

Boosting passenger preference for rail

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INTERNATIONAL UNION
OF RAILWAYS

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Introduction

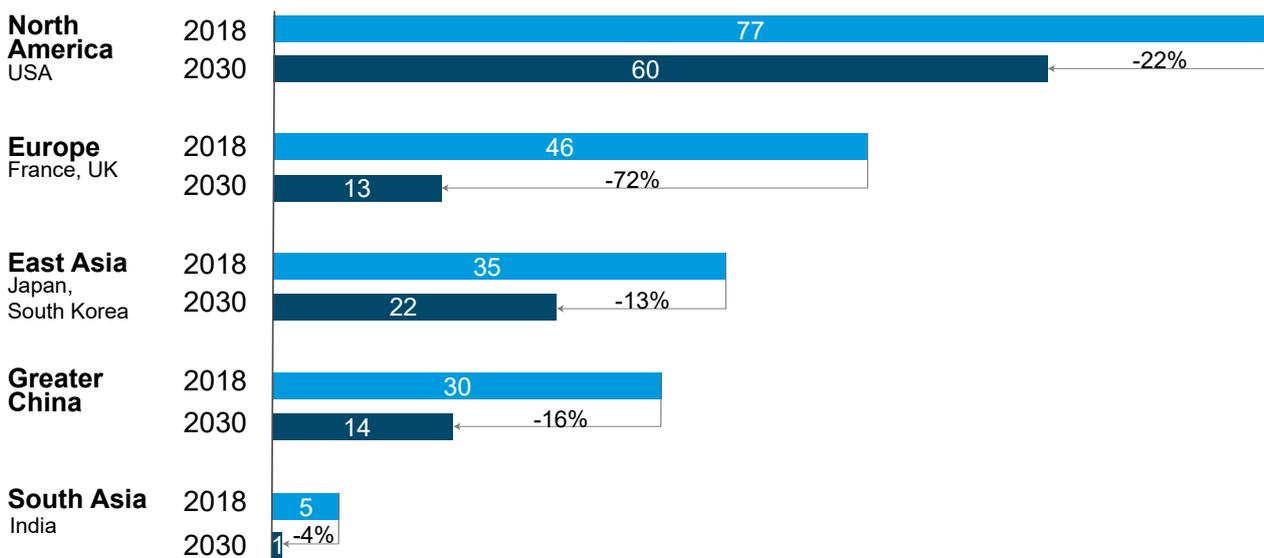
COVID-19 is a global humanitarian crisis that severely affected the lives and livelihoods of citizens around the world. Industries have also been negatively impacted, and over the past two years passenger rail operators have faced challenges arising from changes in passenger behavior such as reduced travel demand following a rise in remote work and online meetings. Health and safety regulations, while necessary, also posed challenges to ridership. Although there are differences across regions, and the type of travel, passenger rail traffic has not fully recovered yet—particularly in North America and Western Europe.

In parallel, the increasing escalation of climate change and its impact globally has implications for travel. Governments and companies are committing to ambitious targets to reduce their emissions. As a result, organizations are increasing their efforts to travel sustainably, and UIC members indicate that many corporates are encouraging rail over air travel where possible. In general, consumers have become more environmentally conscious in recent years and this trend was reinforced by the pandemic.¹ For instance, a McKinsey survey conducted in 2021 found that consumer preferences are shifting toward more sustainable travel as 61 percent of respondents stated that they want to travel more sustainably in the future.² Furthermore, over the next ten years, car modal share is expected to decrease by between 20 and 70 percent, with variations across regions—freeing up modal share that can be captured by rail or other means of transport (Exhibit 1).

Exhibit 1
Private-car modal share is expected to decrease by 2030, and this could be captured by rail

Modal share projection¹, percentage

Selected metropolitans



¹Under the scenario that there are policy-guided shifts to pooled autonomous driving and new modes of transport
 Source: McKinsey Center for Future Mobility (MCFM) research, 2021

¹ "Booking.com's 2021 Sustainable Travel Report affirms potential watershed moment for industry and consumers," Booking.com, June 3, 2021
² Mishal Ahmad, Frederik Franz, Tomas Nauc ler, and Daniel Riefer, "Opportunities for industry leaders as new travelers take to the skies," McKinsey, April 5, 2022

Over the past two years, governments have launched various stimulus packages to relaunch economies. Most include funding for the tourism, transport and travel sectors, hence several countries are focusing on modernizing rail infrastructure and decarbonizing transport. For instance, the European Green Deal, a wide-ranging stimulus package focused on sustainability, is estimated to include €87.5 billion in investment related to rail infrastructure themes.³ Likewise, in the United States, the Infrastructure Investment and Jobs Act (IIJA) allocates \$66 billion in funding and grants towards corridor development, rail track modernization, and safety improvement.⁴ There is a similar focus on improved railway connectivity and convenience in other continents such as Africa where the African integrated high-speed train network is at the heart of the “Agenda 2063” as one of the 15 flagship projects.⁵

Given these global trends, rail may have the strength to position itself as one of the preferred choices of transportation of the future, helping to solve many longstanding challenges in passenger transport: sustainability, speed, and volume. Rail’s strengths include the ability to transport large volumes of people in an efficient manner, at a faster speed than car travel (if high speed or at peak hours when roads are congested), with enhanced travel comfort for leisure and business, and at lower carbon emissions per passenger for electrified networks.

That said, in many regions of the world, rail faces various challenges including high prices—especially for group travelers or families, when compared to car travel—a lack of reliability and punctuality, insufficient density, and a lack of convenience of service from an end-to-end journey perspective.

This report examines passenger rail’s current status and the measures operators have taken to restore rail travel to pre-pandemic levels. It also lists a set of potential levers railway operators can pull to help recover passengers lost during the pandemic, attract new passengers, and develop rail to be a viable alternative to road and air transport.



³ Global Infrastructure Outlook, data extracted in July 2021; “ITF Transport Outlook 2021,” OECD, 2021

⁴ “The bipartisan infrastructure deal,” White House fact sheet, November 6, 2021

⁵ “Agenda 2063 The Africa we want: First ten-year implementation plan 2013-2023,” The African Union Commission, September 2015

Research methodology

This research is the result of a partnership between the International Union of Railways (UIC) and McKinsey and Company.

The conclusions presented in this report are based upon:

- Approximately 20 interviews held between November 2021 and April 2022 with UIC members (including infrastructure managers, operators, and transport authorities) in Europe, North America, Asia, the Middle-East and Africa; nations interviewed account for approximately 75 percent of passenger rail world wide
- Consumer research conducted in 9 countries (France, Germany, Italy, Spain, UK, United States, Canada, China, Japan) in May 2022, with over 700 respondents in each country, to better understand under which conditions passengers would be willing to switch to rail
- Fact-based analysis of public documents, including
 - Eurostat reports
 - McKinsey Center for Future Mobility reports such as *An integrated perspective on the future of mobility*, *Simulating the future of mobility*, and *Passenger mobility outlook*
 - McKinsey Global Institute reports and McKinsey research such as *The Return Voyage: Corporate travel recovery*; *Trends that will define 2021 and beyond*; *Travel and consumer trends 2022*; and *What's next for remote work: An analysis of 2,000 tasks, 800 Jobs, and nine countries*
 - UIC Atlas, Spring 2022 edition
 - UIC report, *Mobility post-Covid: An opportunity for railways*

Current status of passenger rail



Three key findings emerged that shed light on rail's recovery, why passengers may or may not choose rail as a transport option, and the shifts in consumer behavior that have affected rail passenger numbers—and will likely continue to do so in the future.

Passenger rail has not recovered uniformly across geographies

Globally, passenger rail was heavily impacted by the COVID-19 pandemic resulting in severe demand decline before travel restrictions were lifted and ridership began to recover. UIC members' ridership data for 2020 and 2021 show that across geographies, passenger rail experienced a drop in ridership of between 40 and 100 percent, with a global average of approximately 70 percent. Ridership numbers also indicate that while passenger rail seems to have fully recovered in some geographies, it is still recovering in North America and Western Europe.

