

Macroeconomics, Trade & Investment

MTI Practice Notes

Logistics Infrastructure Along the Belt and Road Initiative Economies

Christina Wiederer

Introduction

Logistics is the network of services that support the physical movement of goods, trade across borders, and commerce within borders. It comprises an array of activities beyond transportation, including warehousing and storage, terminal operations (e.g. in ports and airports), express delivery, customs brokerage, as well as data and information management. The global turnover generated by logistics exceeds US\$ 4.3 trillion.¹

A country's logistics performance is key to a country's productivity and its attractiveness to outside investment.² Inefficient logistics raise the cost of doing business and reduce the potential for international and domestic market integration, especially for developing countries. The gains from improving logistics performance are especially high in poorer

countries. Increasing the logistics performance of a low-income country to the average performance of a middle-income country can increase trade by 15% or more.³

Better logistics allow more market access and can thus foster trade.⁴ Failing to move goods seamlessly hampers trade: a one-day delay at the border leads to an average 1% decrease in trade.⁵ Better logistics have a greater effect on trade promotion than tariff cuts: Logistics costs influence trade costs more than tariff barriers in most countries.⁶

Global production chains also depend on a robust logistics sector. Coordinating the various stages of product development, component production, and final assembly requires the ability to move goods across borders quickly, reliably, and at low cost. A lack of logistics infrastructure is one of the main reasons for companies to abstain from extending their procurement network to emerging and developing countries.⁷

¹ Boston Consulting Group (2016): *Transportation and Logistics in a Changing World: The Journey Back to Profitable Growth*. Boston: Boston Consulting Group.

² Hausman, W.H., H.L. Lee, U. Subramanian (2013): "The Impact of Logistics Performance on Trade". *Production and Operations Management* Vol. 22, No. 2, March-April 2013, 236-252.

³ Qureshi, Zia (2011): "The G-20 and Global Development". In: World Bank (2011): *Postcrisis growth and development*. Available at <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/0,,contentMDK:22757059~pagePK:64165401~piPK:64165026~theSitePK:469372,00.html>, 119-151.

⁴ Carruthers, R., J.N. Bajpai, D. Hummels (2004): "Trade and Logistics: An East Asian Perspective". In: Krumm, K., H. Kharas, eds.: *East Asia Integrates: A Trade Policy Agenda for Shared Growth*. Washington, DC: The World Bank, 77-94.

⁵ Djankov, S., Freund, C., Pham, C. (2006): "Trading on Time". *World Bank Policy Research Working Paper* 3909. Washington, DC: The World Bank.

⁶ Gonzalez, J.A., J.L. Guasch, T. Serebrisky (2008): "Improving Logistics Costs for Transportation and Trade Facilitation". *World Bank Policy Research Working Paper* 4558. Washington, DC: The World Bank.

⁷ Straube, F., A. Özgen, O. Ouyeder (2011): *International Procurement – Challenges and*

This note summarizes information relevant to understanding the logistics infrastructure-related bottlenecks impeding international and intra-regional connectivity along the Belt and Road Initiative (BRI) economies. Data originates in the Logistics Performance Index, published by the World Bank⁸.

Key Findings

- The developing countries that are part of the BRI exhibit substantial gaps in trade- and transport-related infrastructure.
- There are large differences in score between the BRI economies as measured by the World Bank's 2018 Logistics Performance Index: 3 of the bottom 20 LPI performers are BRI economies (Afghanistan, Bhutan, Iraq), as are 3 of the top 20 performers (Hong Kong SAR, Singapore, UAE).
- The seven BRI economies with the weakest infrastructure performance are Afghanistan (score of 1.81 out of 5), Bhutan (1.91), Myanmar (1.99), Moldova (2.02), Iraq (2.03), Mongolia (2.1) and Yemen (2.12). The four highest-performing BRI economies in terms of infrastructure are China (3.75), Hong Kong SAR (China) (3.97), United Arab Emirates (4.02), and Singapore (4.06).
- When viewed by region, BRI countries in South Asia exhibit the weakest infrastructure performance, while BRI economies in East Asia Pacific and in high income countries exhibit the highest.
- A challenge for China is that it is surrounded by several economies with high perceived infrastructure gaps, e.g. Afghanistan, Kazakhstan, Mongolia, Myanmar, and Pakistan,

leading to difficulties in land-based transit trade.

- Across BRI economies, logistics professionals perceive gaps in rail infrastructure as more prevalent than gaps in road infrastructure, with port and airport infrastructure receiving higher marks for perceived quality.
- The share of logistics professionals rating the quality of trade- and transport related infrastructure in their country of operation as having "improved" or "much improved" between 2015 and 2017 is higher than the share rating infrastructure quality as "worsened" or "much worsened". The same goes for ICT infrastructure.
- The competence and quality of rail service providers is rated as lower than the competence and quality of service provided by road, maritime, and air transport providers. Warehousing, transloading and distribution services are rated comparatively highly as well.

