Rail and the Effects of the COVID-19 Pandemic

A white paper about how rail is affected during the Covid-19 pandemic and what we can learn from it
Essential workers
You can travel, thank you

Everybody else
Go home
Don’t travel
Save lives
Ensuring Competitiveness in Rail During and Post Pandemic

The Covid-19 pandemic is substantially affecting passenger rail traffic, in a short-term perspective with large decrease in traffic. However, it will also have long-term effects. Once the pandemic is over, we can expect changes in travel behaviours, but also new routines and technology that will continue to be used. Design of both trains and services will look different. The global nature of the pandemic makes a global outlook highly relevant. Learning from others will be crucial to strengthen rail traffic today and in the future.

With this white paper, we want to inspire development by learning from others. However, the implementation in other regions of some of the examples presented might be impossible due, in part, to personal integrity reasons.

This report focuses on rail passenger traffic: it includes both long-distance passenger rail as well as metro, tram and light rail.

The white paper is produced by WSP Sweden Rail Advisory. Investigative research has been carried out in cooperation with WSP India.

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ULF Larsson
Head of WSP Rail Advisory
Decrease of travels with public transportation in urban areas.

**Effects on Travelling**

Travelling by rail and public transport has decreased in all studied countries.

In India, all rail traffic was cancelled on March 22nd. In countries where traffic is still running, the largest decrease of public transportation in urban areas are seen in the United States, Canada, Australia and the United Kingdom.

In Hong Kong, South Korea and Sweden, transit usage decline has been more modest, mainly because these countries have not been placed in lockdown. Additionally, both Hong Kong and South Korea have experienced SARS epidemics and have already developed routines for public transport during a pandemic.
Governments Response to the Crisis

Covid-19 is impacting rail all around the world, but countries act differently to support the rail traffic.

Transport by rail in urban areas is supported in most of the studied countries. However, direct support to the rail sector and long-distance passenger travels is unusual. Only two examples were identified: the United Kingdom and the United States. Another important mode of transport, namely aviation, is receiving direct support in all studied countries.

Support to Aviation Sector
Direct support to the aviation sector has been identified in all studied countries.

SUPPORT TO PUBLIC TRANSPORTATION AND RAIL SECTOR

AUSTRALIA
US$161 million are allocated to employ additional cleaners of public infrastructure such as transport assets in New South Wales. In Western Australia, public transport fares are frozen.

UNITED KINGDOM
US$37 million are allocated to support trams and metros in specific areas. There is also some support for commercial bus services.
- Suspending rail franchise agreements in concert with operators. Revenue and cost risks are transferred to the government for six months.
- Rail tickets bought before the end of March are refunded.
- A US$40 million package of support ensures the continued operation of a Wales & Borders rail service.

SWEDEN
US$300 million are allocated to support public transportation. There is no specific support for commercial operators, but several operators have taken part in short-time furlough (not sector specific).

THE UNITED STATES
US$25 billion have been allocated to public transportation. The national rail sector received support, with, amongst other, changed conditions of the qualifying period for people working in the sector.

HONG KONG
Public transport providers will be subsidized with US$415 million. Fare will be reduced by 20% between July 1st, 2020 and January 1st, 2021.

SOUTH KOREA, CANADA AND INDIA
No direct financial support to public transportation nor railway identified.
What can we learn from operators around the world to be better prepared for the future?

In a crisis, the operators and train manufacturers need to be creative to survive. This section focuses on new routines and technical solutions that have been implemented during the pandemic to limit the spread of the virus.

Asia was among the first to implement new routines as they emerged from the crisis early and have previous experience of SARS epidemics.

It should be noted that some methods presented here can be considered intrusive and, as such, should be discussed on both a technical as well as an ethical level.

This section focuses on three areas:

- New Routines to Mitigate the Spread of the Virus
- New Technology to Mitigate the Spread of the Virus
- Future-Ready Design
New Routines to Mitigate the Spread of the Virus

India, South Korea and China use heat cameras in metros and train stations. People with a fever are asked to leave the stations or are tested or receive medical care.

Facial recognition cameras are used across China. Technology to scan crowds and identify usage of masks as well as individuals with a fever, is being developed.

In Beijing, travellers can use the GPS app AutoNavi to see how crowded each metro station is.

In Shenzhen, metro users are required to scan a QR code placed in each metro car.

In Wuhan, passengers are required, when they arrive and leave the metro, to scan a QR code with their phone.

All countries studied have implemented new disinfection routines for trains, stations and staff.

All over Europe, operators refund tickets more easily than before.
New Technology to Mitigate the Spread of the Virus

A way forward might be to use ‘Hotspot Zone Detection’ and replace the materials on the most frequently touched areas.

Smart Helmets

All over China, helmets with a built-in thermal camera are used. They can automatically detect if someone has a fever five metres away. If so, an alarm is raised.

Virus Spreading in Rail Passenger Traffic

Today, it is believed that the virus spreads primarily through droplets generated when an infected person coughs or sneezes.

These droplets can either be breathed in directly and get into the body via the lungs or they will land on a surface on the train. If a passenger then touches that surface and thereafter its face (a normal person touches its face 20–30 times an hour) without washing its hands, the risk of infection is very high. Once a person is infected with the Corona virus, the disease Covid-19 can be developed.

Drones

All over China, drones with thermal imaging are used outside of public areas, such as train stations, to spot individuals with fever.
Ultra Violet Bus Wash

In Shanghai, an UV-light wash for buses has been introduced. The buses are lit with strong UV light, both on the inside and the outside.

