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**Global Report on Improving Transport Connectivity for LLDCs and
Building of Resilient Transport Infrastructure to Support Accelerated
Progress Towards the SDGs**

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Acronyms and Abbreviations

AU	: African Union
ASEAN	: Association of Southeast Asian Nations
BOT	: Build-Operate-Transfer
CAREC	: Central Asia Regional Economic Cooperation Program
ECOWAS	: Economic Community of West African States
EU	: European Union
FTA	: Free Trade Agreement
GDP	: Gross Domestic Product
GNI	: Gross National Income
IATA	: International Air Transport Association
ICT	: Information and Communication Technologies
IRI	: International Roughness Index
IWT	: Inland Water Transport
LLDCs	: Landlocked Developing Countries
LPI	: Logistics Performance Index
MERCOSUR	: Common Market of the South
NAFTA	: North American Free Trade Agreement
NEPAD	: New Partnership for Africa's Development
NTB	: Non-Tariff Barrier
ODA	: Official Development Assistance
PIDA	: Programme for Infrastructure Development in Africa
PPW	: Paraguay-Paraná Waterway
RCI	: Road Connectivity Index
SDGs	: Sustainable Development Goals
TAH	: Trans-African Highway
TFA	: Trade Free Agreement
TRACECA	: Transport Corridor Europe-Caucasus-Asia
UNCTAD	: United Nations Conference on Trade and Development
UNECA	: United Nations Economic Commission for Africa
UNECE	: United Nations Economic Commission for Europe
UN-OHRLLS	: United Nations Office for the High Representative for Least Developed Countries, Landlocked Developing Countries and the Small Island Developing States
UNOPS	: United Nations Office for Project Services
VPoA	: Vienna Programme of Action
WTO	: World Trade Organization

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Executive Summary

Landlocked Developing Countries (LLDCs) are isolated from global markets because they have no direct territorial access to the sea. Their geographical constraint and remoteness create many challenges to be land-linked. This low transport connectivity causes lower levels of trade compared to transit countries and world average. In addition, LLDCs' transport infrastructure is characterized by missing links and poor maintenance, causing high trade costs and even lower connectivity. This situation impedes the LLDCs' greater integration into regional network and connection to the world's market, and it gets worsened since the COVID-19 pandemic hit the world in the first quarter of 2020. Disruptions in supply chains led by disruptions in the transport systems, have negatively affected the movement of goods and services from and to LLDCs that already face higher transit cost and time during normal circumstances.

Road transport is the primary mode for both freight and passengers. However, road networks in LLDCs are relatively poor in terms of both density and quality. LLDCs need to do more to improve their road infrastructure not only to provide physical access to markets but also to achieve SDG target 3.6 (to reduce the number of crash incidences and road fatalities). Concerted efforts are ongoing to improve road infrastructure mainly through regional initiatives, such as the Asian Highway Network and Trans-African Highway. Yet more needs to be done, such as increasing the capability of road agencies to monitor road condition, establishing an authority that oversees the building and maintenance of road network, and ensuring technical standards are harmonized.

After road, rail is the leading transport mode for most LLDCs. For many, this infrastructure connects them to the sea. Rail freight has also been proven to be resilient during the COVID-19 pandemic as it uses less manpower over long haul distances, hence less frequent human interactions and lower potential of spreading the virus. Despite its potential advantages over road transport, most LLDCs prioritize road infrastructure investments over rail transport. Missing links, aging track and inadequate maintenance are characterizing the railway network in LLDCs. Under the framework of the Intergovernmental Agreement on the Trans-Asian Railway Network and Program for Infrastructure Development in Africa, projects have been commissioned to revitalize and upgrade railway networks in both regions. Latin America has the lowest rail density among LLDCs and the railway development pace is much lower than the other LLDC regions, because inland water transport (IWT) plays a larger role in Latin America. In this region, IWT is a principal means for international trade after road transport and means to access the maritime ports in the transit countries. Yet, several challenges still need to be addressed, such as high initial and maintenance costs and the non-existence of dedicated institutions in charge of the waterway's development.

Compared to the world average, LLDCs also have lower air transport connectivity. Expanding air transport infrastructure demands very high investment, while export commodities of many LLDCs have low value addition. Ethiopia performs best among LLDCs and transports the highest air passenger and freight volumes, because it has been pursuing liberal air service rights and granted Fifth Freedom Rights. LLDCs need to liberalize their air transport services and improve their capacity in mobilizing sufficient financial resources to finance the improvement of aviation. Shortage of skilled manpower to manage aviation infrastructure and airports operations is also a challenge that needs to be addressed. LLDCs need to give more priority to the aviation sector in their national infrastructure development plans. Again, the COVID-19 pandemic has been putting pressure on LLDCs' efforts as planes were grounded and countries have to reprioritize their budget and investment.

Many Euro-Asian and African LLDCs have built dry ports to improve transit efficiency, however more is needed especially along transit corridors. Lack of investment is again being a challenge along with the shortage of skilled manpower in LLDCs. To address this, a Build-Operate-Transfer principle can be adopted. This mechanism will guarantee initial capital and ensure the availability of high skills from the private sector. Finally, having no seaboard does not preclude LLDCs from taking a material interest

in ports and shipping. Many LLDCs have cooperation agreements with transit countries for utilizing their seaports. Resource rich LLDCs with sufficient financial means cooperate with their transit countries in joint development of seaports to derive significant benefits. To move forward with seaport policy, LLDCs can enact laws for the operation of maritime transport, acquire long leases from the maritime neighboring country for land to build land port facilities, and provide funds for port infrastructure using PPP models.

LLDCs are also encouraged to actively participate in transport corridors development, as it constitutes opportunities for LLDCs to access the sea and the global markets. Most LLDCs are part of transport corridors in their regions. The corridor concept has even led to the development of good road and border infrastructure especially in Africa. The main challenge that needs to be addressed include domesticating the corridor policies into national laws and legislations of LLDCs and infrastructure development. The COVID-19 pandemic has brought to light the vital role of the efficient functioning corridors to facilitate smooth cross border activities and to promote coordinated actions to maintain transport connectivity.

Energy infrastructure and ICT connectivity are crucial for increased efficiency in transport and transit systems in LLDCs. Lack of good project implementation skills impedes progress of electricity projects. The high costs of fixed-broadband services have been hindering the progress of trade facilitation. Insufficient digital infrastructure also left LLDCs behind when the pandemic accelerated the rise of e-commerce. It is of utmost importance to increase broadband affordability through the formulation of national broadband policy and ensuring the harmonization of policy and regulatory frameworks at the regional and national levels.

LLDCs need to pay attention to the development of climate resilient infrastructure because transport infrastructure is vulnerable to the climate change impacts, while LLDCs' trade and socio-economic development are very much dependent on transport infrastructure. It is therefore critical that infrastructure investment plans in LLDCs take into account the consequences of the changing climate. As expertise is not yet readily available, technical assistance is needed to build the capacity of LLDCs in this area, especially in the post-pandemic era as the COVID-19 might have reduced the LLDCs' sustainable development aspirations.

