access to £30m to maintain existing services: this was originally earmarked for starting new services.[xi]

Generally, in the medium to long term, worldwide, additional support measures may be required to tackle long lasting challenges. Even after the epidemic is under control, the current outbreak may be a catalyst for more permanent structural behavioural change by users, reducing long term demand for urban public transport, even with supportive actions that we cover in section 8 of this Note below.

In response to that situation the World Bank is proposing five general time-based types of financial support measures for urban public transport systems, as follows[xii]: (not all would be relevant to an equal extent to Bulgaria)

- **Immediate:** Conduct quick top-down and bottom-up financial analyses to estimate revenue losses, payment gaps, liquidity needs, and solvency capacity for public transport authorities, operating companies, and other service providers.
- **In around 30 days:** Deploy instruments for liquidity support, including cash injections through supply-side subsidies or adjusting per-km fares. Provide fast-disbursing credit lines offering guaranteed, low-interest loans to support short-term working capital needs.
- **- 4 months:** Develop institutional, policy, and financial packages to help informal transport service providers. These could help catalyze formalization and corporatization programs. This measure should also include favourable exit strategies for informal operators.
- **- 6 months:** Improve technical fare structures (i.e., paying for operations, fare collection, system management, or infrastructure availability) and boost complementary, non-fare sources of funding (commercial real estate, advertising, parking charges).
- **Around 12 months:** Renegotiate, amend or prepare new terms for provision of public transport services. Update current contract structures (for example, disaggregating fleet provision form operation), performance-based remuneration metrics, and risk identification and allocation to strengthen the longer-

term solvency outlook for service providers. Review fleet upgrading programs (e.g., electric buses) and reprogram investments according to the new financial reality.

4. Non-financial support (e.g. capacity building, institutional and regulatory reforms) provided to Public Transport State-Owned Enterprises and Private companies

Capacity Building

In general terms there will be little need for capacity building during the pandemic; rather, there will largely be too much capacity because of the large cuts in supply of service, even with staff absences and Illness, that result from the pandemic.

However, in one major area extra capacity will be greatly needed and that is passenger information. Public transport information communication is generally rather poor during the pandemic, as services are being changed at a very high rate. There is a need not only for fast-response scheduling software systems but also for experienced and creative schedulers to use them. **A major requirement is for direct links from electronically-produced schedules to real-time information systems, to digital displays, and to social media channels.** Because of the inability and impracticality of updating printed information at stops and elsewhere (e.g. leaflets), simple notices should be displayed on all stops telling users to consult the operator's website and social media channels, which will need to be the main method of communicating with travellers.

Also, as **vehicle resources may be switched to new routes** (e.g. to provide access for hospital staff to new temporary hospitals constructed to deal with the pandemic) there will be some need for bus driver training for such new routes.

Institutional and Regulatory Reforms

Institutional and Regulatory reforms largely take the form of **relaxation of existing regulations and extension of validity of permits and licensing.** Examples include Austria, Denmark and Spain. In the UK, where the implementation of the law around bus operation is governed by the Traffic Commissioners, a flexible approach has been adopted in the administration and regulation of their functions, while maintaining safety standards. An example of this is providing bus operators with the ability to temporarily remove, reduce or alter services with immediate effect (while keeping customers and local authorities up-to-date on their plans), rather than needing to wait 70 days for approval. The European Commission also adopted a package of measures at the end of April 2020 allowing certain certificates and licences to be extended, as health measures made it difficult for some transport operators and workers to complete certain formalities required under EU law.[xiii]

5. Ensuring the safety of Public Transport employees who interact with Public Transport Users and are therefore highly exposed to virus infection

UITP guidance is that public transport is an essential service to provide mobility and that therefore the key objective for public transport operators has to be maintaining the operation. Consequently, public transport operators should focus their pandemic plan efforts on staff, trying to protect them and preparing to deal with absenteeism.

As mentioned in section 1 above, the key factor for successful control in the pandemic is planning. New York City Transit Authority (NYCT), which has an annual ridership of 1.763 billion passengers, has one of the USA's most robust infection control plans for a transit agency. Issued on October 22, 2014, the MTA NYCT Infection Control Manual provides managers, supervisors, employees, and contractors detailed procedures for controlling the spread of airborne and vector-borne pathogens in order to "prevent or minimize employee exposure to potentially infectious material in the workplace." [xiv]

Equipping with proper PPE (Personal Protective Equipment)

UITP acknowledges that the effect of respiratory masks is debated. However, the General Secretary of UITP points out that the obligation to wear face masks on public transport is simple to apply and logical for citizens to understand.[xv] WHO (World Health Organisation) is not advising the use of masks in public places and for those

working in supermarkets, waste collection, schools, transport and similar settings, and the guidance on this is followed by the UK. The general advice of the WHO is to wear masks when tending to an infected or potentially infected person. Public transport operators should obtain local and/or national advice on the use of masks and recommended types of masks. Staff that have to tend sick travellers, clean body fluids or potentially contaminated items and surfaces, should wear disposable gloves. The advice of the IRU (see below) is to wear gloves when using electronic ticketing tools or handling cash.

