Source: GIZ

From trucks to tracks

Promoting rail freight transport in emerging economies

Emerging economies, Railway, Freight transport

Freight rail is one of the most energy-efficient and least carbon-intensive way to transport goods. We look at the trends, goals, barriers and actions of selected emerging economies (India, China, Indonesia, Mexico) in this area. Is there government ambition and already progress for modal shifts from road? What is the role of climate protection and other policy objectives? Are barriers overcome with innovative approaches? Where does international technical cooperation come in all of this? And what common themes, patters or solutions emerge when comparing the country cases?

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Railways are one of the most energy-efficient, safest, and least carbon-intensive ways to transport goods. As part of a balanced multimodal transport system, they support economic integration, competitiveness and trade. In most regions of the world, however, rail has either been losing market share to road freight over the past 10 to 20 years or has hardly changed, often despite government plans to shift more freight to rail.

In Europe, a political renaissance for rail freight is underway, driven by the decarbonization agenda as well as by its resilient performance during the pandemic. Furthermore, shifting from road transport to rail or inland waterway is the most popular freight action in the national climate strategies submitted to the UNFCCC, according to the tracker of climate strategies for transport of the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and the SLOCAT Partnership on Sustainable, Low Carbon Transport.

This article illustrates key challenges and policy solutions in advancing intermodal freight transport, particularly in the context of emerging economies. The experiences of India, Mexico, China and Indonesia are reviewed in this regard. These countries cooperate with GIZ on strategies for greener freight transport and on putting their modal shift objectives into practice, with funding from the German government's International Climate Initiative and from the Federal Ministry for Economic Cooperation and Development. The article highlights selected cooperation activities.

China

The Chinese government has strongly promoted the development of a multimodal freight transport system in recent years. A key element are the Multimodal Freight Transport Hubs (MFTH) that serve as connection between road, rail, rivers, sea and air. Railways are considered the backbone of the system in which other modes are integrated. They currently account for 9.5 % of all freight transport in China, compared to 74.5 % for road freight.

A set of action plans provide the political foundation, including for example: the

'Medium and Long-term Development Plan for the Logistics Industry (2014-2020)', the 'Action Plan for the Construction of Logistics Corridors (2016-2020)', or the 'National Logistics Hub Layout and Construction Plan' etc. The latter was enacted in 2018 and aims to complete the construction of the multimodal transport system by the end of 2025. Advanced standardized intermodal facilities and equipment shall be widely used for mainline transport and regional distribution throughout China with a common set of rules and specifications, following the vision of "one single system" logistics.

Up to 2022, over 40 MFTH have already been build (*Figure 1*). In addition, the railway infrastructure serving the hubs is advancing rapidly as the Ministry of Transportation along with other agencies supports over 100 port consolidation and transportation railroad projects. It is also reported that the service efficiency of the MFTH has been steadily improving through initiatives like express trains between certain hubs or double decker container trains. Moreover, multimodal transportation hubs are increasingly rich in service types and develop innovative intermodal solutions, e.g. rail-air connections for high-value goods.

Multiple challenges remain however for developing the MFTH system. First, many constructions of the hubs and the transport networks are behind their planned schedule and thus the multimodal connectivity remains limited in many places. Second, there is a serious lack of multimodal transport operators who could integrate various transportation resources and assume full transportation responsibilities. Third, the exchange of information along the transport supply chain is far from seamless and efficient as a standard system could not yet be operationalised. There are many data islands. These further weaken the administration's limited ability to evaluate the latest market dynamics and the MFTH's service quality, or to plan further projects.

To address the latter issue, the Sino-German Cooperation on 'Low Carbon Transport' project of GIZ China has supported the Transport Planning and Research Institute of MoT on a pilot project to "Establish & Implement an Evaluation System for MFTH Management in China". Taking reference from international experience, it is designed to objectively evaluate the development status and service level of MFTH, to provide a scientific basis for the government's decisions, to improve the service level of MFTH for enterprises, and eventually to promote China's high-quality development of intermodal transport. The government is currently planning further action to establish an MFTH assessment system.