In all areas, funding limitation is the common main challenge faced by LLDCs. The investment needs to close the infrastructure gap far outweigh the resources available from any single source. Attracting finance from many sources is therefore necessary. However, LLDCs lack bankable infrastructure projects due to the small size of the market, low level of economic development, and limited capacity to prepare them.

Apart from provision of physical transport infrastructure, improving the soft infrastructure components is also very important to facilitate the efficient movement of goods, passengers and vehicles, and to reduce transport costs. Various strategies and initiatives have been undertaken by LLDCs to enhance their trade facilitation, such as establishment of coordinated border management systems and single window. Application of ICT in border management is also progressing in many LLDCs, although the high broadband prices still hinder the implementation.

Most LLDCs had ratified the WTO TFA, but many are yet to ratify international conventions and agreements that facilitate trade and border crossing, such as the TIR convention. Promoting regional integration is also important for LLDCs to promote partnerships with transit countries. Supporting regional initiatives allows LLDCs to take benefits of investment, research and development, and sharing of experiences. All LLDCs participate in at least one regional transit and trade agreement.

In the last chapter, policy recommendations are outlined to improve the capacity of LLDCs on closing their transport infrastructure gaps. Some of them are increasing the capability of road agencies to monitor road condition, mobilizing investment for increasing the rail network and for rehabilitating

and upgrading existing railways, and pursuing bilateral agreements or MoUs to liberalize air service. For inland water transport, LLDCs are encouraged to pursue bilateral agreements with transit countries with connecting waterways, in line with regional and international legal instruments. Even though the recommendations are elaborated for each type of transport infrastructure, it is important to consider all modes of transport as parts of one seamless logistics chain when planning and improving the movement of goods.

Lack of direct access to the sea should not stop LLDCs to take a material interest in sea-port development, and this should be included in LLDCs' transport policies. LLDCs can also take actions to own, lease or have a share in a sea port. In terms of promoting transport corridor infrastructure development to foster opportunities for LLDCs to participate in global trade, it is important that LLDCs incorporate integrated and harmonized planning from regional policies into their national plans.

In terms of energy and ICT infrastructure, LLDCs are encouraged to continue to expand sustainable sources of energy, and include this in their national energy policies. Furthermore, it is of utmost importance to increase broadband affordability to achieving high penetration. Finally, to utilize modern sources of funding, like South-south and triangular cooperation, LLDCs should enhance cooperation with developed adjoining or partner countries to attract investment from them.

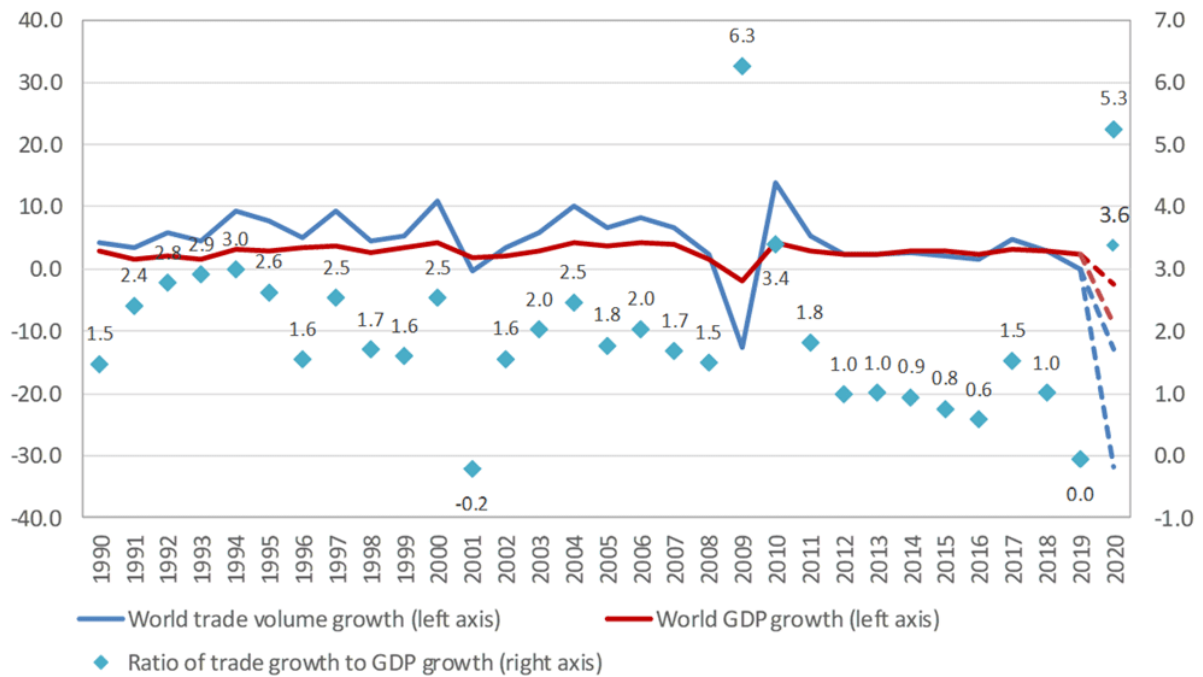
Finally, LLDCs need to strengthen their preparedness to handle likely future pandemic and emergency situations. Protocols and a crisis team to deal with such situations need to be developed. Efforts to strengthen transport corridors need to be undertaken, so that if an emergency situation occurs, borders can stay open and functional whilst remain safe.

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1. Introduction

Globalization has produced an exponential increase in the volume of flows of persons and goods in the last decades. The relationship between trends in global gross domestic product (GDP) and the global value of trade is shown in Figure 1-1 based on estimates by the WTO made in 2020. Until 2018, in all years except 2001 and 2009, trade growth was higher than growth in GDP¹. Trade was a prime driver of economic growth. In 2019, trade volume fell due to persistent trade tensions. The forecast made by the WTO in 2020 for the same year shows that the world trade was expected to fall significantly due to the COVID-19 pandemic. Although, at time of writing, the impact of the outbreak on international trade is not yet visible in most trade data, this forecast most probably well represents the extent of the trade decline.

Figure 1-1: Ratio of world merchandise trade growth to world GDP growth, 1990-2020 (% change and ratio)



Source: WTO (https://www.wto.org/english/news_e/pres20_e/pr855_e.htm)

In any situation, LLDCs lag behind transit countries in terms of their share in global trade (Figure 1-2) due to the lower levels of trade, which is partly due to lower level of transport connectivity. Poor connectivity is effectively a non-tariff barrier to trade. Improvements in border administration and transport and telecommunications infrastructure and services could result in an up to 4.7% increase in global GDP, far outweighing potential income gains from complete elimination of import tariffs (World Economic Forum, 2013). According to the World Bank, it is therefore important to consider transport as part of a holistic approach that considers the entire supply chain, focusing on all policies that impact supply chain efficiency to improve national competitiveness (World Economic Forum, 2013). The logistics performance index (LPI) of LLDCs is generally 50% lower than high income countries.