Along with prescribing requisite training to all staff members on the proper use of PPE, NYCT's Infection Control Manual tasks managers and supervisors with ensuring that employees handling infectious materials are equipped with PPE at all times. According to the manual, hand-washing facilities must also be made readily available and accessible to employees. Antiseptic hand cleansers are an acceptable alternative in environments where handwashing facilities are not possible.

Other Measures

Shenzhen Bus Group (China) insists that all staff on-board public transport and all inspectors have to compulsorily wear a face mask and have their temperatures checked before taking up duty. Shenzhen Bus Group also requires all passengers to wear a face mask before boarding buses, in order to protect not only staff but also other passengers. It also provides special Employee Assistance Programmes to provide counselling services to staff and free distribution of sanitary materials to all staff.

On Seoul Metro one important element of their pandemic crisis management was developing a Staff Evacuation Plan. Once a staff member shows any symptoms of COVID-19, the person is isolated immediately in a dedicated room staffed by an in-house nurse. Once the person is confirmed to have COVID-19, all of the staff in the team is evacuated and the work is carried out by a group of back-up team members to keep operations running smoothly and safely.

All drivers on London Buses, UK, are shielded from public interaction by a clear protective screen. Enhancements have been made on the majority of buses to ensure this screen provides even higher levels of protection, with a plastic film being used to cover holes in the screen. Extensive daily cleaning takes place across London's network, ensuring that 'touch points' on buses (including steering wheel, poles, doors and handles) are treated with antiviral cleaner (as used elsewhere in TfL) every night after the regular cleaning is completed. Bus garages and rest rooms are similarly treated daily. TfL has also asked customers to not sit in seats nearest to bus drivers and signs are now out on the network.[xvi]

After nine COVID-19 deaths of London bus drivers, middle-door only boarding was tested on some routes: over a four-week period. While most buses in London have both front and middle doors, passengers usually using the front ones for boarding. The trial was successful and as a result middle-door boarding was introduced on all the London bus routes where the bus has two doors. This has also been combined with the removal of the requirement for passengers to touch-in on the card reader, thereby making the buses free.

Other general recommendations from UITP are that cleaning routines may have to be adapted and increased focus should be put on disinfecting common surfaces and spots to touch as well as waste disposal. For working places, where no cleaning may be possible between shifts, employees should be equipped with the necessary means and be made responsible to remove any waste and disinfect surfaces before taking over as part of the routine.

Exclusively for its members, UITP now publishes *'Cleaning Procedures and Techniques: Case Studies and Practices against COVID-19 and additional references'.* This lists a number of general cleaning measures to protect staff and passengers in vehicles and stations[xvii], and stresses that a special focus should be put on touch zones (handrails, handgrips, seats, handrails, ticket machines, validation machines etc.). It points out the fact that disinfecting *per se* is a new addition to many protocols for cleaning, with some operators saying that previously they had only used 'regular cleaning products', which did nothing against the virus as they were not disinfectants, and had now changed to using disinfecting products.UITP advises that customer service staff should only be available in information booths or desks with sufficient distance from passengers. Rear door boarding should be introduced to temporarily replace

the front door access of buses, in order to protect drivers who do not have separate cabins. Ticket inspection during an outbreak should be abandoned for the period of the outbreak, as ticket inspectors would be exposed to a very high risk of getting infected, whilst they may also be valuable back-up staff for other critical positions

The IRU has published a bus driver checklist [xviii]which includes the following:

- Clean your driver's cabin and salon using disinfectant on a daily basis, preferably several times a day. Focus in particular on the inside and outside door handles, as well as the steering wheel and dashboard when cleaning the driver's cabin. Focus on individual head restraints and armrests of passenger seats and handrails when cleaning the salon/interior of the bus
- Ventilate the passenger compartment regularly at stopping points. If the temperature allows, drive with the windows open. Avoid using air conditioning or heating
- Wash hands with water and liquid soap for 30 seconds. Disinfect hands regularly before entering and after leaving the vehicle and after completing the required cleaning procedures
- Stay in the driver's cabin whenever possible while on duty unless otherwise required. If you must communicate with passengers, wear a protection mask and gloves.
- Maintain a good distance from passengers when communicating inside salon. Wear a protection mask and gloves and disinfect hands after each close contact
- Inform passengers about the importance of maintaining a distance of 1 metre from others. Monitor compliance, especially when identifying passengers with respiratory symptoms
- Be aware of the virus spreading through coughing and sneezing (via airborne droplets), as well as through direct contact
- If you or your family members show potential symptoms of COVID-19 such as a dry cough or fever, immediately inform your manager
- Follow any specific guidelines given by your company and general recommendations/ instructions issued by health authorities

At Metro Istanbul, cited as Best Practice by UITP[xix], work shifts for front line staff were coordinated so that they would not have to come in contact with each other, and various hygienic protocols came into effect to keep staff safe. In addition, Metro Istanbul started to apply administrative leave for employees with chronic health problems, disabilities, for pregnant women, and for those over 60 years in age, in accordance with local decree.