Structure, Sample and Ranking of the Logistics Performance Index

The Logistics Performance Index (LPI) is a multidimensional assessment of logistics performance. The 2018 edition allows for comparisons across 160 countries. The LPI is based on a worldwide survey of operators on the ground (global freight forwarders and express carriers), providing feedback on the logistics "friendliness" of the countries in which they operate and those with which they trade. They combine in-depth knowledge of the countries in which they operate with informed qualitative assessments of other countries where they trade and experience of global logistics environment.

Opportunities in Emerging Markets. BVL, German Logistics Association. Bremen: Deutscher Verkehrs-Verlag.

⁸ Arvis, J.F., Ojala, L., Wiederer, C., Shepherd, B., Raj, A., Dairabayeva, K., Kiiski, T. (2018): *Connecting to Compete 2018: Trade Logistics in the Global Economy. The Logistics Performance Index and Its Indicators*. Washington, DC: The World Bank.

The LPI measures performance along the logistics supply chain within a country and offers two perspectives: domestic and international.

In the **Domestic LPI**, logistics professionals provide qualitative and quantitative assessments of their own country of operation. It includes detailed information on the logistics environment, core logistics processes, institutions, as well as time and cost data. The Domestic LPI does not include a country ranking or country scores.

The **International LPI** provides qualitative evaluations of a country in six areas by its trading partners – logistics professionals working outside the country. In the International LPI, respondents are asked to rate 8 countries (not including their own country of operation) on a scale from 1 (worst) to 5 (best) across six core components. The International LPI's six core components are:

1. Efficiency of clearance processes (e.g. customs)
2. Trade- and transport-related infrastructure
3. Ease of arranging competitively priced international shipments (“International shipments”)
4. Competence and quality of logistics services
5. Ability to track and trace consignments
6. Timeliness of delivery

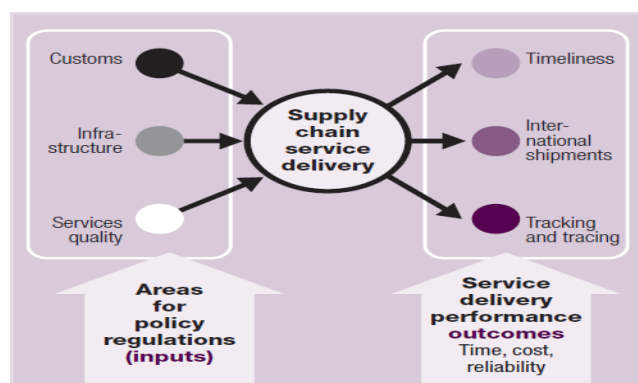


Figure 1: Input and output indicators of the LPI

⁹ Freight Forwarders are professionals whose role is to organize the movement of goods through borders and domestically, organizing consolidation, transportation by typically other providers, and dealing with trade paperwork. They work independently or as part of larger companies.

Whereas the first three components constitute areas for policy regulation (inputs), the latter three constitute supply chain performance outcomes, related to time, cost and reliability (see figure 1). The International LPI includes a country ranking which is based on countries' scores. The ranking is based on around 5,000 individual country assessments by close to 1,000 international freight forwarders⁹ around the world.

The International LPI ranking should not be over-interpreted. As in any data collection exercise, sample variations occur. Upper and lower bounds are provided for the score and the rank.¹⁰ A country's score (rather than rank) over time provides a better picture of its logistics performance. More information on the LPI methodology, including how countries are selected in the International section of the LPI survey, can be found in Appendix 5 of the 2018 report.

International LPI: Quality of Trade- and Transport-Related Infrastructure

The developing countries that are part of the BRI exhibit substantial gaps in trade- and transport-related infrastructure. The BRI economies' average score of perceived quality of trade- and transport-related infrastructure is 2.7 on a scale from 1 to 5, pointing to important gaps (Figure 2). Yet there are large differences in score between the BRI economies: 3 of the bottom 20 LPI performers are BRI economies (Afghanistan, Bhutan, Iraq), as are 3 of the top 20 performers (Hong Kong SAR, Singapore, UAE).

Among the BRI economies, China (score of 3.75 out of 5) and Hong Kong (China) (3.97) are almost on par with global best performers (G7¹¹) (4.04) in terms of perceived quality of trade- and transport-related infrastructure, and Singapore (4.06) lies above the G7 average.

¹⁰ The interval for ranks is built from the ranks corresponding to the upper and lower values in the current distribution.

¹¹ Canada, France, Germany, Italy, Japan, United Kingdom, USA

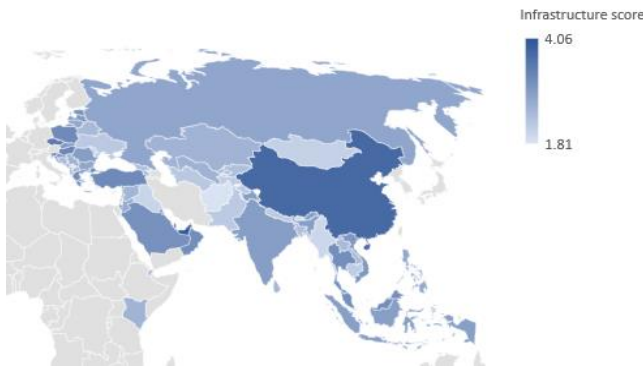


Figure 2: Quality of trade- and transport-related infrastructure of BRI economies; Source: International LPI 2018¹²