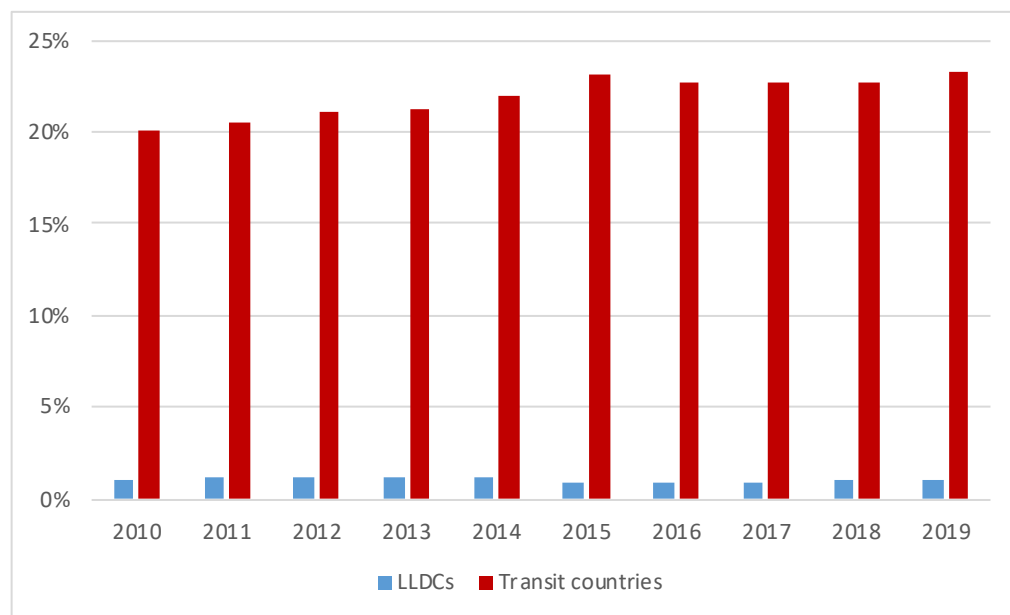
It is important to note that a non-tariff barrier acts in the same way as a tariff in that it increases the cost of trade. Lerner (1936) with its Lerner Trade Symmetry Theorem, found that a 1% increase in

¹The ratio of trade growth to GDP growth is referred to as the "elasticity of trade with respect to income".

import tariffs will result in a 1% increase in export tariff. Similarly, a 1% increase in the cost of trade due to NTBs will result in 1% decrease in the trade component of GDP. Poor connectivity is manifestly part of the logistics. The rationale to investment in transport infrastructure and the complementary soft infrastructure that improves international connectivity for LLDCs is that it will generate macroeconomic benefits due to increasing trade and GDP.

The inadequacy and low quality of transport infrastructure characterized by missing links and poor maintenance cause high trade costs and as such low competitiveness of LLDCs. This situation impedes the LLDCs' greater integration into regional networks.

Figure 1-2: Share of LLDCs and transit countries in global merchandise exports



Source: UNCTADstat

On the soft infrastructure part, the governments in LLDCs, and most importantly transit countries, place trade restrictions and very tight trade controls and protection. As a result, there are many non-physical barriers that lead to cumbersome border crossing. Various organizations have been promoting regionalization for LLDCs as it enables reduction of these barriers to trade and thereby help to reduce trade related costs. LLDCs are highly dependent on regional integration for their connectivity with the world. As indicated by the Vienna Programme of Action (VPOA) for Landlocked Developing Countries for the Decade 2014-2024, 'landlockedness' is a major contributor to the relatively high incidence of extreme poverty and structural constraints in LLDCs.

The WTO (established in 1947) has promoted more trade regulation harmonization, which has facilitated trade and movement to promote economic growth. At the regional level there has arisen a number of regional trading blocks including the Association of Southeast Asian Nations (ASEAN), North American Free Trade Agreement (NAFTA), European Union (EU), African Continental Free Trade Area (AfCFTA), Economic Community of West African States (ECOWAS), and Common Market of the South (MERCOSUR). While trade and economic development is their main mandate, many are free trade areas or FTAs, some have gone further to promote political and regional integration.

This report has been prepared by the United Nations Office for the High Representative for Least Developed Countries, Landlocked Developing Countries and the Small Island Developing States (UN-OHRLS) as part of the project "Strengthening the Capacity of Landlocked Developing Countries under the Belt and Road Initiative to Design and Implement Policies that Promote Transport Connectivity for the Achievement of the SDGs". The report is developed based on desk research including the three

substantive background regional reports that were prepared for the regional review meetings held in preparation of the Midterm Review of the Implementation of the VPoA for (i) the Euro-Asia region held on 11-12 February 2019 in Bangkok, Thailand, (ii) Africa region held on 18-19 March 2019 in Marrakech, Morocco, and (iii) Latin America region held on 10 and 11 June in Santiago, Chile; national progress reports on the implementation of the VPoA prepared by LLDCs, rich materials and documents and statistics from relevant international, regional, and sub regional organizations, and many other sources available publicly.

The report: (1) Comprehensively reviews the development status of transport connectivity in the LLDCs, the challenges faced and constraints experienced by the LLDCs. (2) Identifies major achievements, emerging challenges and opportunities to achieve the Sustainable Development Goals (SDGs). (3) Identifies the capacity needs of the LLDCs to improve transport connectivity and to build resilient transport infrastructure. (4) Provides recommendations on policies and strategies to strengthen LLDCs' capacity to design and implement policies that promote transport connectivity and to build resilient transport infrastructure.