Another Best Practice operator cited by UITP is FGC, Barcelona.[xx] When the crisis began, temperature checks were instated for FGC staff, while shifts were reorganised to separate the staff into smaller teams, and all other activities were adapted to be done remotely in a work-from-home situation demand.

6. Health measures to put in place to protect Public Transport users

Shenzhen Bus Group sanitizes each operating vehicle after each service trip, especially seats, armrests and handles which come into close contact with passengers. Also In Shenzhen all buses are advised to carry not more than 50% passenger capacity to avoid close human contact, and. 14 temperature check stations have been set up in the bus loading areas of major transport hubs.

In collaboration with Seoul authorities, guidelines for the prevention of spreading the virus were printed and displayed in four main languages (Korean, English, Chinese, and Japanese) at Seoul Metro stations. The metros themselves were heavily and thoroughly disinfected on a daily basis, along with a full cleaning of the stations and platforms.

In Barcelona (FGC) more frequent and in-depth cleaning and disinfecting of all trains and facilities, especially those with surfaces often touched by passengers or staff, are still regularly conducted. Physical "touchpoints" were eliminated for passengers as much as possible, and thus, train doors open automatically at every station. They also strictly ensure a maximum occupation of 1/3 the normal capacity.

Shanghai is using Ultra Violet lamps in the bus cleaning bay to kill viruses, although the World Health Organisation advises that Ultra Violet rays can cause skin irritation.[xxi]

UITP reported the following safety measures for public transport users in major cities, as at end March

- Brussels: Passengers required to stand/sit at least 1.5m apart
- Toronto: On buses, passengers are using both front and back doors, but separation between those who pay via smart phone (to the back) and those who still have to pay cash (up front);
- Shenzhen: Recommend the wearing of face masks; Voluntary QR Code for tracing of health information; Temporary protective screen between bus drivers and passengers;
- Copenhagen: Passengers encouraged to spread out on the bus and keep away from driver;
- Toulouse: Boarding from bus front door not allowed.
- Berlin: Suburban train doors open automatically.
- Hamburg: As far as technically possible all doors will open at stops. For buses doors will open automatically following a request to stop (the "stop" button still remains in use). No access to buses by the front door, tickets also no longer sold by the driver. Toilets on the Ferry (WB) services are closed to reduce cross infection;
- Nuremberg: Metro: Automatic door opening where technically possible. Bus: No access to using the front door, tickets also no longer sold by the driver. The driver will not check tickets. Light Rail: Doors automatically open.
- Munich: Where technically possible, doors will open automatically.
- Milan: Level of service is being adapted to allow 1 meter distance between passengers.
- Madrid: Buses advised to carry no more than 25% passenger capacity.

An overview of the changed procedures that have been adopted by urban public transport operators in North America (regarding both section 5 above and Section 6) in the light of the pandemic are shown in a White Paper by WSP.[xxii]

7. Fare adjustment measures, etc.

Whilst global reductions in fares (or even removal of fares) can be considered as a way of attracting passengers to use public transport during the pandemic, this may be actually contrary to national policy. For instance, in the UK the current policy is for people to stay at home and therefore not to use public transport at all, unless the journey is essential. There are examples of free travel or reduced fares generally during the pandemic, e.g. Toulouse, but they are rare.

By contrast, the **reduction or removal of fares for certain essential or key workers is seen as Good Practice**. For instance, the Mayor of Greater Manchester, UK, has announced free travel on the Metrolink tram network for NHS and social care staff.[xxiii] Again in the UK, the partnership between the local transport authority (TfWM) and the bus operators has delivered free bus and tram travel for West Midlands NHS staff. [xxiv]

8. How to resume the Public Transport market post crisis?

The current message of "avoiding public transport" will need a very quick and sharp reversal as restrictions are lifted. That is done by making the perception of public transport as "safe, both for the passenger and the driver."

Part of that is enabled by equipping drivers with PPE and ensuring that social distancing is obeyed even after the virus has departed. Another feature of post-virus public transport will need to be simplicity, ease of understanding and reliability. **Digitalisation as a key feature of public transport will need to be central to it** in order to make public transport attractive. **This applies both to operation and to payment.** Public Transport will need to incorporate both fixed and flexible services, but both will need to be trusted: digitalisation is a key pre-requisite of that.

Another form of social distancing could be used at metro stations, where entry gates could be programmed to let in only a certain number of people at a time, as Milan is planning to introduce.[xxv]

The Integrated Sustainable Urban Transport Systems for Smart Cities project (Smart-SUT) has produced a manual of *'Standard operating Procedures (SOPs) for Bus Transport for post COVID-19 Lockdown'*[xxvi] which aims to build on the measures in sections 5 and 6 above to create an environment that safe for both staff and travellers and, importantly, engender the confidence that public transport post-crisis is safe. It has diagrams showing typical seat occupancy configurations post-Covid-19 in various size buses. However, it should be noted that it is aimed principally at the market in less-developed countries, does not necessarily coincide directly with current UITP guidance (e.g. on the wearing of face masks) and may not necessarily be entirely appropriate for the situation in Bulgaria.