Mexico

Most of the Mexican rail services are freight-oriented. The network of 23,731 kilometers connects industry with ports and with the U.S. border. Less than 1 % is electrified. The main products transported by rail are corn, cement, containers and iron and steel for the automotive industry.

Railways transport a significant 13.6 % share of freight in Mexico. They come third after road transport (56 %) and maritime transport (30 %), according to 2017 government figures which include international transports. Rail freight even slowly gained market share over the past three decades, yet it stagnated in recent years. The positive trend resulted from major rail reforms in the 1990s from a publicly run rail service to a rail system under private concessions, which made freight tariffs drop and boosted private investments in infrastructure and services.

Mexico's transport model, based on concessions, has favoured infrastructure development in the regions with the highest economic growth to the detriment of less developed areas. This, together with the lack of comprehensive long-term planning and criteria for the allocation of investment based on the needs of the population, has led in recent years to a disorderly growth of transport, deterioration of infrastructure and concentration on road transport as the main means of transport. There is an oligopoly of rail concessionaires who barely compete as they operate on separate corridors that are poorly connected. In addition, investments in infrastructure need a boost – basically no new tracks were built over the past two decades.

To address underinvestment, the Mexican government launched an infrastructure development strategy 2020 to 2024 which includes a sectoral programme on transport. It aims to encourage the construction of railways for freight transport in areas with economic development potential to improve network connectivity in production centres and ports. In 2021, twenty-one passenger and freight rail projects were in different stages of development worth EUR 23 billion of investments, with many projects in the less developed Southeast.

The strategy explicitly recognizes rail freight as an intervention that can cut CO_2 and air pollution and thus contribute to Mexico's international climate goals. Mexico has pledged reduce a total of 48 Mt CO_2eq by 2030 from the transportation sector. The NDC lack further details on freight sector action yet the need for a greener freight system is evident by the fact that close to 60 % of air pollutants in Mexico are caused by freight vehicles.

To generate the conditions and incentives towards a multimodal freight market, the Ministry of the Environment and Natural Resources and the Ministry of the Communications, Infrastructure and Transportation cooperate with the GIZ Sustainable Transport Program in Mexico. The Ministry

Figure 1: MFTH operation in China Source: UPS

Figure 2: Bulk goods transport in Mexico Source: GIZ

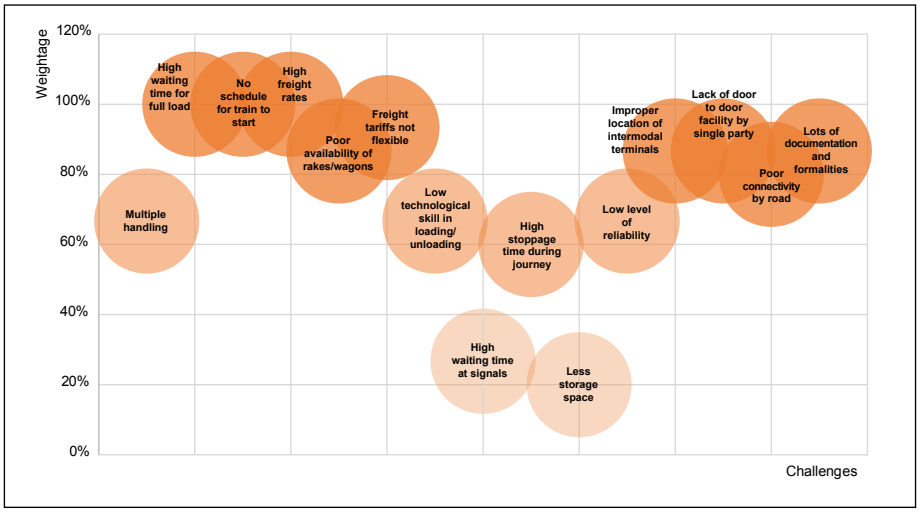

Figure 3: Challenges in Rail Freight Movement Source: Stakeholder Survey by Tanya Mittal, 2020

Figure 4: Rail loading dock in Indonesia Source: GIZ

of Economy and the Railway Transport Regulatory Agency (ARTF) are also involved, especially for the development of regulations for quality infrastructure and good practices in the railway system.