In regions where passenger rail traffic seems to have fully recovered, rail is the main method of transportation, and COVID-19-related restrictions were generally lifted earlier than in other regions. Services were restored rapidly, and working behaviors amongst travelers remained unchanged as travelers were not impacted by the home-office trend or restrictions to business travel.

In Europe, the pre-COVID-19 passenger base has developed new behaviors resulting in lower demand. In North America, in addition to new behaviors, rail services have not been fully restored yet.

However, in parts of Asia such as China and India, and in Eastern European countries such as Poland and Czech Republic, passenger rail traffic is largely back to pre-COVID-19 levels. This recovery was driven mainly by the rapid restoration of services to pre-pandemic levels, temporary ticketing discounts, and the existing under-capacity of train services in these countries. Recovery is also seen in countries without high-speed rail (HSR) networks and where rail is nationalized.

Convenience remains the main driver for rail selection

Primary customer preferences, both pre- and post-pandemic, for choosing rail remain heavily linked to the product, specifically convenience factors such as speed, accessibility (including distance to station, station accessibility, departure time, ease of ticket purchase, train boarding process, and offering simplicity), and price relative to other modes of transport.

Post-pandemic, customer expectations for passenger rail cleanliness and public-health security have increased, but generally customers do not feel that trains are less safe than other means of transportation from a sanitary risk perspective.

Sustainability considerations are increasing but are not reflected yet as a critical consumer preference that impacts the decision to buy rail tickets.

There have been fundamental shifts in travel behaviors

Some travel reasons, such as business and commuting, have been changed by the pandemic, and these changes will likely remain in the future.

It is expected that much of the office workforce will return to work in a hybrid mode, as only 20 percent of workers could perform their jobs remotely for 3 to 5 days a week.⁶ And McKinsey research indicates that advances in remote-work technology will also fundamentally change the way education is delivered, normalizing online and remote learning. Especially for the large segment of business travel, new forms of virtual collaboration imply that the number of occasions for a trip may be permanently reduced.

In Western Europe, the loss of some pre-COVID-19 commuter and business travel is likely to be counterbalanced by new commuters and those who are choosing rail for “green” considerations. New commuters are people who left large cities during the pandemic and may now need to take trips back to these cities. For instance, in the UK,

⁶ “What’s next for remote work: An analysis of 2,000 tasks, 800 jobs, and nine countries,” McKinsey Global Institute, November 23, 2020

the number of homes acquired outside of the city of London increased by 62 percent in 2021, according to the UK-based estate agent Hamptons. The firm described this trend as “the biggest ‘great escape’ from the capital since 2007”.⁷ Similarly, in Italy, real estate acquisition outside the major urban areas grew by 47 percent between Q3 2020 and Q3 2021 compared to only 36 percent for major urban areas.⁸

Sustainability concerns are also affecting rail travel. Consumers are willing to switch from plane and car to rail as a more sustainable mode of transport,

and companies are committing to aggressive decarbonization targets which results in corporate travelers favoring rail over flights where possible.

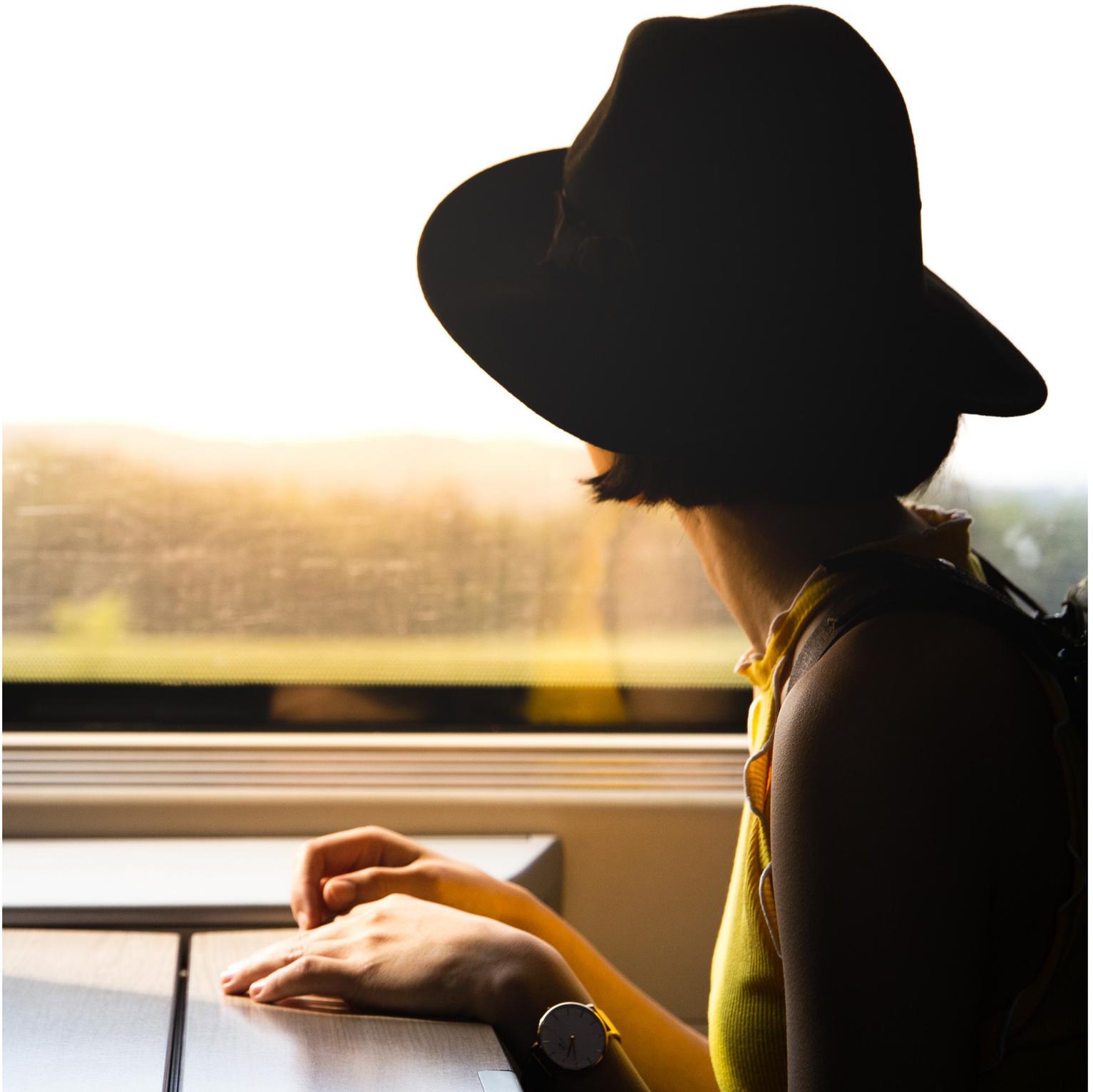
However, even if overall demand stays the same, travel patterns and routes have changed—requiring operators to adapt their systems. Operators see opportunities to leverage new behaviors to make the whole system more sustainable and efficient as the typical morning and evening peaks may become less important in the future.



⁷ “Tired of life? No, just tired of London: Record £55bn spent buying homes outside the capital,” *The Guardian*, December 26, 2021

⁸ “Housing trends: movements towards the hinterland and the province are increasing,” *MonitorImmobiliare*, June 15, 2022

Customer expectations in 2022



Only with a detailed understanding of travelers' preferences, and emerging trends, can passenger rail operators succeed in ramping up services that may encourage passengers to switch to rail.

Overall, our primary customer research across nine countries in three continents (Europe, Asia and North America) shows that price, safety, and the core product offering remain the main drivers for passengers when choosing their mode of transport (Exhibit 2). In all investigated regions except China, people report price as their key criterion for choosing a mode of travel. Additional characteristics and features like easy booking processes or connected services are far less important. Comfort and cleanliness are also rated comparatively low, except for Japan, where this aspect is rated as a high priority.