Disinfecting Robot

In Hong Kong, robots are used for disinfecting the metro trains and stations. The cleaning is carried out with minimal human intervention.

Hotspot Zone Detection using Computer Vision

Hotspot zone detection system uses existing CCTV or IP cameras combined with computer vision to identify if people are frequently touching physical objects in an area where a camera is installed. If the number of touches exceeds the threshold value, an alert is sent to the authorities and the area can be declared as a hotspot zone. The software can also be used to spot the use of personal protection.
Future-Ready Design

What should the next generation of trains look like once the Covid-19 pandemic is over? What can be done to make passengers in rail transport feel secure? How can we reduce the next viral spread and be more agile during the next unknown pandemic?

Substituting materials

Studies show that the Corona virus behaves differently depending on the type of surface it lands on. It lives longer on non-porous surfaces. Of the materials tested in controlled lab environments, the virus survived:

\[
\begin{array}{ll}
\geq 72 \text{ hours on plastic and stainless steel} \\
\leq 24 \text{ hours on cardboard} \\
\leq 4 \text{ hours on copper.}
\end{array}
\]

Another study shows that on the most effective copper, viruses expire after 30 minutes.

We may be able to prepare the train industry for the future by using “hotspot zone detection” and replacing stainless steel and plastic with copper or cardboard on frequently used surfaces in train interiors.

Materials in train interiors of the future will probably have to be resistant to strong disinfectants or UV light washing.

Flexible design

Airplanes have modular and flexible designs, ready to remove seats to transport goods or people in need of assistance. France and Spain, turn high-speed trains into transports for Covid-19 patients during the crisis.

If passenger traffic takes time to recover to pre-pandemic volumes, containers that fits on a passenger seat can be used to transport goods or packages.

Another possible development is modular seats that can be rotated during a pandemic or the annual flu season. Where every other passenger is facing forward and every other backwards. An easily attachable cover, covering the head area, can avoid spreading viruses.

Digitalization

Physical tickets are exchanged with QR codes.

Apps informing passengers on crowded platforms and trains.
Conclusion

This global outlook serves as an inspiration to what stakeholders on different levels can do to strengthen passenger rail transport both short-term and long-term.

Learning from international experience in this area is important to ensure that public transport and the rail sector stay strong during and after the pandemic.

Globally, rail traffic has been heavily affected by Covid-19. Therefore, rail and public transportation receive governmental support in many countries, but not everywhere. Aviation has received support in all studied countries. It is important that governments ensure that rail stays competitive post-pandemic.

Many new routines have been implemented and new technology has been developed. This white paper presents some solutions that are currently in use, but the Covid-19 pandemic will most likely have effects on rail and metro for many years to come.

One possible long-term consequence is the use of new materials and different designs. Material where viruses can live for a longer period could be substituted with other materials with better antiviral properties. There is also a possibility to rebuild trains to increase the social distancing and incorporate modular design so that the operators can use trains for other transportation needs in time of crisis.

Noteworthy, some of the examples have clear disadvantages when it comes to, for example, personal integrity. A solution implemented in one country may not be desirable in another country.

WSP Rail Advisory’s quest is to strengthen the competitiveness of the rail sector and this white paper can be seen as a contribution in this effort.

Can we help societies thrive in a world we do not control? What if we can?

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Countries studied

Wikipedia’s summary of Modal Share

Effects on Public transit usage during the covid-19 pandemic

Moovit Public Transit Index

Privately owned operator SJ’s website information

Privately owned operator Arlanda Express’s website information

Deutsche Welle, German Media organisation

Interviews conducted by WSP Rail Advisory

What do the governments do?

NSW Government
$2.3 billion health boost and economic stimulus

Western Australian Government.
Western Australian Government response

BBC News Coronavirus
Government £30m bailout for light rail

Government of the United Kingdom
Written statement to Parliament Rail emergency measures during the COVID-19 pandemic

Railway Gazette
£40m support package for Wales & Borders services

Government Offices of Sweden
Regeringen presenterar stöd till kollektivtrafiken

Federal transit Administration
U.S. Transportation Secretary Elaine L. Chao Announces $25 Billion to Help Nation’s Public Transportation Systems Respond to COVID-19

Association of American Railroads
Railroads Applaud Relief for Unemployed Rail Workers

South China Morning Post
Coronavirus: massive HK$30 billion relief package revealed as Hong Kong government plans to bail out struggling industries and fund the fight against the deadly bug

South China Morning Post
Hong Kong commuters to get subsidy boost after the government lowers threshold as part of coronavirus relief scheme

Operators’ New Routines

Airborne biological hazards and urban transport infrastructure: current challenges and future directions

China’s tech fights back

Thermal checking at stations in India

Heat detecting cameras in South Korea

Infrared temperature monitoring equipment in China

Wuhan, QR code to track passengers

Shenzhen, QR code in the subway

Beijing, GPS app

Solutions for limiting the virus

Disinfecting robots, smart helmets, thermal camera-equipped drones and advanced facial recognition software are all being deployed in the fight against Covid-19 at the heart of the outbreak in China

Smart helmets

Hotspot Zone Detection

Ultra violet bus wash

Future-ready design

Passenger aircraft interior stowage solution

PMC Human Coronavirus 229E Remains Infectious on Common Touch Surface Materials

Rebuild speed trains in France

Renfe and Taglo builds trains for the Spanish state
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