To highlight the benefits associated with rail, the National Private Transport Association and GIZ jointly developed a calculation tool for GHG emissions and air pollutants for freight transport. A pilot application of the tool for companies that use two major freight transport corridors from Mexico City to La Paz and to Mexicali demonstrated that road-rail intermodal transport emits about less 50 % CO_2 and around 30 % less air pollutants than road transport. With these results, the ANTP will promote modal shift to companies across Mexico. The tool also enables companies which already go intermodal to estimate their transport emissions and use the results for reporting and marketing.

Mexico has committed internationally to reduce a total of 48 Mt CO_2eq by 2030 from the transportation sector through its NDC. The NDC doesn't contain further details on freight sector action, but the need for mitigation is evident by the fact that close to 60 % of air pollutants in Mexico are caused by freight vehicles.

India

The Indian Railways (IR) operates the 4th largest network in the world with 123,542 kilometres of tracks. By 2019, it had employed 1.3 million people becoming world's eighth largest employer. About 9,146 freight trains runs daily on its network moving at a slow average speed of 24 kmph. Though, the rail freight traffic is increasing over the years, the sector is unable to uphold surge in freight share and facing a continuous decline since 1950 falling from 89 % to below 20 % of freight volume in 2020. Bulk cargo like coal, iron ore, cement, fertilizers and food grains make up 90 % of the transported commodities. Freight transport remains the major revenue earner for IR, at 64 % during FY19. The profits are used to cross-subsidise the passenger segment.

Why shippers in India increasingly prefer road over rail-based transport can be seen from *figure 3*. The market perceives railways as too slow, too expensive, less reliable, and not well connected to other transport systems.

The Government of India (GoI) aims to reverse the trend. India's institution for policy planning Niti Aayog targets a freight modal share of 45 % by 2030. To achieve this, the GoI has substantially increased the annual capital expenditure for increasing rail capacity and improving rail infrastructure to EUR 625 billion by 2030 (which is 4 times the level in 2014). On top of that, India wants a 100 % electrified network of broad-gauge railway by the end of 2023 – and is on track to achieve that goal.

To identify priority projects, IR announced the National Rail Plan (NRP) in 2020. It aims to create capacity that would accommodate growing traffic demand, and to increase efficiency and profitability of IR. Part of the plan are dedicated freight corridors with higher carrying capacity and speed that shall be constructed with private investments with fully electrified double stack container facilities.

Building on the NRP, the Ministry of Commerce and Industry launched the GatiShakti National Masterplan for Multimodal Connectivity in October 2021. The masterplan has a huge EUR 1.2 trillion budget and is designed to integrate and coordinate the infrastructure projects of 18 ministries to break departmental silos, integrate various transportation modes and address issues relating to last mile and multi-modal connectivity. More recently, in December 2021, the Ministry of Railways came out with the "GatiShakti Multi-Modal Cargo Terminal" policy, aiming to establish 100 new terminals within three years. A National Logistics Policy is also under preparation, targeting to cut logistic costs from 14 % to 10 % of GDP.

The Green Freight India Project by GIZ is assisting the Ministry of Commerce and Industry and logistics actors to make these plans work. It delivers knowhow on how multimodal logistical infrastructure is governed in Germany and in Europe, and it supports government initiatives with a potential to save CO_2 emissions from freight transport in India.

One specific area of cooperation is the revitalization of Roll-on Roll-off (Ro-Ro) services where whole trucks are loaded on rail wagons and thereby achieve savings in travel time, truck maintenance costs and emissions. A pre-feasibility study for potential corridors for starting Ro-Ro services found that their currently limited commercial viability could be improved with dis-

counted haulage rates. Additional recommendations relate to designing Ro-Ro wagons that can handle larger trucks, to developing suitable facilities in terminals, to choosing rail link routes with spare capacity, or to involve private operators in traffic consolidation and service delivery.

Another project milestone is the launch of online 'Freight GHG Calculator' which shippers, operators and logistic service providers can use for calculating and comparing total cost of transportation and GHG emissions between various modes of transport for a fixed Origin-Destination pair. IR is using the calculator to award its freight customers with 'rail green points' which they can use for PR purposes, and to raise awareness of rail's environmental benefit.