1.1. Landlocked Developing Countries

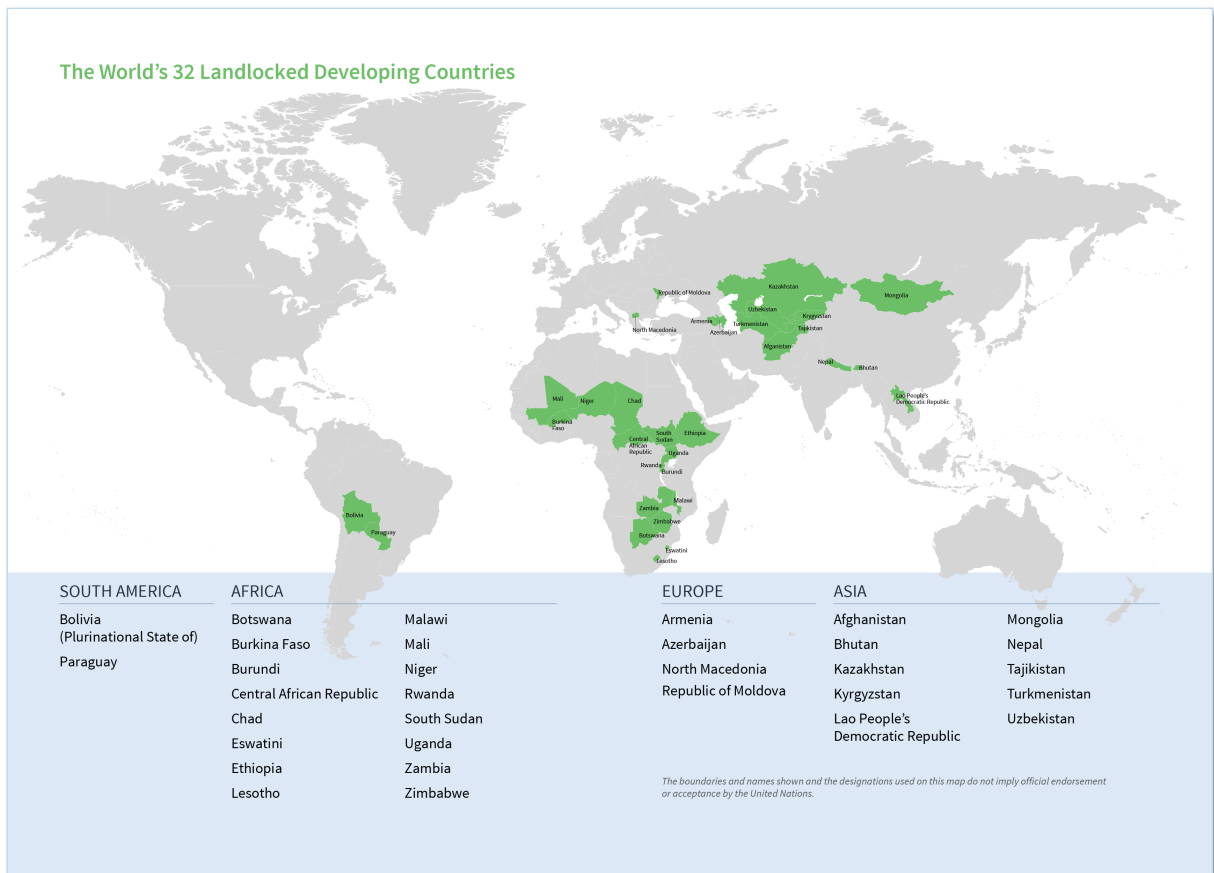
LLDCs as a group constitute 32 countries across Africa, Asia, Central and Eastern Europe, and Latin America as depicted in Figure 1-3.

LLDCs are made up of around 533 million people (2020) and are among the poorest of developing countries (nine of which have the lowest human development indices), and more than half of them are also least developed countries, with limited capacities and dependent on a very limited number of commodities for their export earnings. The average GDP per capita (constant 2010 US\$) of LLDCs in 2018 is just over US\$1,600 versus global US\$10,881².

As highlighted earlier, LLDCs' trade depends on transit through other countries and their competitive advantage might be threatened by additional border crossings, long distances from major markets and significant transportation costs and time and as a consequence could undermine their socio-economic development, human and social progress and environmental sustainability.

² World Bank Open Data. Available at <https://data.worldbank.org/indicator/NY.GDP.PCAP.KD>. Accessed on 3 December 2019.

Figure 1-3: Landlocked Developing Countries



Source: UN-OHRLLS

1.2. Transport Connectivity

Increasing connectivity is the crucial way to transform landlocked countries into land linked countries. Connectivity can be defined as “connectedness” in terms of transport, trade, customs and logistics processes. A developed transport connectivity system would allow transport modes and infrastructure to be well-interlinked. This has an even more important meaning for landlocked and bridging/transit countries, given the former’s absence of a direct territorial access to the sea and to maritime routes. Having efficient connectivity is necessary to face effectively the challenges arising from their geographic location and to exploit alternatively the remoteness and isolation from world markets.

The most immediate benefits from developed connectivity concerns the improvement in accessibility expressed in terms of reduction in travel time and transportation costs. The fragmented infrastructure and supply chain to LLDCs leads to additional expenses and extended times. Properly designed policies that promote sustainable transport connectivity can also strengthen the competitiveness of the country through the facilitation of trade within and across the regions and creating or reinforcing access to markets.

Improving connectivity is not just dependent on hard infrastructure development, which needs to be completed to ensure the smooth movements of passengers and freight, but a range of factors that include but are not limited to:

- Regulatory framework and procedures governing the hard infrastructure

- Legal framework: the bilateral and multilateral agreements (on trade, customs, transit, and etc.) and other ways of cooperation among countries which can eliminate barriers for effective corridor management
- Legislative actions: the necessary legislation, which should be enacted or harmonized among member states.
- Institutional capacity: the efforts necessary to improve skills of the human resources involved in the process.

1.3. Global Frameworks for Sustainable Development in LLDCs

United Nations Sustainable Development Goals

Although there is no stand-alone SDG on transport, transport is considered as a cross-cutting issue throughout the 17 SDGs. The transport related UN SDGs goals and targets are goal 3 (targets 3.6 and 3.9), goal 7 (targets 7.2 and 7.3), goal 9 (targets 9.1 and 9a), goal 11 (target 2), goal 12 (target 12.4), and goal 17 (target 17.14).

Vienna Programme of Action

The VPoA is the principal programme of the UN that charts a plan for the sustainable economic and social development of LLDCs for the Decade 2014-2024. It aims to address the special development needs and challenges of LLDCs stemming from landlockedness, remoteness and geographical constraints of landlockedness through specific actions in six priorities areas: (1) Fundamental transit policy issues, (2) Infrastructure development and maintenance, (3) International trade and trade facilitation, (4) Regional integration and cooperation, (5) Structural economic transformation, and (6) Means of implementation.

The full and effective implementation of the VPoA is critical for LLDCs in achieving the SDGs. This report will touch upon all of these priorities as they are related to transport connectivity.

1.4. Organization of the Report

This report consists of seven chapters. After the Introductory chapter, the report starts with the status of transport infrastructure development in LLDCs that covers all modes of transport. Thereafter, the state of energy and ICT infrastructure development (chapter 3) is discussed. Chapter 4 discusses the development of climate resilient infrastructure, focusing mainly on approach and best practices. Chapter 5 discusses investment and maintenance funding for transport infrastructure in LLDCs. Finally, chapter 6 discusses the soft infrastructure part of transport connectivity, namely trade facilitation and legal framework, and chapter 7. The last chapter summarizes the findings of the research and outlines policy recommendations to improve transport connectivity in LLDCs.