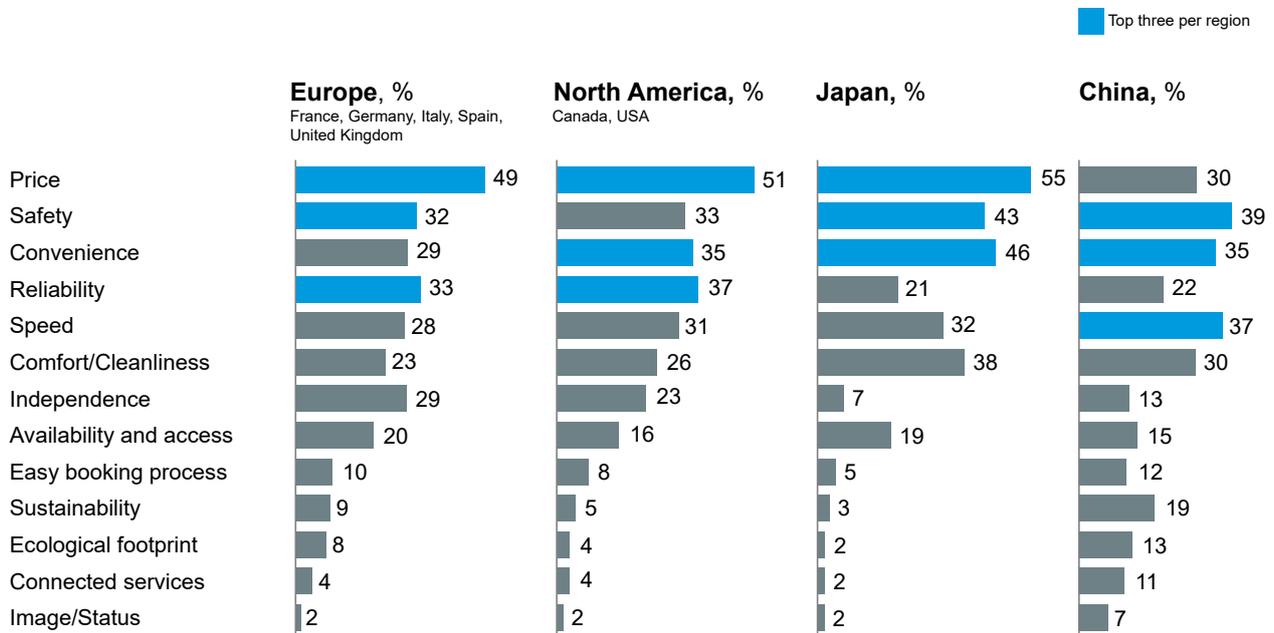
Most notably, new trends such as sustainability-related aspects seem to play only a minor role for passengers in their travel selection, with only 3 percent (Japan) to 19 percent (China) indicating this

aspect as one of their top-three decision criteria. When asked about their sustainability behavior, 87 percent of customers expressed an interest in sustainable products, but only 12 percent would be willing to pay a premium for such sustainable products or services.

Decision criteria differ substantially between countries. Preferences in China, for example, are much more dispersed, requiring train operators to cater to a broader set of customer expectations. Interestingly, aspects which are taken for granted in a specific country may be rated relatively lower in that country—for example, reliability is rated lower in Japan than in any other country surveyed, a country with one of the most reliable train services in the world. Similarly, in Europe, where the electrification of transport is relatively advanced and regulations on emissions of vehicles are strict, sustainability considerations are almost negligible. Chinese respondents, on the other hand, rate sustainability as much more important for their mode of transport decision.

Exhibit 2

Price, safety, and core product offering remain key drivers for choosing mode of transport



To better understand and verify these results, a conjoint survey was conducted where participants were presented with different specific trip options, comparing trips by car, train, plane, and bus. In each scenario, the trips' attributes like costs and travel time were varied. Participants were then asked to choose their preferred mode of transport based on these attributes so that their decision situation closely resembled real-life decisions on the mode of transport—which allowed informed insights to be revealed on what factors actually matter in individuals' considerations.

This study's results to a large extent confirm previous insights. Price remains, by far, the core decision criterion. Other important factors are largely related to overall time of travel, especially regarding frequency, travel time for the trip, as well as time to station. Likewise, those study participants not choosing train transport reported that this was mainly due to high prices and lack of convenience, due to, for example, a lack of direct itineraries. Going beyond the criteria of price and time of travel, other

features such as the quality of the offer can be seen as a "nice to have", but they barely change an individual's decision and therefore will not contribute significantly to raising rail's modal share.

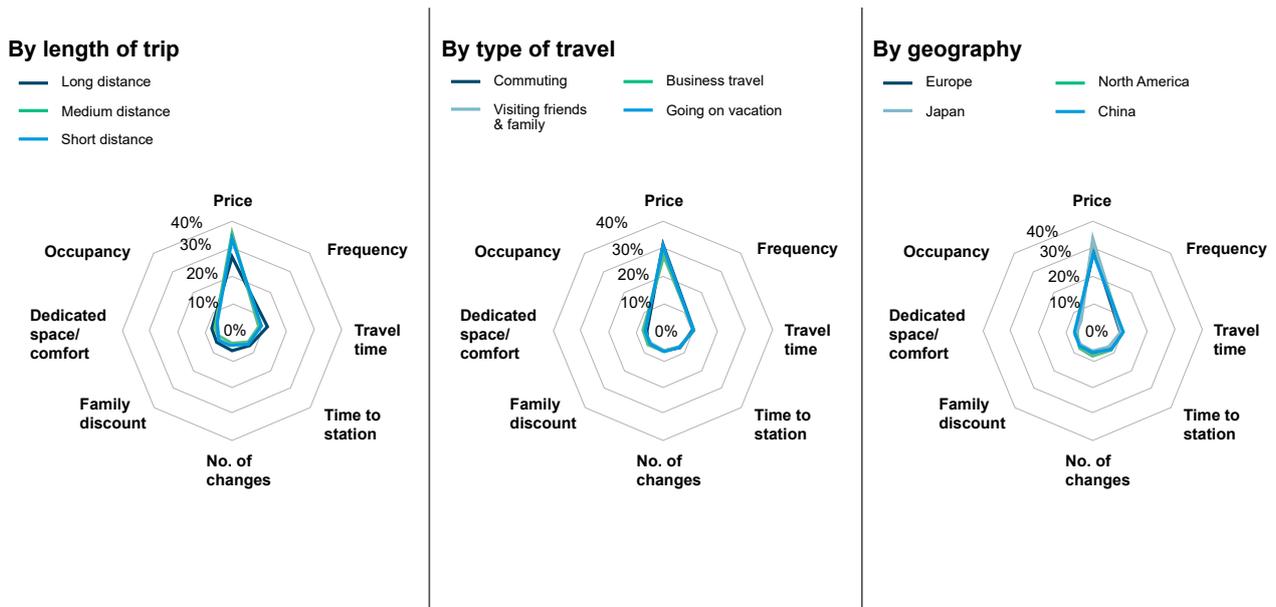
These results are robust even for specific traveler groups, so that the same pattern holds for different trip lengths, different types of trips, and different geographies (Exhibit 3). For example, no major variation between vacation and business trips can be observed.

Regarding the trip length, a major difference between long-distance travel compared to short and medium distance was identified. Long-distance travelers assign less importance to price (26 percent compared to 34 percent for medium and 32 percent for short distance) and are more interested in convenience factors like travel time and the number of changes required. Apart from this specific potential for customer differentiation, these findings underline the importance of price and core product offering for all travelers when deciding on their mode of transport.

Exhibit 3

Price and core product offering are the most important criteria independent of travel type, length of travel, and geography

Decision criteria towards choice of transportation, relative importance in percentage



Overall, these results indicate that rail operators could focus on their core offerings, including convenience, reliability, and speed, as well as price and safety. To do so, operators need to have access to ensure some fundamentals, including a well-developed railway network that allows safe, convenient, and reliable train connections at high speed. Railway infrastructure expansions and ongoing investments for maintenance and repair are needed to support this.