The BRI economies with the weakest infrastructure performance are Afghanistan (score of 1.81 out of 5), Bhutan (1.91), Myanmar (1.99), Moldova (2.02), Iraq (2.03), Mongolia (2.1), Yemen (2.12), Cambodia (2.14), Tajikistan (2.17), Nepal (2.19), Pakistan (2.20), and Ukraine (2.22). The four highest-performing BRI economies in terms of infrastructure are China (3.75), Hong Kong SAR (China) (3.97), United Arab Emirates (4.02), and Singapore (4.06).

A challenge for China is that it is surrounded by several economies with high perceived infrastructure gaps, e.g. Afghanistan, Kazakhstan, Mongolia, Myanmar and Pakistan, leading to difficulties in land-based transit trade. When viewed by region, on average, the South Asian BRI economies exhibit the weakest infrastructure performance among all BRI economies, whereas those in the East Asia and Pacific Region exhibit the highest (see Figure 3).

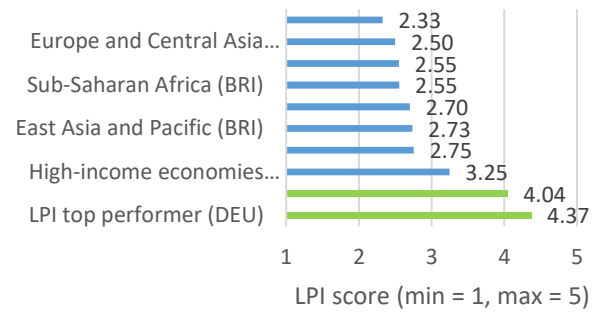


Figure 3: Average Infrastructure Score by region; Source: International LPI 2018¹³

The average infrastructure score for BRI and non-BRI economies is virtually the same. This is because the non-BRI list includes both most highly performing economies (high-income countries), but also the lowest performers.

Domestic LPI: Quality of Infrastructure by Transport Mode

A caveat for the following section: Like data from the International LPI, data in the Domestic LPI is context-dependent and reflects perceptions. In the Domestic LPI, data is based on logistics operators' perceptions of their own country of operation. In countries with mature logistics systems (those that tend to score higher on the International LPI), demands by operators tend to be higher than in countries with nascent logistics systems, leading to a higher percentage of respondents in highly performing countries rating the domestic infrastructure as lacking.¹⁴

Quality of Trade- and Transport Related Infrastructure in BRI Economies by Infrastructure Type

Question 18 in the Domestic LPI asks respondents to "Evaluate the quality of trade- and transport-related infrastructure in your country of work". Figure 4 to Figure 9 show the share of respondents answering "low" or "very

¹² The following BRI economies are not featured in the 2018 International LPI: Azerbaijan, Palestine, Tanzania, Timor-Leste

¹³ "BRI" in brackets denotes that this group only covers BRI members in a given group. Regional

groups do not include high-income economies; see separate "High-income economies (BRI)" group.

¹⁴ Data from the Domestic LPI is available for up to 28 BRI economies; the remaining BRI economies are only featured in the International Section (except for Azerbaijan, Palestine, Tanzania, Timor-Leste).

low¹⁵. Answers are grouped by infrastructure type.¹⁵

For BRI economies in the sample, the share of respondents perceiving the quality of road infrastructure as “low” or “very low” (Figure 4) is highest in Indonesia, the Russian Federation and Romania, and lowest in Singapore, Poland and Oman. For rail infrastructure, the picture looks different (Figure 5): The United Arab Emirates and Oman are among the countries with worst perceived rail infrastructure quality, together with Tanzania and Indonesia. China, Singapore and India fare best. To illustrate how context-dependent these

numbers are: the share of German respondents who perceive the rail infrastructure quality as “low” or “very low” (23%) is almost as high as the share of Indian respondents who perceive their country’s rail infrastructure as lacking (26%). The corresponding share of respondents in the top 20% of LPI performers overall at 33% is even higher, and the same goes for respondents in the G7 countries (35%, not including Japan). Given the differences in the countries’ rail infrastructure, those numbers most likely reflect that infrastructure quality demands of German logistics professionals are higher than those of their Indian peers.