The UK and South Africa 'virtual' operator, Zeelo, now also looking at markets in Italy and Ireland, is aiming to move large numbers of people at peak times over medium distances in shared vehicles, with the level of perceived safety mentioned above but at a higher level of flexibility and service. Acting as a broker, it hires in vehicles from bus operators, to develop 'smart' bus services in partnership with major employers, business parks or councils, to help them get their staff out of their cars and into bigger, cleaner vehicles. But to do this on a large scale it needs a variety of stakeholders to work together: municipalities, transport authorities, mobility companies, HR directors, property developers, land owners and many more.

Transitioning the resumption of the Public Transport market

A paper by WSP aimed at the Australian situation argues that the return towards higher levels of public transport use should be transitioned[xxvii]. It argues for three levels of transition, with a progression from 1 to 3 as the lockdown is reduced. Scenario 1, based on Australian Government guidance of 27th April, is 'Strict Distancing', with 1.5 metres between people and no standing. Scenario 2 ('Moderate Distancing') has 'no person sitting directly next to, behind, or diagonally across from another', with at least 1 metre between people. The 'Relaxed Distancing' of Scenario 3 allows for s gap between people on each seat row and at least 1 metre distance between people facing one another.

How to maintain competition with the car

Another aspect of the restoration of public transport is the redesign of cities, during the pandemic, in a way which pushes out the car, or at least makes it less attractive. Some cities have already started making these changes. The Colombian capital, Bogota, is adding 47 miles of bike lanes to reduce crowding on public transport and help prevent the spread of COVID-19 — as well as to improve air quality. New York City, which has witnessed a surge in cycling as people avoid public transport, has said it would install new bike lanes, while Mexico City is considering a fourfold increase to its cycling network. Extension of cycle networks, together with the opening of central urban areas to micromobility modes such as e-scooters, can make a city more attractive to public transport.

An important key to this is to focus public transport on core networks and design in 'mobility hubs', using micro-mobility solutions and bicycles as access modes from and to those mobility hubs. The mobility hubs also function as a network of gathering points for the sort of smart bus services that companies such as 'Zeelo' envisage, while the larger mobility hubs can also be interchange points on the spine of the core public transport network. The specific role of micromobility in the life of a city, particularly the way in which it could be used to interface with and support the role of public transport in delivering a sustainable transport offering for travellers, should be carefully considered.

Once coronavirus restrictions are relaxed, keeping social distancing in the bus and the train will require **smoothing the demand peaks**. The transport operators believe that a step-by-step approach and early coordination will be necessary so that the bus and train can make the preparations for the operational ramp-up in good time.

Spreading the peak can be assisted with tools such as fare incentives. An analysis of this is given in an article by Eric Jaffe on 'sidewalk-talk'.[xxviii]

How to protect vulnerable Transport (such as taxis) to retrieve their pre-crisis market share

Taxis are an important element of the urban transport mix, not only for delivering mobility but also for providing employment. One way of protecting them in the post-viral world is to find a way of using them during the pandemic but in such a way that it gives users security. In China this was done through using them to provide unique services in Shenzhen with stringent virus protection and control initiatives. "Minimal contact anti-virus taxis" have minimal physical contact between passengers and drivers and vehicles. Drivers are instructed to open and close doors for

passengers, seats are disinfected after each ride to ensure that the next passengers are protected, hand disinfectant dispenses are installed in all vehicles, and temporary screens are installed to separate passengers from drivers.

Disinfection of all vehicles takes place at least three times daily, before departure, between shifts, and after operation. All drivers are also asked to register via a QR code and application in order to trace their previous and subsequent movements.

The support of the taxi industry during the pandemic was also characterized by a substantially reduced monthly taxi rental fee as well as cutting the electricity charging service fee by half in the 10 charging stations operated by SZBG. This places taxi drivers in a better position once the market grows again.

9. What are the best practices to compensate transport businesses in an accountable and traceable manner?

Public transport operators may usually be contracted on bus kilometres driven, but will be impacted by the reduction in service frequency while having to pay the same amount of operating costs (leasing fees, depot rental, drivers' and other employees' wages, etc.). Compensating them will require traceable, auditable processes. The key principle is that payment should be based on what is both currently operated and what is 'normally' operated and that both figures and the relationship between them can be verified.

In the UK COVID-19 Bus Service Support Grant (CBSSG) is available to operators who are currently running between 40% to 50% of scheduled commercial mileage for a typical non-school week. Payments will be available for three months starting from 17 March 2020. The initial payment will be based on 2017/18 data submitted to the Department of Transport, with the following formula used:-

$$\frac{\text{2017/18 commercial BSOG live kilometres}}{52} \times 4 \times \text{Service level \%} \times £1.0051$$

By the end of the month operators in the UK will need to provide a list of services (including registration numbers), the live commercial kilometres operated and passenger details (split by fare-paying and concessions). The same information will be required for 2019 as a baseline. Operators will not be permitted to achieve an operating margin through CBSSG funding. Applications to register onto the CBSSG scheme should be made through DfT portal https://www.smartsurvey.co.uk/s/CBSSG_declaration/ by 13 April.