2. Status of Transport Infrastructure Development

2.1. SDGs as Drivers for Improving Connectivity

Transport infrastructure is the conduit for trade and mobility. Reduced travel time and costs are only one of the benefits that stem from good transport infrastructure provision. Good transport infrastructure, in terms of quantity and quality, will contribute to the achievement of SDGs. The quality of infrastructure, including that of transport, shapes the basic competitiveness of economies (SDG 9.1.2). Good quality road infrastructure contributes to reduce the number of crash incidences and road fatalities (SDG 3.6). Provision of reliable rail and inland waterway infrastructure will make these two modes more competitive, promote modal shift towards these modes, and this will reduce air pollution produced by road transport (SDG 3.9 and 12.4).

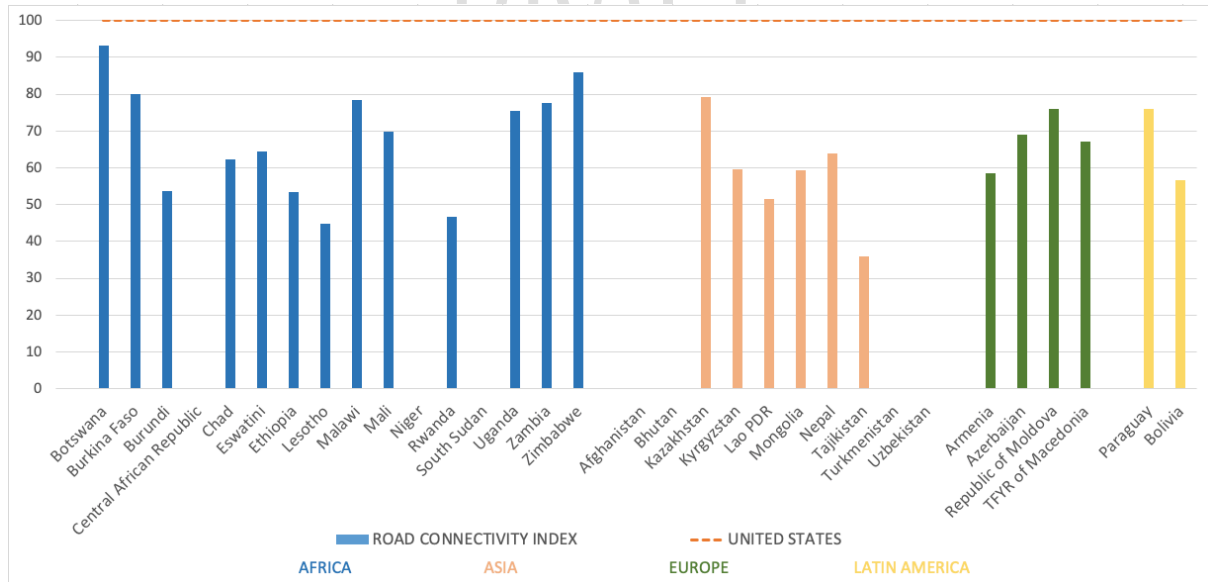
This chapter reviews the development status of transport infrastructure in LLDCs, including the challenges and constraints experienced by the countries to develop and maintain the infrastructure.

2.2. Road Transport Infrastructure

As the primary mode of transport for both freight and passengers, road network plays a critical role in providing access to and from LLDCs. Compared to rail and air transport, road transport shares the highest freight volume (Figure 4-1).

Figure 2-1: presents the Road Connectivity Index (RCI) of the LLDCs (no data available in 7 countries). RCI is an index developed by the World Economic Forum as part of its Global Competitiveness Index. The RCI comprises two elements: 1) a measure of the average speed of a driving itinerary connecting the 10 or more largest cities in an economy accounting for at least 15% of the economy’s total population; and 2) a measure of road straightness. The scale ranges from 0 to 100 (excellent).

Figure 2-1: Road connectivity index 2019



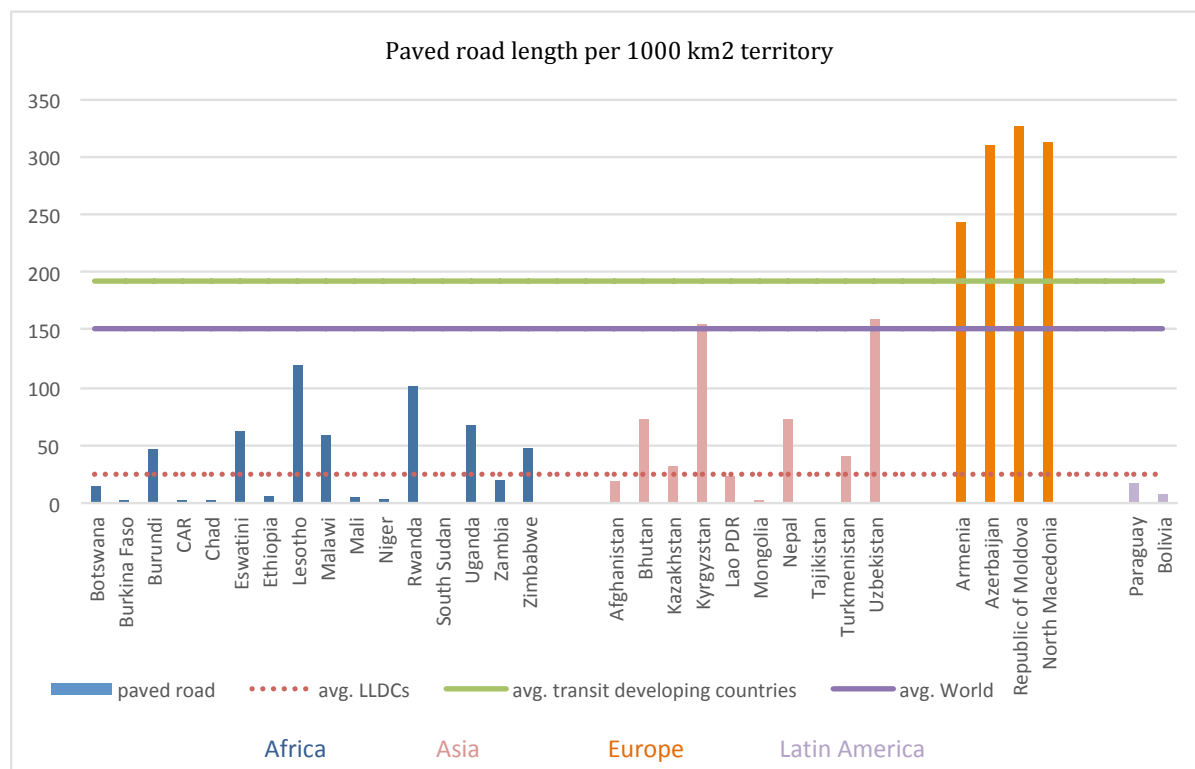
Source: World Economic Forum (2019)

African LLDCs perform best among other regions as three countries have value of at least 80 and nearly 70% of African LLDCs have value of at least 60. Considering how the index is measured, this high performance is most likely due to light traffic that allows higher speed. Eastern European and Central Asian countries perform well, while Eastern Asian LLDCs are low performers with RCI of less than 60, most likely due to the topography of the countries.