When it comes to the responsibility for financing the system, individuals' preferences on the state's role vary between geographies (Exhibit 4). While people in Europe and China largely prefer state

financing over individual financing, respondents in North America and Japan see a stronger role for the individual in financing the infrastructure system. When comparing opinions on financing for rail infrastructure versus national road infrastructure, across all countries, people attribute a stronger role to the state for road infrastructure than they do for rail. In North America, this tendency is most pronounced (with a score of 54 for rail vs. 37 for road, where 0 indicates full state financing, and 100 indicates full individual financing). Lastly, the distribution reveals major peaks at both ends in all countries except China. This indicates significant polarization on the question of state financing of public infrastructure in these countries.

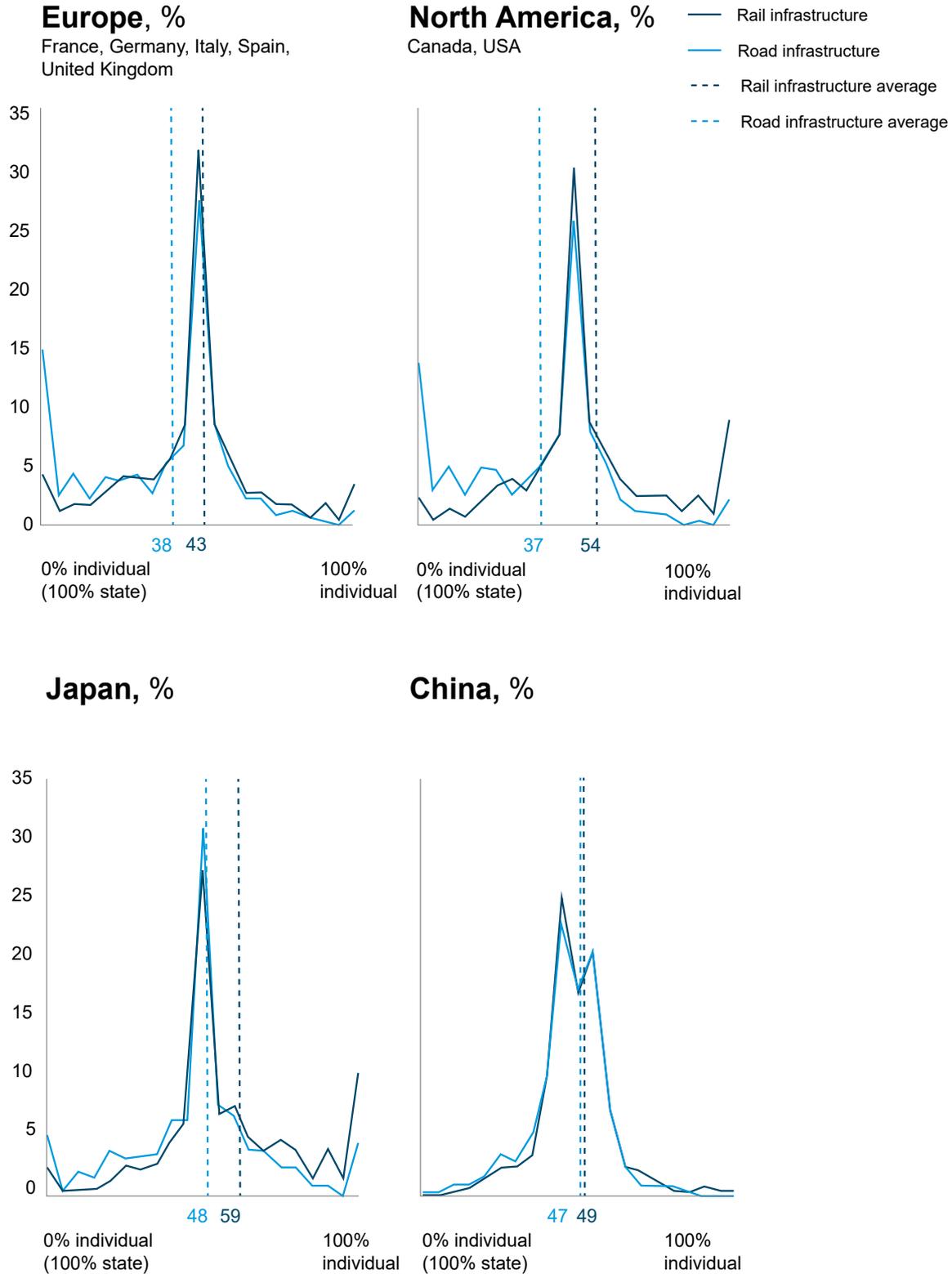
“Price remains, by far, the core decision criterion. Other important factors are largely related to overall time of travel, especially regarding frequency, travel time for the trip, as well as time to station.”

Exhibit 4

Individual opinions varied regarding the state's role in financing infrastructure

Individual financing preferences, %

When thinking about your national rail and road infrastructure, to what degree should the state finance this according to your opinion?



A high-speed train is stopped at a station platform. The train is white with a blue stripe and is reflecting the sunset sky. The platform has a tactile paving strip in the foreground. The sky is a mix of blue and orange, indicating sunset or sunrise. The train is positioned on the right side of the frame, extending towards the left. The platform is on the left side of the frame. The overall scene is captured in a low-angle perspective, emphasizing the sleek design of the train.

Three horizons to boost rail modal share

Building on the customer insights gathered, together with the rail operators' existing measures to create rail ridership momentum, this section offers ideas on how rail operators can increase modal share with a focus on increased industry sustainability in the long term. Rail operators, together with infrastructure managers and policy makers, can consider various measures across the following three horizons to grow passenger preferences for rail and establish rail as the means of transportation of the future (Exhibit 5):

A. Help restore rail travel to pre-COVID-19 levels by ensuring that current customer expectations are met or exceeded, especially in terms of reliability and safety, and adjusting offerings to meet changing demand and habits. The goal is to bring back the former

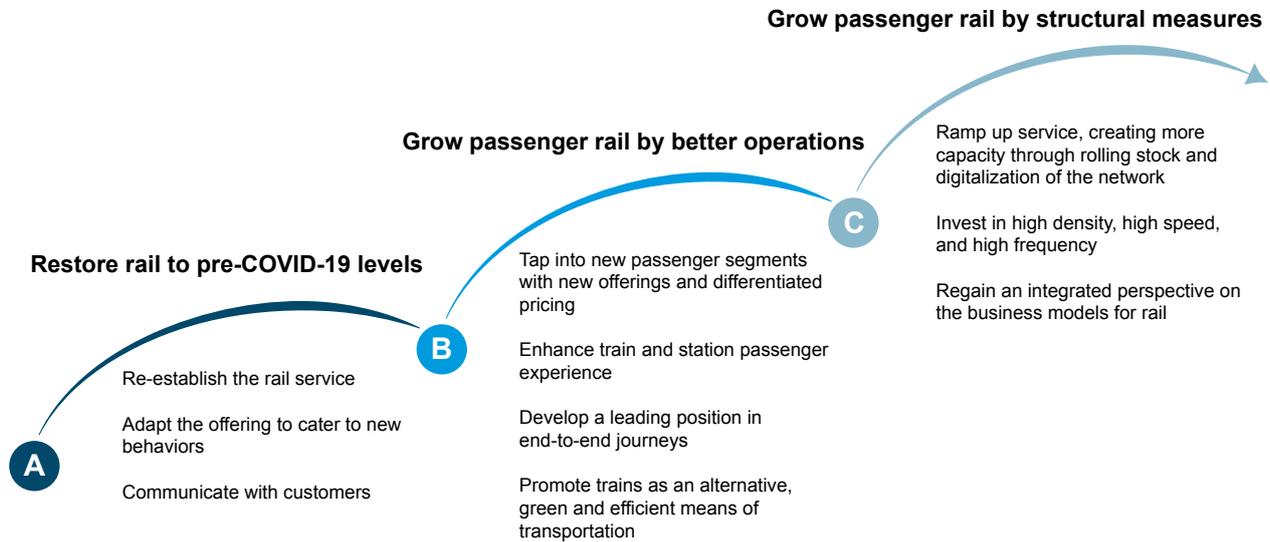
customer base, and these measures have already been implemented by a number of operators.