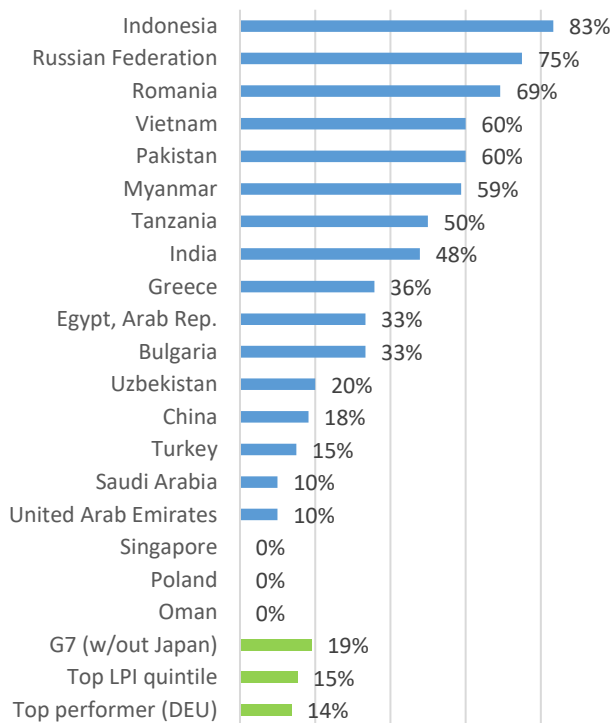


Figure 4: Quality of road infrastructure perceived as “low” or “very low”; Source: Domestic LPI 2018

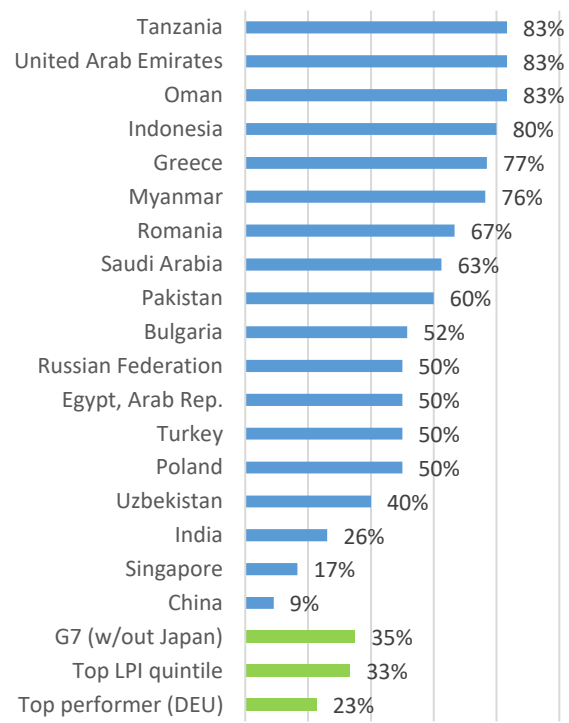


Figure 5: Quality of rail infrastructure perceived as “low” or “very low”; Source: Domestic LPI 2018

In the sample, the largest problems in the perceived quality of port infrastructure (Figure 6) are by far in Indonesia (83%), followed by Myanmar (52%), the Russian Federation (50%) and Romania (50%). In three BRI economies not a single respondent rated the port infrastructure quality as “low” or “very low”: China, Singapore, and Poland – the same as in

LPI 2018 top performer Germany (Figure 6). For airport quality (Figure 7), a similar picture emerges: Indonesia (67%), the Russian Federation (50%), Myanmar (47%) and Romania (42%) have the highest proportion of respondents rating their countries’ airport quality as “low” or “very low”, whereas none of the respondents in China and Singapore did.

¹⁵ For all charts in the Domestic LPI section: numbers for the G7 economies only include Canada, France, Germany, Italy, the UK and the

US, as Japan was not featured in the 2018 Domestic LPI.

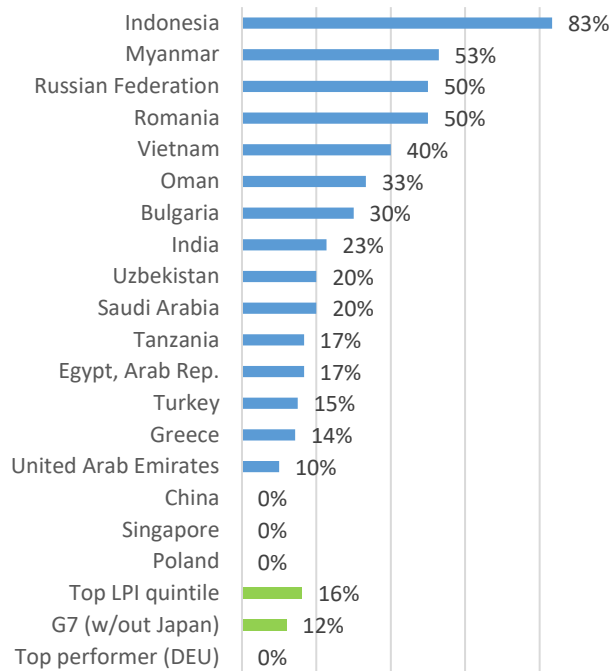


Figure 6: Quality of port infrastructure perceived as “low” or “very low”; Source: Domestic LPI 2018