However, in terms of road quality, LLDCs generally have relatively poor road network when compared to their transit neighbors and they lag behind the global average. Having good quality road network is important to provide physical access to markets. An indicator that can be used to measure it is paved road density (

).

Figure 2-2: Paved road density of LLDCs



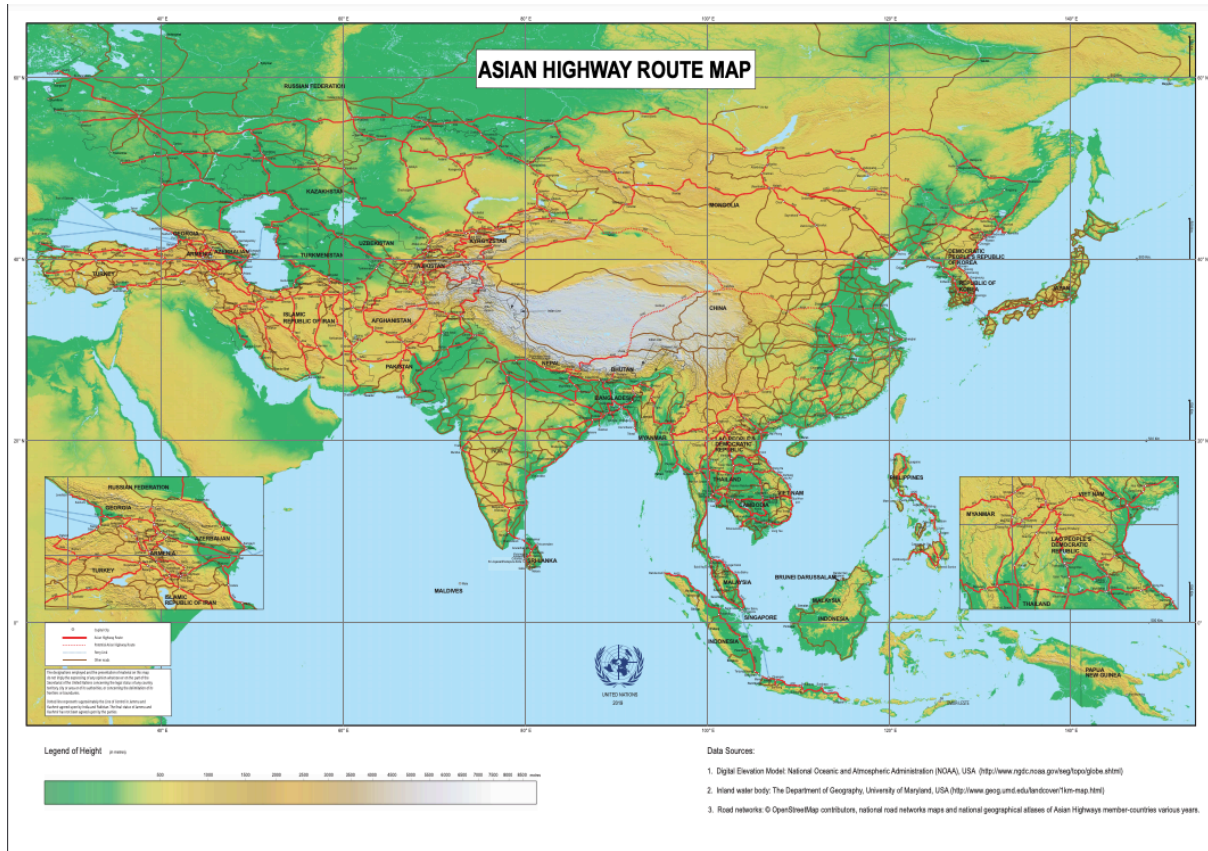
Source: UNCTAD (2014), UN-OHRLLS (2019b), UN-OHRLLS (2019c)

Note: Data used is the most recent available, ranging from 2009 to 2015.

Eastern European and Central Asian countries perform best among LLDCs in terms of their paved road density. The paved road density in the European LLDCs is even higher than the average of transit developing countries and the World average. Being part of the Asian Highway network certainly contributes to it as infrastructure quality is incorporated in the Intergovernmental Agreement on the Asian Highway Network, in the form of a system that classifies Asian highways according to their carrying capacities (number of lanes) and pavement types. All Asian LLDCs are part of this initiative aimed at enhancing the efficiency and development of the road infrastructure in Asia, supporting the development of Euro-Asia transport linkages and improving connectivity for landlocked countries³. The Asian Highway plays a key role in fostering coordinated development of regional roads and connects many LLDCs to internationally recognized transport networks (UN-OHRLLS, 2018). It comprises 143,000 km of roads passing through 32 countries in Asia and the Pacific. Of this network length, 7% do not meet the minimum desirable class III-standards (Jaimurzina, 2019). In this context, the low quality of roads is a major cause of crash incidences and road fatalities in Asia (OECD, 2018).

³ <https://www.unescap.org/our-work/transport/asian-highway/about>

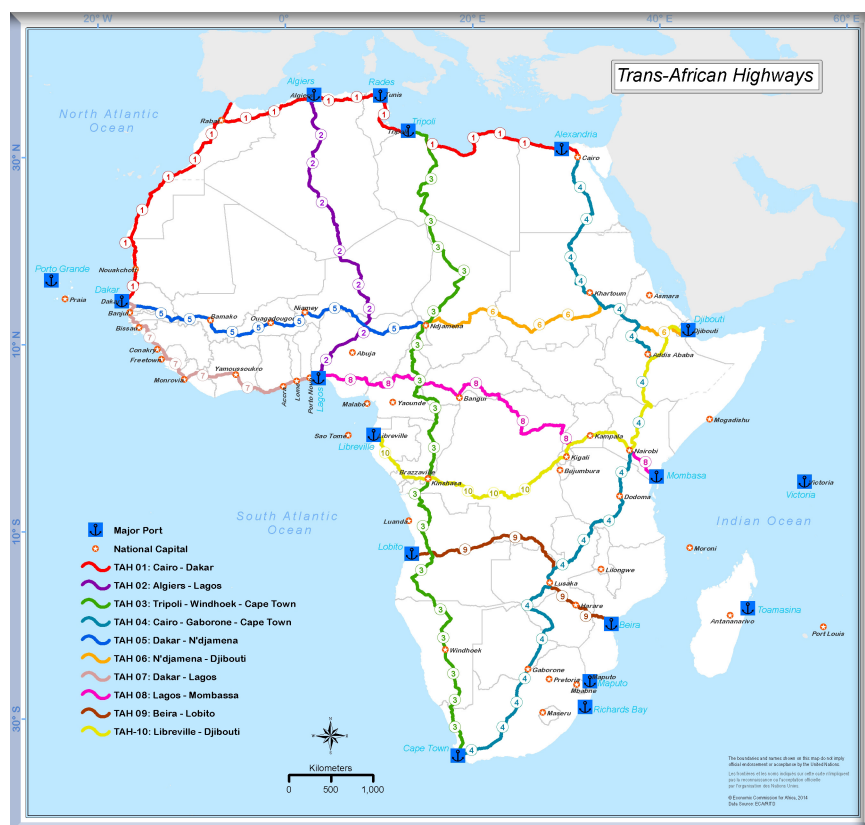
Figure 2-3: Asian Highway Route Map



Source: UNESCAP (https://www.unescap.org/sites/default/files/AH-map_0.pdf). Accessed on 12 February 2021.