Indonesia

Indonesia is another regional giant in Asia, home to more than 270 million people and a per capita GDP of USD 4,292 in 2021. Railways are used for goods transport on the main islands Java and Sumatra which are both economic production centres and geographically large enough for railways to make sense.

Indonesia's railways transported 53 million tonnes of goods in 2021, 10 % up from the previous year. Freight transportation has become a lifeline for the business of the country's rail operator PT Kereta Api Indonesia amid the Covid-19 pandemic. Coal has historically been the dominant commodity, accounting for about 75 % of the volume and mainly on Sumatra. The rail-based transport of containers, cement and fuel products has also grown significantly, yet at a lower level and predominant on Java.

The Ministry of Transportation plans to boost rail freight. Since 2018, the Ministry's Railway Masterplan aims for a modal share 11 to 13 % of the total national freight market or 534 million tonnes by 2030. This would be a 10-fold growth from today's volume. In addition, the National Logistics System Policy as well as Indonesia's NDC Roadmap endorse rail freight as a strategy to strengthen logistics performance and to mitigate transport CO_2 emissions.

However, the path to multiplying rail freight in Indonesia is filled with challenges. In the private sector, there is low interest to undertake rail infrastructure projects because intermodal rail freight is perceived as unattractive by logistics industry players. Rail freight transport has low demand for several reasons, including high costs and low quality of service – e.g. low frequency of trains, long transit or waiting times, and multiple handling risks (see *Figure 4*). There are also only very few rail freight service providers and thus a lack of business innovation and of tariffs that can compete with trucking services.

The root cause of the low competitiveness of rail freight compared to trucks is the lack of adequate infrastructure. This means substantial investment is required to make rail competitive with road transport. However, for Java Island, the government's priority programmes in the next five years will focus more on developing passenger transportation. Considerably less budget has been allocated for rail freight projects such as connections between ports and the railway system. Despite the ambitious modal shift target, strong political drive and a clear action plan are not yet in place. Because of these challenges, potential investors remain cautious.

The GIZ TRANSfer project used its funding from the German government's international climate initiative to lead a three-year dialogue with the Ministry of Transportation, the railway operator, other government agencies and the logistics industry with a view to address the challenges. In the process, the Ministry introduced simplified licensing requirement for multimodal transport operators and included several port-rail connection projects in its 2020 to 2025 Five-year-plan and in the government's list of infrastructure projects of strategic priority. The government also issued Presidential Regulations in 2019, 2021 and 2022 to support rail port integration and rail sidings to industrial areas in various provinces of Java.

Nonetheless, the various projects seem to be stuck in the pipeline, with little progress in planning or implementation. To mobilise momentum and financial resources from international development banks, GIZ has proposed to bundle the various project under the umbrella of a rail-port connectivity investment programme. The idea is to adopt a unified approach in project planning and preparation, and especially funding and financing, while still recognising the individuality of each project. The programmatic approach aims at achieving larger scale impacts and creating an opportunity for donor agencies to invest additional and focused funding.

Conclusion

The four case studies signal a positive outlook for rail freight in emerging economies. Governments recognise the role of rail in an integrated multimodal transport system and have set ambitious goals for rail freight. The modal shift policies are motivated by a desire to develop efficient national logistics systems that strengthen competitiveness and economic development.

Furthermore, the various strategies recognise railways as a relieve for congestion, accidents, air pollution as well as growing transport CO_2 emissions. Significant public investments in rail and terminal infrastructures have been planned in all four country cases. Not least since the pandemic, freight transport has become a lifeline for the domestic railway operators.

Impacts from the policies and investments will take years to materialize. The choice for rail will remain challenged by a multitude of factors such as the perception and demand by shippers, by the alignment of various policies and actions, or by the level of competition between transport modes.

Infrastructure expansion is critical for success but must be complemented by an enabling environment for multimodal service providers, by investments in the monitoring of freight data and in policy evaluation, by a fair regime of taxes, incentives and subsidies for different transport modes, and by digitalisation and innovation. All this requires a sufficient set of decision-makers in each country who are committed to support the rail freight agenda. International cooperation helps to strengthen their capacity in developing effective policies and projects. ■

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