10. How to activate the *force-majeure* provisions to renegotiate the terms of Public Transport contracts between the Authorities and Operators

Force Majeure provisions could be used to renegotiate the terms of Public Transport contracts between the Authorities and Operators, but the **key principal in the pandemic is that there needs to be co-operation between the Authorities and the Operators** in order to achieve satisfactory continuance of the necessary public transport service. Whether *Force Majeure* provisions can be activated depends on the wording of the contract, but it is in neither the municipality's or the operator's interests if the public transport operator collapses because of the Pandemic.

11. Use of digital 'smart' infrastructure to trace the infected population, monitor movement and enforce confinement

With much of Europe at a standstill as a result of the coronavirus pandemic, politicians want the telecoms operators to provide data from smartphones on the spread of the virus. But the use of such data to track the virus has triggered fears of growing surveillance, including questions about how the data might be used once the crisis is over and whether such data sets are ever truly anonymous. Mapping how populations move between locations has proved invaluable, however, in tracking and responding to epidemics, including ebola in Uganda.

The strategies for reopening an economy before a vaccine is developed could involve monitoring the contacts of newly infected people, which will raise questions about how much curtailment of privacy societies are prepared to take. In South Korea, which is seen as a benchmark of how to control infectious diseases, the authorities can require telecoms companies to hand over the mobile phone data of people with confirmed infections to track their location. The data has enabled the rapid deployment of a notification system alerting Koreans to the movements of all potentially contagious people in their neighbourhoods or buildings.

Governments around the world are creating apps to gather more personal data, such as who is sick and with whom they have been in contact. Even the EU's General Data Protection Regulation, which was adopted in 2018, has a clause allowing exceptions for cases that are in the public interest.

The use of location data to track the disease has been applied in Italy, Spain, Norway and Belgium, with the UK, Portugal and Greece set to follow. In cities such as Madrid and Milan, telecoms operators have created heat maps that show how restrictions on movement are working and what effect the presence of police on the streets is having on behaviour.

In cities such as Madrid, telecoms operators have created heat maps that show how restrictions on movement are working. European telecoms companies remain adamant that the information that has been provided to governments is anonymised and aggregated. That means it cannot be traced to any specific individual or phone. The process of scrubbing the data usually takes between 24 and 48 hours before it is available in data sets that can then be used by governments. The industry insists that data about users is of little use for big data analysis of the contagion: the best way to track the spread of the pandemic is to use heatmaps built on data of multiple phones which, if overlaid with medical data, can predict how the virus will spread and determine whether government measures are working.

Another use of technology is the use of drones for the monitoring of transport systems. In some cases, drone usage regulations might be relaxed to allow for remote monitoring, while in other cases the establishment of protocols for safe movement of drones might be beneficial.

Regarding the role of smart infrastructure in public transport some municipal bus operators in China, like Beijing and Shenzhen, are encouraging people to use traceable payment methods like WeChat or Alipay, instead of cash. These payment methods not only cut down on exposure risks, but also help local authorities trace possible contacts and quickly inform passengers and relevant communities if a passenger is diagnosed with COVID-19. Shanghai has put QR codes in its buses and is encouraging passengers to scan and register their contact information. Chinese cities have also adopted new data-driven tracking and scheduling. In Suzhou, a smart transit platform analyses crowd distribution inside buses in near-real time and identifies the volume of passengers in each vehicle through smart transit cards. The system proved helpful during the early stages of the COVID-19 outbreak, when the vehicle occupancy information was made available to the public to allow the staggering of travel time, and it is now helping the city monitor a slow return to normal.[xxix]

12. Application to Sofia and other cities in Bulgaria

There are several lessons for Bulgarian municipalities from Best Practice around the world. **A key one is the learning from the experience of the pandemic to develop integrated plans and protocols** within both the public transport operator organisations and the Urban Mobility Center. The current pandemic is unlikely to be the last one in the foreseeable future even if the specific Covid-19 virus is overcome, so these plans need to be continually reappraised on an ongoing basis. The plans need to include a strong communication element both for the organisations' own staff but also for passengers.

Secondly, **integration of existing public transport digital information tools and of associated processes** needs to be developed quickly so that correct information can be passed to passengers about what public transport operations are running, including both when and where. If public transport is to regain its position in the life of the city it needs to be dependable.

Thirdly, **the space in the city, particularly in the city centre, needs to be re-envisioned during the lockdown** so that space for walking is increased to make it more pleasant and so that cycling becomes easier. A flip-side of this is that

space for driving is reduced (e.g. pavements are made wider, certain streets are made pedestrian only). Combined with a shift in parking policy to widen the areas covered by the parking restrictions of the Sofia Blue Zone and Green Zone, this makes public transport more attractive. This process of raising the attractiveness of public transport could also be enhanced by the introduction of certain new orbital bus routes in the city - provided that the road network and its junctions was able to deliver reliability of operation of such bus services.