B. Grow passenger rail by better operations, building on the existing infrastructure, to expand the passenger base beyond pre-pandemic customers. The goal is to capture new customers and create new opportunities to travel in the short term.

C. In the longer term, grow passenger rail by structural measures which may require an increase in fundamental investments in rail infrastructure, and explore potential changes to the current business model. The goal is to expand passenger rail as a viable alternative to cars and airplanes, in more circumstances.

Exhibit 5

We identified 10 levers to restore and boost passenger rail, over three horizons



A. RESTORE RAIL TRAVEL TO PRE-COVID-19 LEVELS

Operators around the world have taken steps to aid demand recovery by re-establishing service availability and reliability, adapting offerings to suit new customer needs, and making these changes known to customers through clear communication. These same levers could be important in their continuing efforts to restore rail travel to pre-pandemic levels.

Re-establish the rail service

Re-establishing a fast and reliable service is likely essential to restoring rail service to pre-COVID-19 levels, even if trains are not at full capacity. In doing so, demand can catch up to capacity for those who want to travel. Maintaining frequent service will likely prevent passengers from taking up alternative means of transportation (e.g., private vehicles) or creating new travel habits.

In Western Europe, most operators ramped up very quickly to re-establish services, to between 90 and 100 percent of pre-pandemic levels, thereby driving faster demand recovery. Even when ridership was down by approximately 85 percent, most operators continued to keep more than half of trains running at their usual schedules to prevent travelers from developing new habits.

Adapt the offering to cater to new behaviors

As a result of the pandemic, some cities' peak-hour rail traffic decreased as people either moved away from cities or shifted to a hybrid way of working. Rail operators can continue to adjust to this ridership trend by adapting their service offerings accordingly. To do so, three questions can be asked to guide operators in decision making: when, where and how often do people travel? By focusing on new travel patterns, rail operators can make their services more convenient for customers.

Rail operators adapted to travelers' needs by modifying train schedules and ticket offers to respond to changing behaviors. Border restrictions resulted in a resurgence of local leisure travel experiences, such as weekend trips to national parks or nearby cities, and operators swiftly reacted by launching targeted offerings to match this trend. For instance, Amtrak relaunched the USA rail pass in the summer of 2021 enabling customers to pay a single discounted fare that allowed them to hop on/off trains across 500 destinations over 30 days. Similarly, JR East in Japan launched a half-price ticket promotion between August and December 2021, available for select Shinkansen and express lines. This was one of the most effective deals the operator launched that aimed to increase domestic tourist ridership.

Likewise, rail operators adapted to altered commuting behaviors by catering to the hybrid-work reality whereby many commuters reduced the number of days they traveled to an office. For example, Deutsche Bahn (DB) began offering a limited time 20-journey ticket for 20 single trips, on a route specified by the purchaser, as a more flexible alternative to a monthly ticket. In the US, the Southeastern Pennsylvania Transportation Authority (SEPTA) also announced various initiatives under its proposed \$1.6 billion operating budget for 2023 in an effort to boost ridership post COVID-19. Its \$10 Neighborhood Flex DayPass is targeted at riders traveling shorter distances and can be used for up to 10 rides on various transport modes (including buses, subways, trolleys and Zone 2 regional rail) for a single day.

Other operators adjusted schedules and services to enhance commuting convenience for business travelers. For instance, in 2021, Amtrak expanded its service from Richmond, Virginia to Washington, D.C. (and other East Coast hubs) for daily commuters. Service expansion included three daily departures to maximize traveler convenience. In Japan, JR East expanded its in-station and in-train services to retain business travelers by providing

shared offices, and tools to improve concentration for work in trains such as augmented-reality glasses, and separation screens. It also created new services to encourage “workation” (work and vacation trips) by combining railway, hotel, car rentals, and remote-work offerings.

In another example, in June 2020, Auckland Transport in New Zealand announced a generous 30 percent price reduction for rail tickets for weekday travel between 9am and 3pm and after 6:30pm. This initiative aimed to encourage off-peak travel, helping the operator to adjust to changes in commuter needs and manage travel demand throughout the day for COVID-19 safety considerations.

In addition, focused promotional offers primarily targeting long-distance or lower-traffic routes were launched to increase ridership. For instance, Renfe joined the Black Friday celebrations in November 2021 when it offered significantly discounted tickets, with prices starting at €8.35, on long-distance routes to several destinations in Spain and France. Renfe noted that the goal of the promotion

was to encourage people to travel more after the restrictions put in place during the pandemic were lifted.

Communicate with customers

Communication with a mass audience is crucial for increasing awareness about the return of rail service, and rail operators worldwide raced to create vivid and compelling marketing campaigns to do so. Communication is a key component in creating awareness of rail services and fostering the desire to travel again.

For instance, the Canadian Crown Corporation’s Via Rail “Book your comeback” campaign is aimed at getting passengers on the move again, specifically by promoting leisure trips that allow customers to escape daily stresses through convenient and flexible end-to-end travel. Several other operators developed similar campaigns, including partnerships with local tourism services to encourage weekend tourism and travel to destinations outside of the city (Exhibits 6 and 7).

Exhibit 6

Several operators put together targeted marketing campaigns to advertise that they were back

Case example



Operators raised **awareness** for railway travel after pandemic restrictions

They focused on awakening the **desire to travel** by train

Moreover, campaigns promoted information on health-related **travel conditions**

“ The main challenge is to compensate traffic lost from commuters with leisure and traffic during weekends: young people and leisure are the future ”

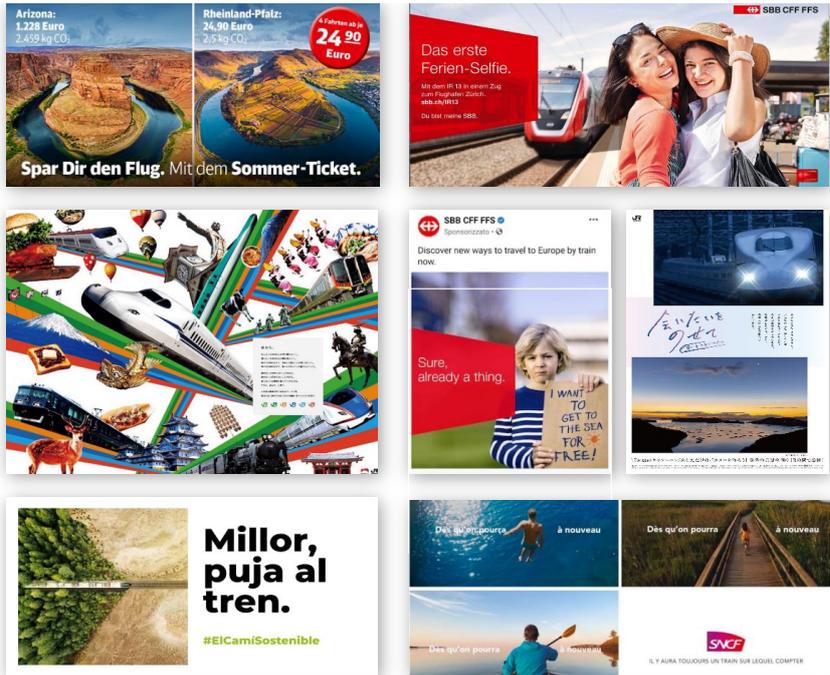
– Marketing director, major railway operator

Exhibit 7
Developing the desire to travel

Several campaigns were targeted specifically towards **tourism**

Communication focused on the desire to travel and stressed the **ease** of rail travel

Campaigns addressed the **environmental / ecological** aspects of rail travel (e.g., lower CO2 emissions)



19

To encourage COVID-19-wary travelers to choose passenger rail, some operators leveraged statistics on health-related travel factors, for instance mentioning that the risk of infection is not higher on a train than it is in a retail environment. Operators also increased train sanitation practices to soothe passengers' health-related concerns and created

automated consumer nudges about health-related travel requirements. They communicated their sanitization measures, including special hygiene control and guidelines for rail employees, to customers through posters and leaflets on trains and throughout railway stations.