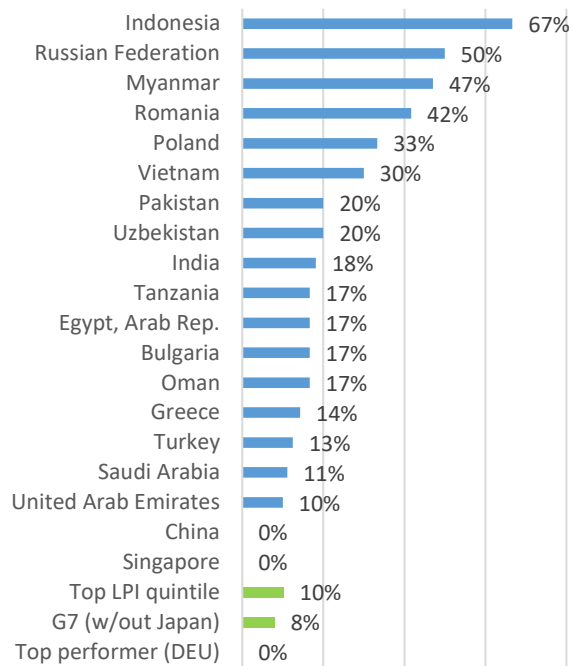


Figure 7: Quality of airport infrastructure perceived as “low” or “very low”; Source: Domestic LPI 2018

Warehousing refers to the commercial storage of goods that will be sold or distributed later. They are used by manufacturers, importers, exporters, wholesalers, transport providers and customs authorities. Warehouses are part of the logistics infrastructure of a country, along with transportation networks (road, rail, air and waterway networks), dry ports, logistics zones, inland container depots, container freight stations, and ICT infrastructure. Warehousing is essential to maintain an uninterrupted flow of goods and materials from the source to the point of consumption. For the BRI economies in the sample, the largest perceived quality issues in warehousing and transloading infrastructure occur in Uzbekistan (80%) and Vietnam (60%) (Figure 8). The least problems are seen in

Poland, Singapore, the Russian Federation (0% each), as well as China and Romania (8% each). Telecommunications and IT infrastructure is relevant to logistics operations as it allows for rapid information sharing among all supply chain actors, which is indispensable for modern production processes and the avoidance of stock-outs and the need for expensive buffer stocks. The highest perceived quality gaps in telecommunications and IT infrastructure in the BRI sample are in Indonesia (67%), Uzbekistan (50%) and the Russian Federation (50%) (Figure 9); the lowest gaps are in Oman, Singapore, the United Arab Emirates (0% each) and India (4%). As for the comparator countries, quality gaps in telecommunications and infrastructure are perceived as higher in the G7 countries (8%; not including Japan) and Germany (14%).

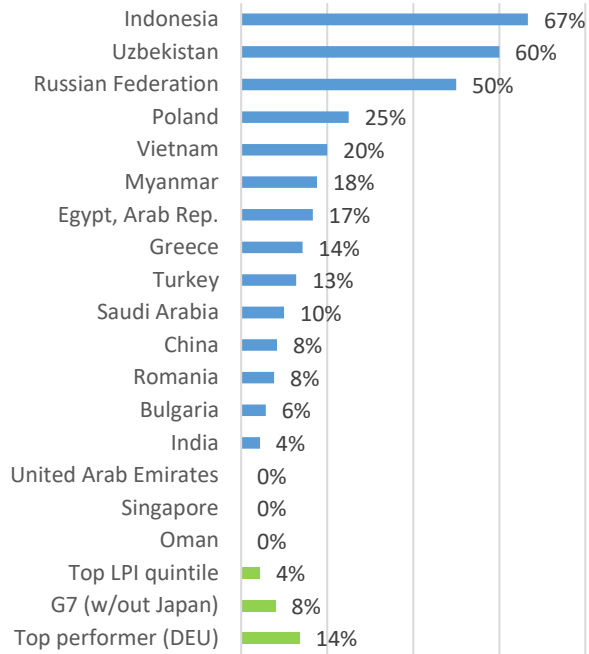
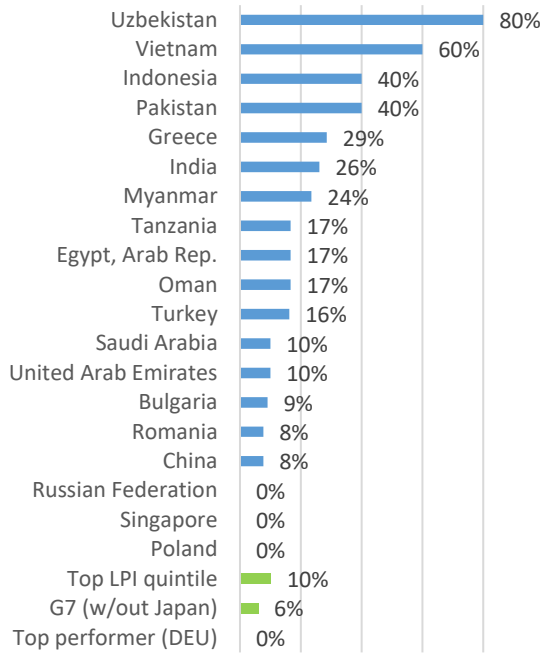


Figure 8: Quality of warehousing/ transloading infrastructure perceived as “low” or “very low”; Source: Domestic LPI 2018

Figure 9: Quality of telecommunications and IT infrastructure perceived as “low” or “very low”; Source: Domestic LPI 2018

Figure 10 shows changes in the perceived quality of trade- and transport-related infrastructure (e.g. road, rail, port, airport, warehousing, and telecommunications infrastructure) in select BRI economies since 2015. Answers are grouped by “much worsened or worsened” and “improved or much improved”.¹⁶ China stands out as the

country with the highest share of perceived improvements (92%), followed by Singapore (88%), Oman (83%), Pakistan (80%) and Uzbekistan (80%). Countries where respondents perceived few positive changes include the Philippines (25%), Romania (25%), the Russian Federation (25%) and Nepal (0%).