APPENDICES

A. Key Acronyms:

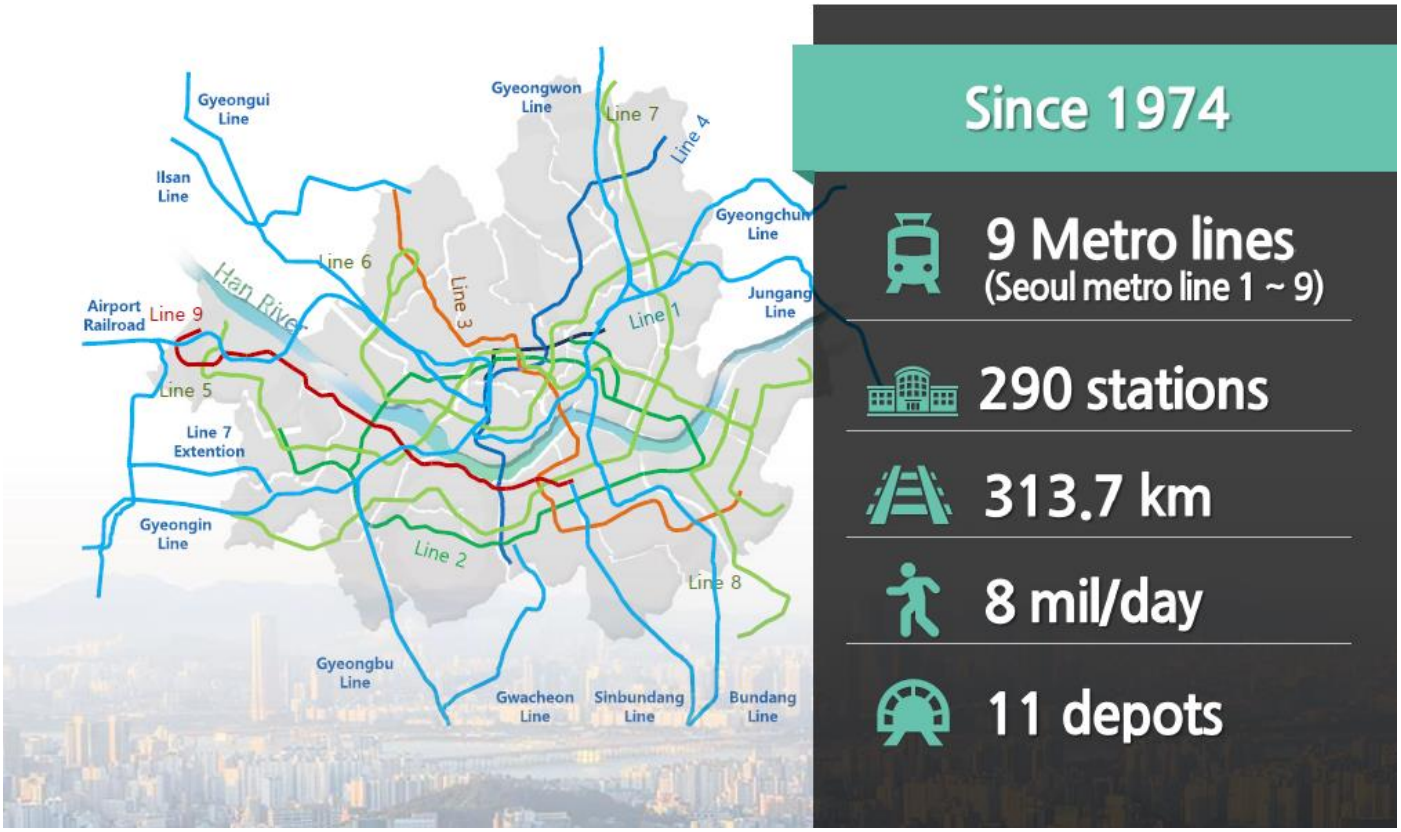
- APTA: American Public Transportation Association
- CER: Community of European Railway and Infrastructure Companies
- Eurocities: the network of major European cities
- IRU: International Road Transport Union
- POLIS: the network of Cities and Regions for European Transport Innovation
- UITP: International Association of Public Transport
- WHO: World Health Organisation