“Communication with a mass audience is crucial for increasing awareness about the return of rail services, and rail operators worldwide raced to create vivid and compelling marketing campaigns to do so.”

B. GROW PASSENGER RAIL BY BETTER OPERATIONS

Operators could build upon their existing networks to attract new passengers and enhance the travel experience. These measures can potentially expand the passenger base beyond pre-pandemic customers and increase rail's modal share.

Tap into new passenger segments with new offerings and differentiated pricing

Increasing modal share requires operators to react to the growing transport market and convert passengers from other modes of transport through new offerings and differentiated pricing. Based on experience in Italy, Spain, and France, we observe that intra-rail competition is a way to diversify offers and increase frequency of service for riders. These benefits come as a result of the long-term regulatory and structural changes in these nations.

Examples of new services include the revival of overnight trains in Western Europe. In 2021, French operator SNCF re-established night-train connections between Paris and Nice and launched the Paris-Munich-Vienna service in partnership with ÖBB.⁹ Others revived slower long-distance trains with intermediate stops at smaller cities, such as the FlixTrain offer in Germany.

Rail operators could consider the approach taken by the airline industry that has shown significant growth over the past three decades. McKinsey research shows that the airline's reliance on a low-cost carrier model was on the increase, pre-pandemic, and this may have accounted for much of this growth. While this low-cost approach may be more challenging to implement in rail, some operators have done so. SNCF has demonstrated this with OuiGo, that makes use of less attractive stations and focuses on high-demand routes with a no-frills offering.

Beyond a pure low-cost offer, rail pricing is a key consideration for growing demand. To ensure affordable access to train tickets, operators globally have leveraged reduction cards, capped prices,

and campaigns for targeted segments such as students or families. For instance, in Italy, a 10 to 15 percent decrease in price, combined with increased high-speed supply brought about by a competitive environment, resulted in a 70 percent increase in demand for services and a 50 percent increase in total revenue between 2011 and 2018.¹⁰

Some operators have adopted a dynamic / yield pricing approach, which can be challenging as it is highly complex. In this scenario, the desired outcomes need to be well calibrated to avoid increasing margins to the detriment of train capacity and the service offer. Nevertheless, an intelligent pricing system could incentivize customers to increase train adoption through new fare types, temporary discounts, or multi-pass offers tailored to consumer behaviors. Dynamic pricing could be used to manage demand and grow operator revenue, for instance through shifting traffic from peak times to fill up empty trains throughout the day. Furthermore, pricing could encourage existing passengers to use the train differently for new needs, such as for leisure and tourism instead of business travel.

Enhance train and station passenger experience

Despite connected services not being among the top criteria that prompt passengers to choose rail over other means of transportation, operators could encourage new passengers to consider train travel by redefining rail travel experiences to make travel time more productive and meaningful. Enhanced offerings could be centered around customers' needs for flexibility, and increased connectivity.

Trains could be re-positioned as multifunctional spaces, going beyond only offering seats to bridge distances. For example, the DB Regio project presented a re-imagined train travel experience with a broad range of interior ideas such as health studios, office cabins, children's play areas, and napping areas.¹¹ Such measures could create an enhanced and differentiated experience for rail travel.

⁹ SNCF press release for Paris-Nice, 25 February 2021; SNCF press release for Paris-Vienna, 14 December 2021

¹⁰ Based on analysis of Trenitalia and Italo annual reports 2011 and 2018

¹¹ "The Ideas Train: Concepts for the future of regional transport," DB

Expansion of onboard services such as increased digital connectivity, luggage concierge, pet transportation, and food-ordering services could make trains more convenient and offer additional options for revenue growth. For instance, in China, there are dedicated areas for business class travelers at major HSR stations that provide Wi-Fi access and other business services. Regular station seats have been replaced with multi-function chairs that provide massages and device-charging points.¹²

There is also potential to modernize train stations through technology, like Swedish Railways' interactive app, The Guide, which enables passengers to use augmented reality to navigate their way to train platforms. Such initiatives are advancing the role of the train, from the traditional service that takes a traveler to their destination, to a multi-functional, customizable space that caters to their needs.

Develop a leading position in end-to-end journeys

Convenience and passenger experience are inseparable from the notion of an end-to-end journey. Many operators are investing in developing an ecosystem of partners to solve this challenge, for instance by pioneering mobility-as-a-service (MaaS) applications. The following four components could help operators to provide an end-to-end journey experience and make access to trains as easy as possible.

Integrated information for passengers:

Several players in the market provide end-to-end journey information, including Google Maps and applications from railway operators such as SNCF. In China, rail travel apps are comprehensive, and include travel information such as station updates, and timetable delay notices, as well as other services such as hotel booking, car rental, and online food delivery. This integrated variety of information facilitates a smooth end-to-end experience.

One single ticket: Few examples of integrated tickets exist. One example can be found in Germany, where DB offers city tickets sold together with train tickets, allowing DB train riders to transfer seamlessly to local public transport for the last mile of their journey.¹³ Another German example is the Federal State Nordrhein-Westfalen, that launched a mobility app eezy.nrw. This app provides e-tariffs to users regardless of the mode of public transport they choose. Users check in when they start their journey and check out when it ends and the app automatically charges the ticket price by using GPS and mobile data, calculated on a basic price plus beeline kilometers.¹⁴ These examples are not found worldwide and are often limited to few means of transportation in a single region or country.

One platform (e.g., one single pass to access multiple means of transportation): Recently, innovative applications offer booking, payment, and sourcing of multiple mobility types (e.g., car sharing, e-bikes and trains) to enable customers to use one platform for their entire trip. Leading MaaS applications are also beginning to include events, sightseeing, and attractions that can be accessed while on the passenger's route. For example, a Japanese MaaS application that was launched in Fukuoka, combines modes of transport, unifies payments, and shows events and sightseeing information on the route.

Data on demand: Data is the fuel of the MaaS platform. When combined with advanced analytics, it could provide insights on where, when and how each means of transportation is used to help operators offer better service and connections. Many operators are investing in this area, including SNCF. Furthermore, SNCF now has equity stakes in Fluctuo, a startup that collects and integrates mobility data across Europe (including Cityscoot, Tier, Dott, Voi, ShareNow, FreeNow, SNCF Connect & Tech, Cogo and public transport specialists).¹⁵

¹² Alice Shen, "Chinese railway station installs massage chairs in waiting area," *South China Morning Post*, December 4, 2017; "Business class vs first class on China's high-speed rail network," *Executive Traveller*, June 15, 2022

¹³ DB Tickets & Deals, City-ticket: Public transport included, DB website

¹⁴ Eezy.nrw website

¹⁵ SNCF press release, January 19, 2022

Promote trains as an alternative, green and efficient means of transportation

Rail operators can position trains as a sustainable alternative to air and car for business and leisure travel. This opportunity is particularly relevant for regional short-distance travel where trains are competitive to air travel on time and cost.

In addition, rail operators could introduce sustainability tools into offerings to raise awareness and inform customer choice. For instance, adding emissions savings to ticket stubs may nudge customers towards more sustainable travel options.

Additionally, for business clients, rail operators could communicate how passenger rail can contribute to corporate goals of becoming carbon neutral and reducing carbon emissions for sustainability reporting; this could support clients in developing travel plans to achieve their goal of contributing towards achieving a 1.5°C pathway.