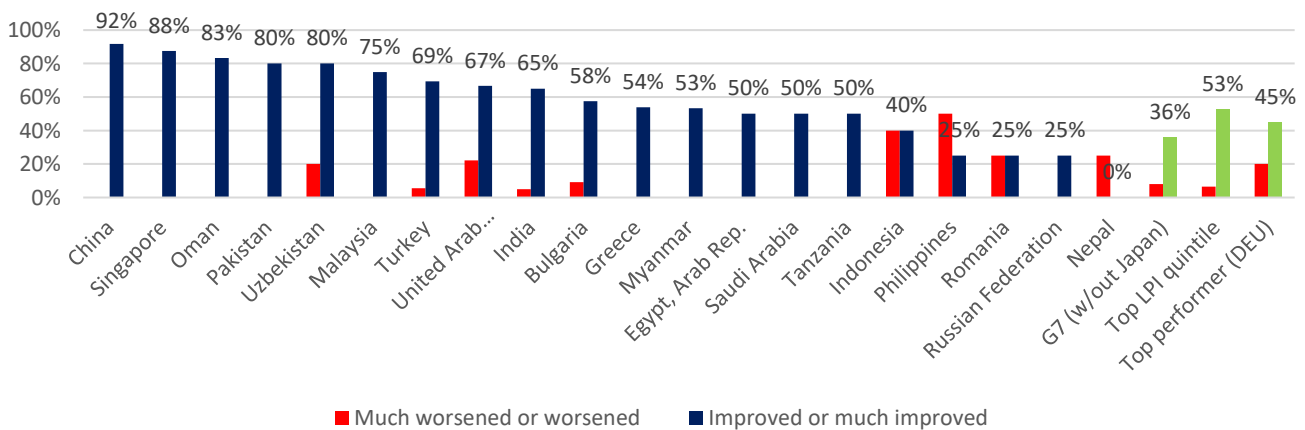


Figure 10: Changes in the perceived quality of trade- and transport-related infrastructure in BRI economies since 2015; Source: Domestic LPI

¹⁶ Improvements are marked in blue for BRI economies and in green for comparators; worsened

values are marked in red. Data labels refer to “improved or much improved” category

Figure 11 shows changes in the perceived quality of telecommunications and IT infrastructure in BRI economies since 2015. Answers are grouped by “much worsened or worsened” and “improved or much improved”.¹⁷ China again stands out as the country with the highest share of perceived

improvements (91%), followed Bulgaria (88%), Myanmar (87%), Greece (85%) and Egypt (85%). The corresponding figure for the top LPI quintile is 67%. BRI countries with the lowest share of perceived positive change in quality of telecommunications and IT infrastructure are Indonesia (40%) and the Philippines (0%).

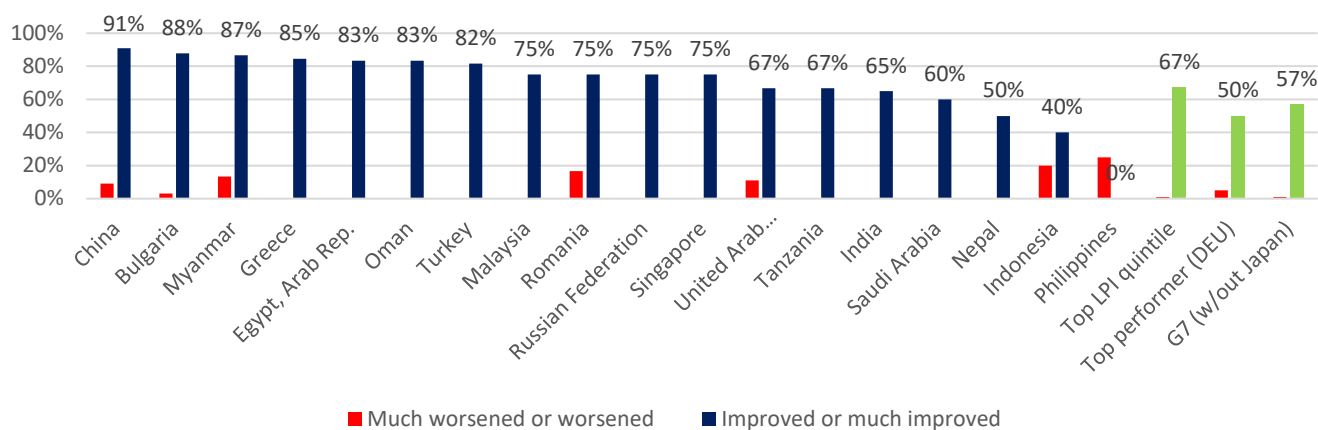


Figure 11: Changes in the perceived quality of telecommunications and IT infrastructure in BRI economies since 2015; Source: Domestic LPI

Competence and Quality of Logistics Services in BRI Economies by Services Type

Question 19 in the Domestic LPI asks respondents to "Evaluate the competence and quality of service delivered by the following in your country of work". Figure 12 to Figure 16 show the share of respondents answering "low" or "very low". Answers are grouped by services type.