B. COVID-19 Responses in Seoul Metro

Seoul Metro

Seoul Metro

Connects Seoul Metropolitan area

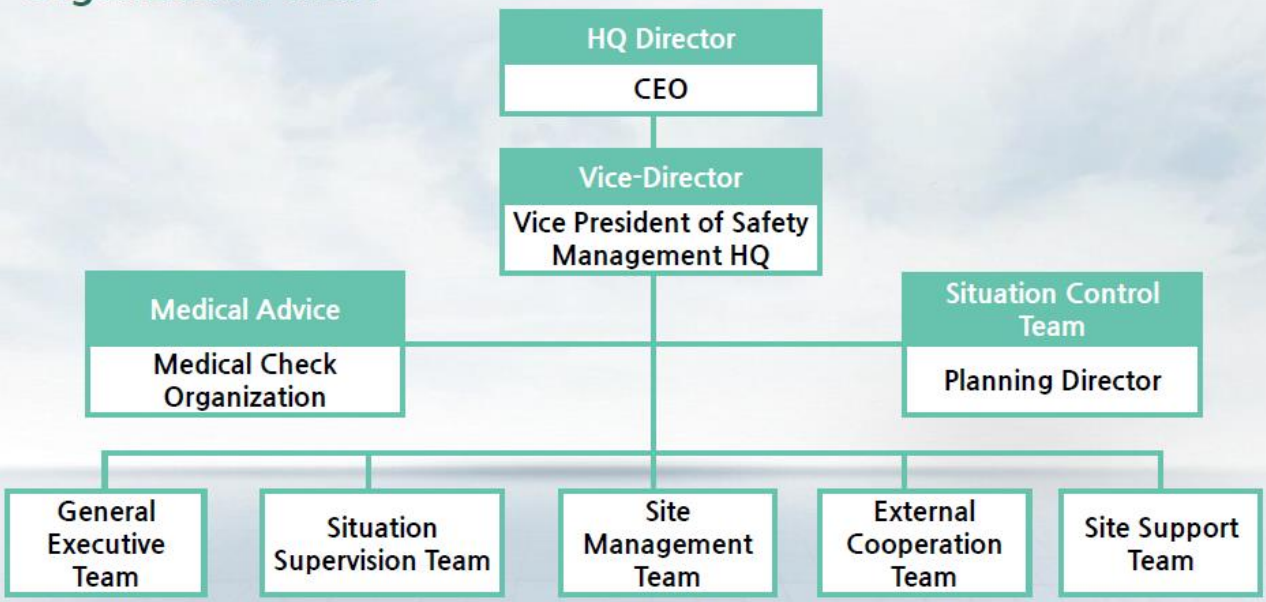


Seoul Metro

Anti-Calamity Headquarter

Stage of Epidemic Alert Crisis : Highest Level ~

» Organization chart

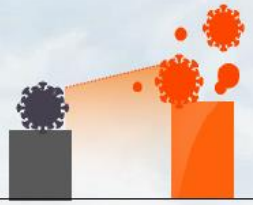


» Period: '20. 2. 3. ~ (24h operation) ※ Daily meeting (pm 15:00)

Protection for metro passenger

Strengthening of Anti-Epidemic activities for EMU & Station

» Station and station facilities



	High	Severe
Station (Platform, Waiting room)	Once a week	Twice a week
Toilet	Once a day	Twice a day
Passenger-contact facilities (EV button/ES Hand-rail, etc)	Twice a day	Four times a day
Cleaning of Transportation Card	Once in 5 days	Once a day

Protection for metro passenger

Prevention of Additional Infection

Other Activities (now processing)

Hand Sanitizer
All Station and E/L(869 unit)

ES Handrail Sterilizer
(25 Station 247 unit)

Thermal Imaging Camera
(6 Station)

Shortening of train operation
(Next day AM1:00 → AM24:00)

Protection for metro passenger

Strengthening of Public Relations for citizen

» Various promotional media(Anti-Epidemic guideline for COVID-19)

Index	Broadcasting	Screens	Poster	Placard	Leaflet	Banner
Volume	290 station Every 12 minute	29,009 〈station 11,745 Trains 17,264〉	40,536 〈Line 1~8 38,431 Line 9 2,105〉	605 unit	0,33M unit	875 unit

Seoul Metro

Measures to protect employees

Control Plan

Seoul Metro

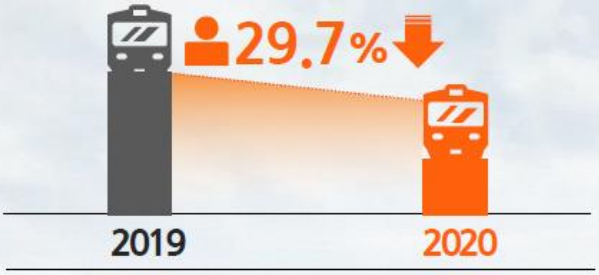
Measures to protect employees

Control Plan

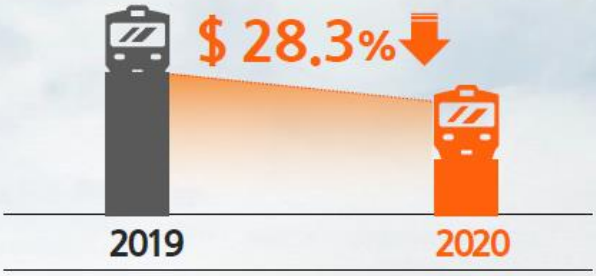
Reduction in ridership and revenue

Number of passengers 29.7% ↓, Fare-revenue 28.3% ↓

» Number of passengers



» Fare-revenue



(based on '20. 4. 11.)