Road is the main mode of transport in Africa, carrying 90% of passengers and 80% of goods (OECD, 2018). However, the average paved road density in African LLDCs is 10.59 km per 1000 km², nearly half of the LLDCs' average (24.66 km). The paved road density in the majority of the African LLDCs is lower than the average of LLDCs. In Africa, the regional connectivity is fostered by the Trans-African Highway (TAH), a network of 10 routes with a total length of 54,120 km Figure 2-4. It is meant to provide direct routes between capital cities and provide connectivity to sea ports for the African landlocked countries. However, the network is characterized by missing links situated in all corridors that are yet to be completed.

Figure 2-4: Trans-African Highway Network



Source: UNECA (<https://www.uneca.org/acs/pages/geo-information>). Accessed on 2 March 2020.

In the framework of the Programme of Infrastructure Development in Africa (PIDA), projects are commissioned to close the missing links (Table 2.1). PIDA is a joint initiative by the African Union Commission (AUC), the New Partnership for Africa’s Development (NEPAD), the African Development Bank (AfDB), United Nations Economic Commission for Africa (UNECA) and Regional Economic Communities (RECs), to accelerate Africa’s regional integration by building the infrastructure necessary for strengthening competitiveness in trade.

Table 2.1: Projects to close missing links on TAH network in African LLDCs

Country	Line section	TAH corridor	Current status
Central African Republic	Lagos to Mombasa	TAH8	No data
Chad	Ndjamena to Djibouti	TAH6	Project definition
Niger	Algiers to Lagos	TAH2	Construction
Niger, Libya, Nigeria	Tripoli to Cape Town	TAH3	No data

Source: PIDA website (<https://www.au-pida.org/pida-projects/>). Accessed on 12 February 2021.

Both LLDCs in Latin America have paved road density under the LLDC’s average. Most roadways in the countries are not all-season roads and cannot be passed during the rainy seasons. This situation leads to direct road transport costs.

Table 2.2: Additional road needed in LLDCs

Region	Additional road length (km)
Sub-Saharan Africa East	53,900
Sub-Saharan Africa West	53,100
East Asia	8,300

South Asia	7,700
Eastern Europe and central Asia	57,900
Latin America	15,200
Total LLDCs	196,100

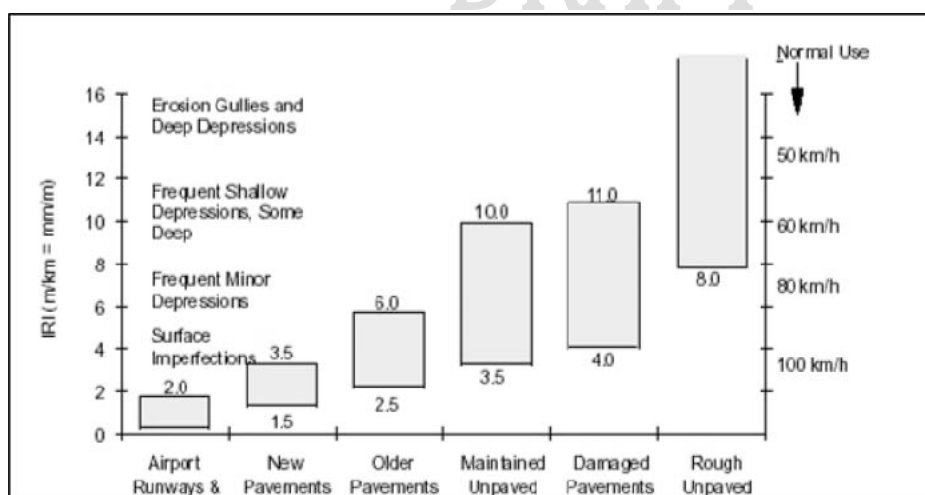
Source: UN-OHRLLS (2018)

For LLDCs as a group to reach the global average of paved road, UN-OHRLLS (2018) estimated that nearly 200,000 kms of paved roads would need to be constructed (Table 2.2). The estimates made here do not include non-paved roads, urban transport infrastructure, any cost for recovering the deteriorated condition of current transport infrastructure and the cost of maintaining the expanded transport networks in good condition.

When it comes to road infrastructure for trade routes, a high proportion of heavy goods vehicles must be taken into consideration. As such the standard of design needs to be higher than ordinary roads in terms of its strength, durability and capacity. In terms of capacity, Bharadwaj et al. (2016), based on fieldwork in India, argued that with increase in percentage of trucks or decrease in percentage of cars, capacity is found to be reducing for traffic movement using 2.6-m paved shoulder lane and also for scenarios without shoulder lanes. The decrease in capacity (vehicles/hour) is found to be nearly 48–50% for traffic stream with 100% trucks as compared to the capacity (vehicles/hour) estimated for traffic stream of 100% cars.

The condition of road infrastructure also significantly influences the levels of service provided on international trade routes. For example, damaged road pavement may reduce operating speeds from 100 kph to 60 kph, as shown in Figure 2-5. Consequently, a vital Key Performance Index (KPI) for the trade route is the International Roughness Index (IRI), which is used by highway professionals throughout the world as a standard to quantify road surface roughness by measuring pavement condition that directly affects ride quality and vehicle operating costs.

Figure 2-5: IRI scale



Source: Elghriani et al. (2015)

IRI is expressed in meters per kilometer (m/km) or millimeters per meter (mm/m). The values can vary depending on the classification of roadway, from 1.5 to 3.5 m/km for new pavements and from 4.0 to 11.0 m/km for damaged pavements. The IRI limits for new, reconstructed, or rehabilitated roads vary in different countries. Some national standards defined different thresholds for the acceptance of new roads, for new roads at the end of the warranty period, and for acceptance of reconstructed roads (Múčka, 2017). Kazakhstan, for instance, specifies IRI 2.4 mm/m for highways and first-class roads, and 3.0 for second and third class roads.