The share of respondents perceiving the competence and quality of road transport service as “low” or “very low” is highest in Uzbekistan (80%) and the Philippines (50%), and lowest in Saudi Arabia (11%), China (8%) and Singapore (0%), i.e. in those countries satisfaction with road transport services is highest (Figure 12). As for rail transport service, its quality is perceived as “low” or “very low” mostly in Vietnam (90%), Myanmar (82%), Oman (80%) and the Philippines (75%) (Figure 13).

¹⁷ Improvements are marked in blue for BRI economies and in green for comparators; worsened

values are marked in red. Data labels refer to “improved or much improved” category.

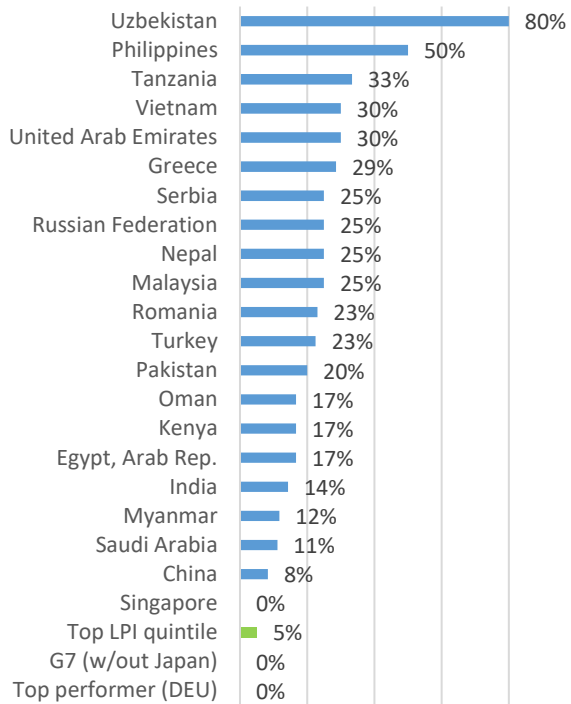


Figure 12: Competence and quality of road transport service providers perceived as “low” or “very low”;
Source: Domestic LPI 2018

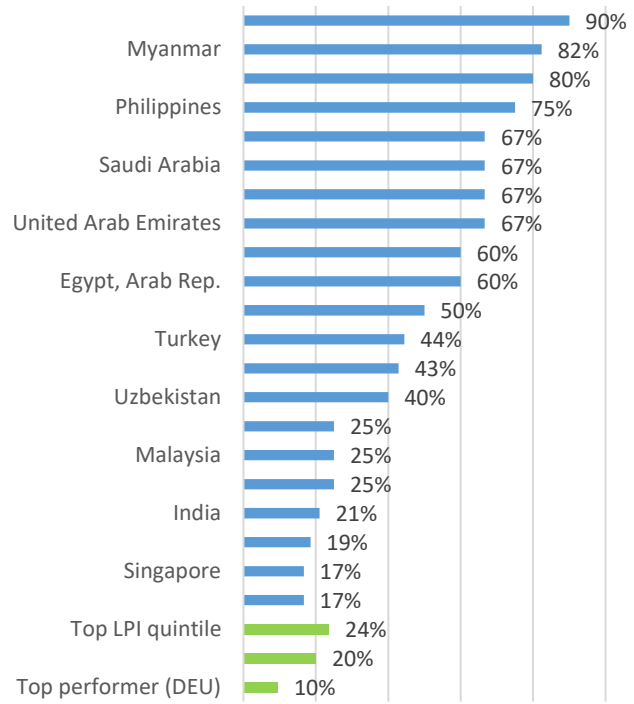


Figure 13: Competence and quality of rail transport service providers perceived as “low” or “very low”;
Source: Domestic LPI 2018

The competence and quality of maritime transport service providers is not a major bottleneck in BRI economies featured in the 2018 Domestic LPI. Only between 0 and 25% of respondents in all featured economies rate maritime transport service quality as “low” or

“very low” (Figure 14). The picture looks different for air transport services, where 75% of respondents in Nepal and 60% of respondents in Uzbekistan indicate that the competence and quality of air transport service providers is “low” or “very low” (Figure 15).