Index	Number of passengers				Fare-revenue	
	2020	2019	decrease	percent	decrease	percent
Total	408,261,000	580,664,000	(-)172,403,000	(-)29.7%	(-)97,975,000,000	(-)28.3%
(daily average)	5,302,000	7,541,000	(-)2,239,000		(-)1,272,000,000	

[i] According to data from TomTom at https://www.tomtom.com/en_gb/traffic-index/sofia-traffic/
[ii] https://www.gstatic.com/covid19/mobility/2020-04-26_BG_Mobility_Report_en.pdf
[iii] https://www.uitp.org/management-covid-19-guidelines-public-transport-operators
[iv] See https://www.apta.com/wp-content/uploads/Standards_Documents/APTA-SS-SEM-S-005-09.pdf
[v] https://www.uitp.org/news/open-letter-european-institutions-uitp-and-fellow-associations-advocate-continuity-public
[vi] See https://transitcenter.org/how-transit-agencies-are-reallocating-service-to-prioritize-public-health-and-social-equity/?deliveryName=DM59815
[vii] See https://www.transport-network.co.uk/Bus-firm-restores-services-for-key-workers/16573
[viii] SZBG: 'Combating COVID 19': Presentation to World Bank Group, April 2020
[ix] See https://www.forbes.com/sites/carltonreid/2020/04/08/preventing-civilizations-collapse-with-on-demand-transit-service-for-key-workers-during-pandemic/#1820912478c6
[x] See https://www.uitp.org/news/guardians-mobility-front-lines-seoul-south-korea
[xi] See https://www.gov.uk/government/news/almost-400-million-to-keep-englands-buses-running
[xii] See https://blogs.worldbank.org/transport/protecting-public-transport-coronavirus-and-financial-collapse?cid=tai_tt_transport_en_ext
[xiii] https://ec.europa.eu/transport/media/news/2020-04-29-coronavirus-package-measures-support-transport-sector_en?
[xiv] See https://www.nap.edu/catalog/24795/public-transit-emergency-preparedness-against-ebola-and-other-infectious-diseases-legal-issues
[xv] https://www.linkedin.com/pulse/physical-distancing-public-transport-may-mean-end-mohamed-mezghani/?trackingId=SBRaINiZQMWrGJAiYOY6Zw%3D%3D&deliveryName=DM62009
[xvi] See https://www.transport-network.co.uk/Government-rules-out-PPE-for-transport-workers/16598
[xvii] These are:
• Equipping staff with protecting equipment, hand sanitizers and masks
• Disinfection of all interior rods inside trains cars/vehicles at the end of every round trip
• Disinfection of all driver cab and driving consoles at the end of every round trip
• Disinfection of all trains/vehicles and stations after finishing operating hours
• Disinfection of door opening buttons several times a day
• Disinfection of all escalators' hand rail and handgrips several times a day
• Disinfection of all elevators several times a day
• Dismantle all public water coolers and water dispensers in subways stations
• Dismantle of handles inside trains/vehicles to decrease the possibility of disease spread
• Disinfection of ticket gates, ticket machines, validation machines several times a day
• Disinfection of restrooms several times a day
• Control of ventilation system
• Air-conditioning systems: increase in filter cleaning or stopping ventilation in trams and buses, however there is no scientific evidence of the spreading of the virus through air-conditioning systems.
[xviii] See https://www.iru.org/resources/iru-library/recommendations-bus-and-coach-drivers-during-covid-19
[xix] See https://www.uitp.org/news/guardians-mobility-front-lines-istanbul-turkey
[xx] See https://www.uitp.org/news/guardians-mobility-front-lines-barcelona-spain
[xxi] https://www.youtube.com/watch?v=SqytOuYfsnA.
[xxii] At https://www.wsp.com/-/media/Insights/Canada/Documents/2020/Transportation_WhitePaper_COVID_Response-v2.pdf
[xxiii] See https://www.smarttransport.org.uk/news/latest-news/manchester-mayor-offers-free-metrolink-travel-for-nhs-and-healthcare-staff?utm_campaign=15_04_2020_Smart_Transport_weekly_newsletter&utm_medium=email&utm_content=Smart%20Transport%20-%20weekly%20newsletter&utm_source=adestra&utm_term=Manchester%20mayor%20offers%20free%20Metrolink%20travel%20for%20NHS%20and%20social%20care%20staff
[xxiv] https://www.tfwm.org.uk/news/free-bus-and-tram-travel-for-all-nhs-staff-during-coronavirus-outbreak/
[xxv] https://www.reuters.com/article/us-health-coronavirus-italy-transport/company-buses-extra-shifts-italy-retools-transport-to-end-lockdown-idUSKCN2252BA?
[xxvi] https://www.sutp.org/publications/standard-operating-procedures-sops-for-bus-transport-post-covid19-lockdown/
[xxvii] https://cdn.wsp.com/-/media/Insights/Australia/Documents/WSP---PT-and-COVID-19-white-paper_280420.pdf
[xxviii] https://medium.com/sidewalk-talk/reviving-the-economy-means-reviving-transit-here-are-9-ideas-to-help-62b4637d613c
[xxix] https://thecityfix.com/blog/3-ways-chinas-transport-sector-working-recover-covid-19-lockdowns/