C. GROW PASSENGER RAIL BY STRUCTURAL MEASURES

Operators could ramp up investment in infrastructure and service excellence to offer a viable alternative to road and air transportation in the long term. Doing so will likely require investment in high-density, high-speed, and high-frequency networks. This involves increasing capacity and level of service through capital investments that include rolling stock, infrastructure, and digital technologies.

Ramp up service, creating more capacity through rolling stock and digitalization of the network

Around the world, operators are upgrading their fleets. Rolling stock investments have been projected to increase across all geographies at a rate of 6 percent a year between 2019 and 2024.¹⁶ New rolling stock increases capacity, creates higher customer satisfaction and improves sustainability. It also offers the opportunity to modernize interiors,

add connectivity, and improve services. While investment in rolling stock is key to modal share growth, supply of rolling stock from manufacturers will likely need to be ramped up and accelerated to meet the investment demand.

Existing infrastructure could also be used to its full potential. Operators can enhance digitalization and implement advanced analytics to optimize scheduling and asset management through real-time fleet management. Further optimizations could be obtained through leveraging advanced analytics to create a holistic network design that can unlock economic potential and maximize timetable efficiency.¹⁷ Operators are adopting technologies such as movable block, automatic driving, and intelligent dispatching to improve the capacity and automation level of the line, increase the resilience and flexibility of the system, and achieve timely responses to the changes of transportation demand according to the real-time state of passenger and freight flow.

Invest in high density, high speed, and high frequency

Density, speed, and frequency are three factors that position train travel as an efficient and convenient passenger service. On a global level, developing this level of service may be the way to grow rail modal share, and indicates significant investment in new infrastructure, digitally enabled train operations, and rolling stock.

The case for high density, high speed, and high frequency has already been made numerous times around the world. In France, Germany, Italy, Spain, and Japan, the introduction of HSR massively increased rail modal share, replacing cars for shorter distances and planes for longer distances. With the introduction of high-speed services, rail modal share doubled for the route between Berlin and Munich and between Tokyo and Ishikawa, while growing by 2.8 times between Madrid and Seville (Exhibit 8). High-speed connections are a key success factor as journey time critically impacts rail modal share when compared to air travel (Exhibit 9).

¹⁶ "Worldwide market for railway industries," SCI, 2016; "Prospects for market developments of infrastructure and rolling stock 2020," SCI Verkehr

¹⁷ "Safe, smart, and green: Boosting European passenger rail's modal share," McKinsey, October, 2021

Exhibit 8

High-speed rail can increase rail modal share – replacing cars for shorter distances and planes for longer distances

The introduction of high speed led to a more than a **doubling of modal share for rail** and a **reduction of air traffic by around 50%**

Paris to Marseille
780 km



Berlin to Munich
590 km



Rome to Milan
570 km



Madrid to Seville
530 km



Tokyo to Ishikawa
450 km



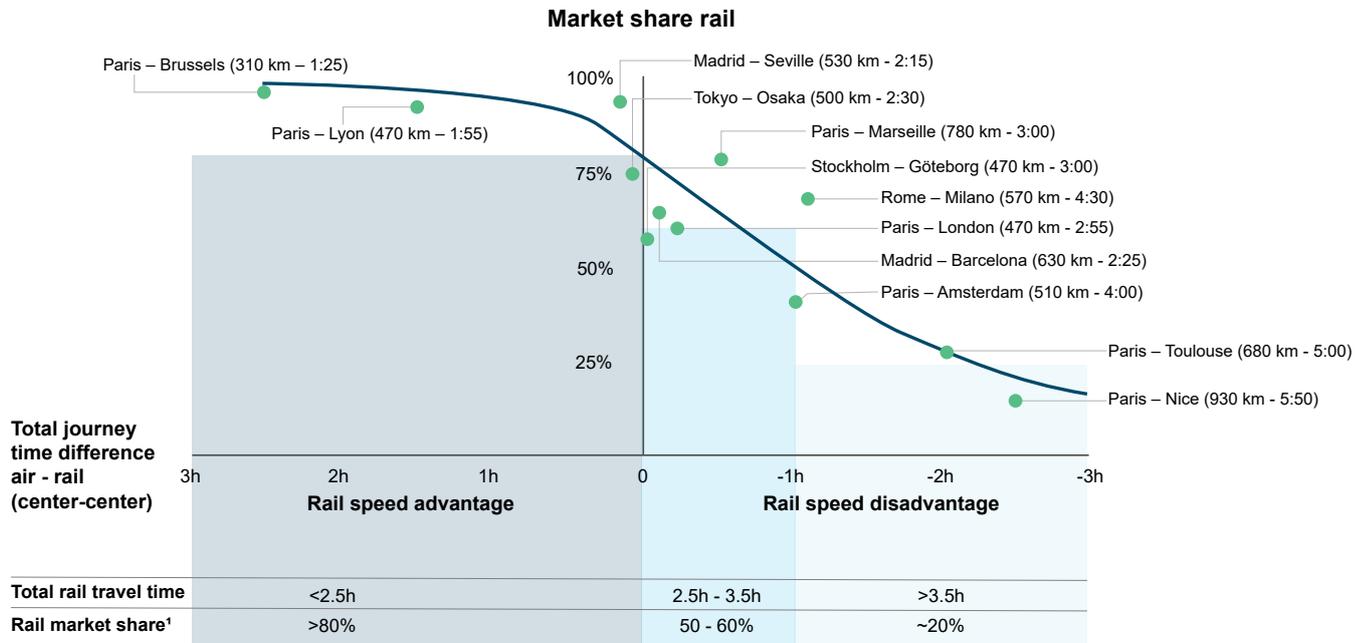
Paris to Brussels
310 km



Exhibit 9

High-speed connections are a key success factor as journey time impacts rail market share vs. air

Examples – current as of 2022



¹ Excluding road traffic volume

Source: VIC, Press articles

Various examples indicate that high-density networks and high-frequency services are key for growing rail modal share. In Eastern Europe, there are examples of two different rail strategies that yielded different results. Poland closed parts of its once dense network and consequently reduced train movements over the last 20 years. In contrast, the Czech Republic managed to keep its network largely constant and increased the number of train-kilometers offered. As a result, rail modal share in the Czech Republic increased by roughly 16 percent whereas Polish rail modal share decreased by approximately 30 percent over the same 20-year period.¹⁸

In another example, Switzerland combines dense and frequent network connections, its rail system being one of the densest and most utilized networks in Europe. As a result, Switzerland's modal share, at 12 percent above the European average, is the highest in Europe. The country's rail network is being developed further; its 2035 vision includes half-hour service on nearly all long-distance connections, and quarter-hour service on most busy long-distance connections.¹⁹

Regain an integrated perspective on the business models for rail

Rail generates four to six times less CO₂ emissions than traveling by internal combustion engine cars, and even generates less than electric vehicles. When evaluated against air transportation, rail is a more sustainable option, producing about 10 to 15 times less CO₂ per passenger.²⁰ Even if sustainability is not the first criterion that prompts passengers to choose rail over other means of transportation, interest is on the rise. McKinsey research indicates that, in recent years, consumers' preferences have been shifting away from private vehicles as awareness around shared-mobility, electromobility, and sustainability has increased.

Furthermore, as urbanization leads to increased populations within cities and city agglomerations, rail is an efficient means to relieve traffic congestion

from individual mobility in high density regions. For instance, in the Netherlands, a successful rail network "Randstadrail" was built by connecting old train tracks and existing tram/metro tracks to create a light rail line between The Hague and Rotterdam. This significantly reduced road traffic and increased the number of rail passengers from 29,000 per day in 2007 to 125,000 a day in 2018.²¹ Another example is the in the state of Washington, where the DoT estimates that high-speed rail in the Pacific Northwest could absorb at least 20 percent of intercity trips, significantly reducing congestion; it is also estimated that it could eliminate more than six million metric tons of carbon emissions.