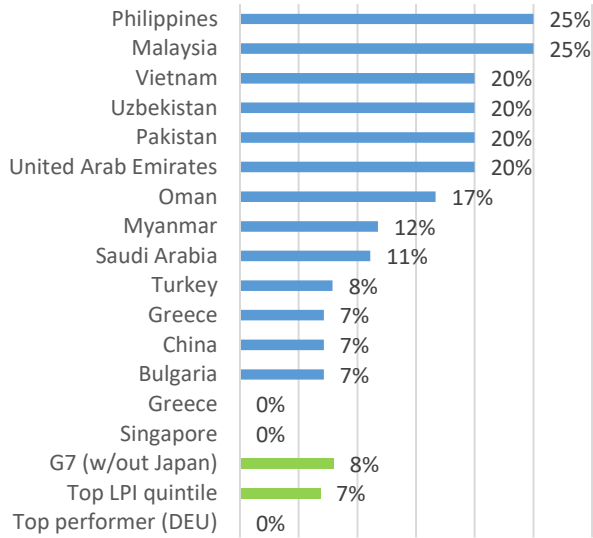


Figure 14: Competence and quality of maritime transport service providers perceived as “low” or “very low”; Source: Domestic LPI 2018

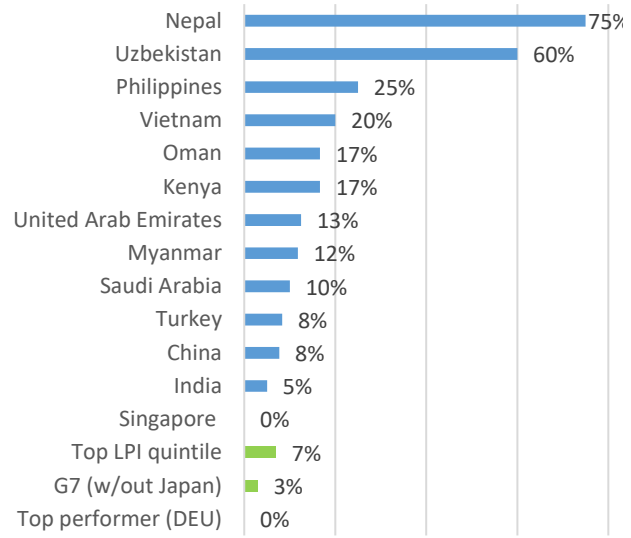


Figure 15: Competence and quality of air transport service providers perceived as “low” or “very low”; Source: Domestic LPI 2018

The quality of warehousing, transloading and distribution operators is perceived as reasonably high in BRI economies in the sample, with the highest rating in Singapore, Oman, and China (0% each of respondents indicating “low” or “very low” quality (Figure

16). In the top performing countries (Germany, G7 economies, and the top LPI quintile), only between 0 and 5% of respondents perceive the quality of warehousing, transloading and distribution operators as “low” or “very low”.

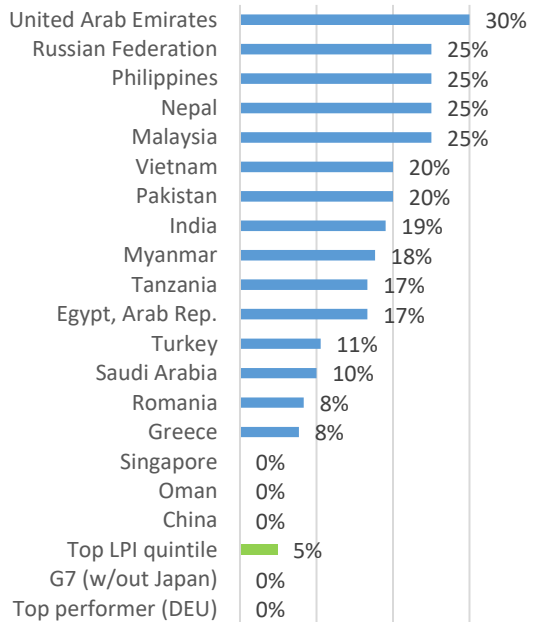


Figure 16: Competence and quality of warehousing, transloading and distribution operators perceived as “low” or “very low”; Source: Domestic LPI 2018

Conclusion

Several countries that are part of the BRI have large gaps in trade- and transport-related infrastructure, constraining their productivity, raising the cost of doing business, and reducing attractiveness to outside investors. As gains from improving logistics performance are especially high in poorer countries, improving trade- and transport-related infrastructure (along with logistics performance overall) in developing countries that are part of the BRI could increase trade as well as enhance international and domestic market integration. Improving logistics performance in those countries could lower logistics costs and enable countries to become part of international procurement networks.

Coordinating the various stages of product development, component production, and final assembly requires the ability to move goods across borders quickly, reliably, and at low cost. The BRI economies which would benefit most from infrastructure investments (based on their LPI infrastructure score) are Afghanistan, Bhutan, Myanmar, Moldova, Iraq, Mongolia, Yemen, Cambodia, Tajikistan, Nepal, Pakistan, and Ukraine. In most BRI countries, perceived infrastructure gaps are highest in rail transport, followed by road transport. Infrastructure investments in these transport modes seem sensible as road transport is the dominant transport mode in most countries, and rail transport – along with maritime shipping – has the lowest environmental footprint among transport modes.

About the author:

Christina Wiederer, Economist, World Bank
Macroeconomics, Trade & Investment Global
Practice
cwiederer@worldbank.org