Rail could also contribute to the growth of local GDP by facilitating the flow of people and goods between cities. This could contribute substantially to a country's advancements in welfare, as observed in countries with highly advanced HSR lines, such as China and Japan. In China, the rapid development of the HSR network since 2008 directly contributed to economic growth in large-mega cities and developed cities.²² The opening of the Wuhan-Guangzhou HSR service increased the GDP of Chibi City by 3.7 percent through increased tourism and industrial-sector traffic.²³ HSR also generates welfare gains through improved employment mobility and job rates. In Japan, the Shinkansen significantly increased economic activity in Nagoya, a hub between Japan's largest cities Tokyo and Osaka/Kyoto, which in turn increased employment by 11 percent.²⁴

However, despite these advantages, there are challenges to be overcome when growing rail modal share. Specifically, there are challenges associated with getting all stakeholders to collaborate towards the shared goal of increasing rail modal share. There are three topics to consider:

Perception of rail as mode of travel: When travelling by car or plane, the passenger's perception of the journey is one of seamlessness. For plane travel or car hire, customers can evaluate offers and book with a simple cost or fee structure.

¹⁸ Based on Eurostat data: Modal split of passenger transport

¹⁹ Safe, smart, and green: Boosting European passenger rail's modal share," McKinsey Research, October, 2021

²⁰ Ibid

²¹ Ibid

²² Mengjie Jin, KC Lin, Wenming Shi, Paul Tae-woo Lee, Kevin X Li, "Impacts of high-speed railways on economic growth and disparity in China", Transportation Research Part A Policy and Practice, August 2020

²³ Jibo Yu, Yuanhang Zhou, Qian Huang, Xuemei Li, Yiwen Hou, Xu Wang, "Analysis of the Impact of High-Speed Railway on County Economic Development Based on the Synthetic Control Method: The Hubei Province in China", *Mathematical Problems in Engineering*, vol. 2021, November 23, 2021

²⁴ Kazunobu Hayakawa, Hans Koster, Takatoshi Tabuchi, Jacques-François Thisse, "How high-speed rail changes the spatial distribution of economic activity: Evidence from Japan's Shinkansen," *VoxEU*, April 8, 2021

In the case of owning a car, the 24/7 availability is also a likely friction factor that can prompt passengers not to choose rail.

Rail can present more challenges from a passenger perspective; there are fixed timetables, the necessity of changing trains, different tariffs and pricing schemes between different operators, discount regimes that may not apply to the whole journey, publicly subsidized tariffs, and many other nuances. Hence, travelers nowadays who prefer ease and simplicity are confronted with a rail travel system that has numerous complexities to be researched and understood.

Increased offerings from operators: While market liberalization, for instance in Europe, has led to new offerings, market entry still remains difficult: Planning interfaces between transport authorities, network managers, and operators that are neither digitized nor standardized can bring a lot of operational burden. This makes planning and running a train across different networks significantly more challenging than running a car, a bus, or a plane from an operator's perspective. While the need for interoperability of networks and higher capacity of existing infrastructure has been identified, the roll-out of digitization programs able to address those topics has been delayed in many regions of the world.

To compound the operational challenges, the financial case for increasing offerings is not always clear, as cost and benefits are often distributed unevenly among the different stakeholders. When it comes to cross-network offerings, operators often face different toll systems and subsidy schemes leading to contradicting incentives. For example, running a coupled train every second hour incurs half the infrastructure charges compared to running a single train each hour. In addition, some tracks are charged by train kilometers and others by passenger kilometers.

These complexities have led to a situation where there are relatively few new entrants—even in markets with a clear competitive framework. And where new entrants do exist, they are mainly incumbent rail operators from neighboring countries. The overall approach of market regulation and financing of train operations could benefit from first evaluating the socio-economic value of a new offering, and then deciding on the right distribution of costs and incentives.

Development of the infrastructure: The same is true for the question of network expansions. Rail projects need to demonstrate their individual socio-economic advantages, or in some cases even a positive business case to secure investment.

While the societal advantages of decreased CO₂ emissions, and city congestion, as well as rail's increased stimulus to regional economic development have been clearly shown, the individual business case for rail expansion is not as easy to make. Going forward, policy makers could consider how decisions are taken and how current regulation and incentive mechanisms might impact rail expansion. Policy makers could consider the following questions:

- How could operators adapt rail pricing appropriately for passengers who are planning to travel by car, and who make marginal cost comparisons based on this?
- How could policy makers adapt track fees and concession models to encourage a broader offering, while still benefitting from the premiums that operators charge?
- Could the systemic advantages across stakeholders be re-evaluated when calculating expansion or upgrading business cases?

Operators could follow a tailored approach depending on their situation



The measures outlined in the three horizons could help rail operators adjust service offerings to today's context, grow rail modal share, and transform rail to become a more sustainable option when compared to alternative modes of transportation. However, operators may need to adopt a tailored approach depending on their current rail service characteristics and network maturity. This section presents four archetypes of rail networks—based on the density of train service, passenger rail's modal share, and the type of governance in place—and outlines how operators can consider the most relevant levers to grow or recover modal share, depending on their priorities.

The four archetypes are as follows:

Mature networks with established high-speed capacity and steady rail modal share (mainly Western Europe)

In this archetype, operators may need to restore the service to 100 percent as a first step, then focus on adapting offerings and communicating with customers to attract new riders to account for the lost ridership travel due to new working habits. Operators could also continue to develop new services and partnerships to expand the value proposition around convenience, end-to-end journey, and overall passenger experience.

In addition, efforts to increase modal share may include increasing capacity where possible—through digitalization for instance—and promoting rail as a green, efficient, reliable, and comfortable transport option as travelers are likely to be green conscious.

Mature networks without high-speed capacity (mainly Eastern Europe)

In this archetype, there is no pressing need for a COVID-19 recovery plan as the passenger

base may not have another transport option. The challenge is around significantly increasing rolling stock capacity, especially for commuter rail, to offer a reliable alternative to road transport.

Therefore, the focus could be on ensuring the basics are in place and developing an offering focused on convenience, including the end-to-end journey, and high speed.

Fast-growing and nationalized railways (e.g., Middle East)

In this archetype, there is no need for recovery, as capacity is likely limited and often enough to meet demand. Operators within this archetype could focus on enlarging both the network and rolling stock fleet capacities, with an acceleration of investments in new infrastructure, such as high-speed capacity to capture untapped demand.

The main levers for growing rail passengers could include ensuring the basics are in place—especially safety, regularity, punctuality, and cleanliness—and ramping up service.

Freight-focused railways with passenger services as a second priority (e.g., North America)

In this archetype, the first goal is to restore the service to pre-COVID-19 levels by anticipating passenger needs and communicating availability of the service.

Longer-term, the goal is to achieve a customer mindset shift which positions rail as a modern and efficient mode of passenger transport. This would likely require investments in high density, high speed, and high frequency—with frequency and speed as a top priority. Operators could also focus on improving the passenger experience, for business travelers in particular, and magnifying the sustainability angle of rail transport.

Conclusion

Opportunities exist for rail operators to restore passenger rail to pre-COVID-19 levels and gain modal share. Rail operators that focus on restoring and growing the passenger base, and promoting opportunities to travel, as well as creating viable option for riders have potential to succeed.

Growing rail modal share has become a necessity in the face of climate change, the increasing oil price, and expanding populations that need access to transport.

To drive impact and significantly increase rail's modal share, optimizing what already exists will likely not be enough. The following actions could help all stakeholders to grow passenger rail modal share:

- Railway operators may want to create a strong vision of what their service offering in ten, twenty, or thirty years could be, and identify the required capabilities in terms of people, technology, and infrastructure—as well as the amount of investment they will likely need—to turn their vision into reality
- Infrastructure managers could simplify access to their networks so that new offers can be brought to the market quickly—this might include a harmonization of technological systems or a digitized interface for planning and agile service delivery
- Policy makers could assess their current modal share and define concrete objectives that help to inform their future investment policies

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