Based on the above analyses, there are two main challenges that need to be addressed by LLDCs to increase their road connectivity:

1. Completing missing links

Although efforts have been made in completing missing links, namely through regional initiatives, significant challenges remain. LLDCs need to adopt innovative national transport policies and programs such as establishing dedicated road funds and PPPs for infrastructure financing (the latter is discussed in section 5.2.5). These are necessary to support the regional initiatives and ensure their effectiveness.

2. Developing robust maintenance programs

The deterioration of road infrastructure is a result of lack of maintenance. Monitoring the road pavement condition using international standards (such as IRI) is essential for two reasons. Firstly, it ensures standardization of data and transferability among countries. Secondly, it can help countries to develop robust and systematic road maintenance programs for various scenarios. Table 2.3 shows a guideline used by Indonesia Directorate General of Highways to determine the necessary maintenance needed for every scenario.

Table 2.3: IRI and maintenance categories

Road condition	IRI (m/km)	Type of maintenance
Good	$IRI \leq 4.0$	Routine maintenance
Fair	$4.1 \leq IRI \leq 8.0$	Periodic maintenance
Lightly damaged	$8.0 \leq IRI \leq 12.0$	Road improvement
Heavily damaged	$IRI \geq 12.0$	Road improvement

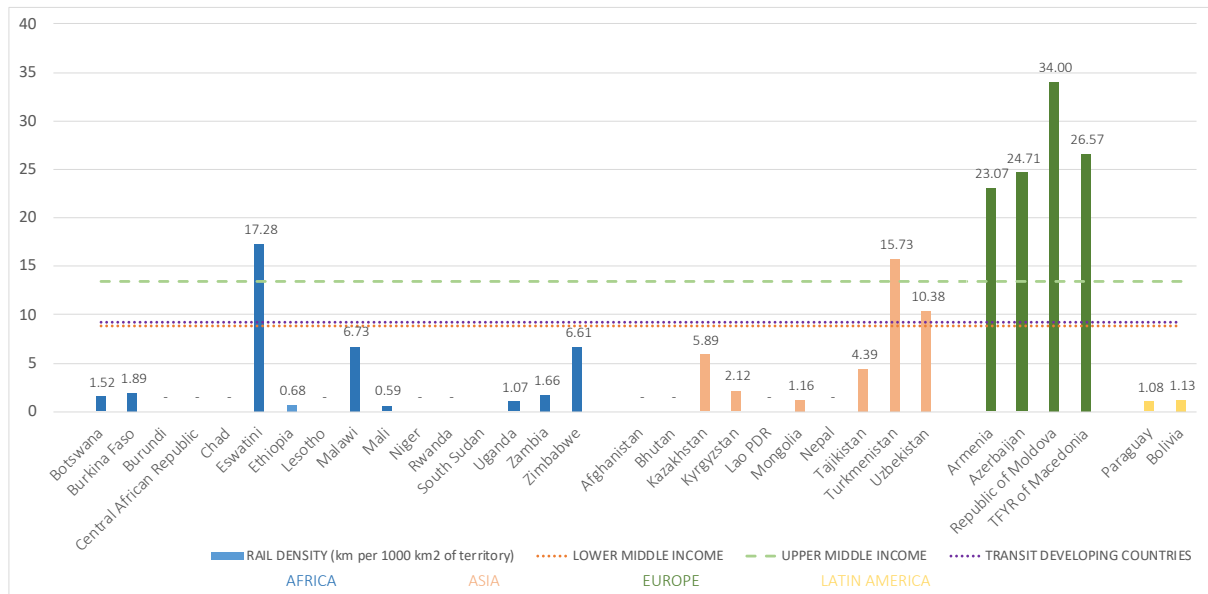
Source: Simamora et al. (2018)

2.3. Rail Transport

Many LLDCs are linked to the sea by rail. Rail transport has potential advantages over road transport in terms of lower tariffs, makes it ideal for LLDCs to transport their low-value bulk goods. Furthermore, rail transport offers shorter and more reliable transit times due to fewer stops in transit and shorter border-crossing wait times and fewer en-route delays.

After road, rail is the leading transport mode for most LLDCs. Figure 2-6 shows the rail density in LLDCs (no data is available in 12 countries). Five African LLDCs (Burundi, Central African Republic, Chad, Lesotho and Niger) do not have railways.

Figure 2-6: Rail density



Source: World Bank Open Data. Available at <https://data.worldbank.org/indicator/IS.RRS.TOTL.KM> (accessed on 12 February 2021) and <https://data.worldbank.org/indicator/AG.SRF.TOTL.K2> (accessed on 20 January 2020).

Note: Data is most recent available ranging from 2000 to 2019

It is obvious that European LLDCs have much higher rail density than other regions and the average of both low-middle income and upper-middle income economies. In 2017, the Baku-Tbilisi-Kars railway was commissioned. This link is claimed to be the shortest route connecting Europe and Asia (Azerbaijan, non dated document).

The Asian and African LLDCs have both similar performances. Despite the position of many Asian LLDCs as transit countries between Europe and Asia, the low rail density shows the low investment committed to this infrastructure. Under the framework of the Intergovernmental Agreement on the Trans-Asian Railway Network, which 6 Asian LLDCs have ratified, the Trans-Asian Railway network is being improved and modernized. The Trans-Asian Railway network comprises 117,500 km across 28 ESCAP member countries. 10.5% of the network still needs to be constructed, which equals to 12,400 km, and US\$75.6 billion of investment will be required to close these missing links (ESCAP, 2017). Several projects to close the missing links are ongoing or completed (Table 2.4). Another challenge faced in Asia is harmonizing gauges and rolling stocks across several countries.

Table 2.4: Missing links in the Trans-Asian Railway network

Country	Missing links	Distance (km)	Costs (US\$ million)
Armenia	Martuni to Meghri	316	3,200
Kyrgyzstan	Kochkor to Arpa	357	2,100
	Karasu to Torugart (border China-Kyrgyzstan)	274	2,000
Lao PDR	Vientiane to Mu Gia (via Thakhet)	450	732
	Vientiane to Boten	417	7,000
	Thanaleng to Vientiane	9	50
	Pakse to Savannakhet	230	5,000
	Savannakhet to Densavanh/Lao Bao	222	5,000
Mongolia	Nariin Sukhait to Choibalsan	1,591	4,455
	Nariin Sukhait to Shiveekhuren	46	129
	Tavan Tolgoi to Gashuun Sukhait	267	748
	Khuut to Bichigt	200	560
	Khuut to Numrug	380	1,064
Nepal	Kakarvitta to Brahma Mandi	920	No data

Source: ESCAP (2017)

The best practice of a modern railway line in African LLDCs might be the 753km Ethiopia-Djibouti railway, also known as the Addis Ababa-Djibouti railway, which is the first modern electrified railway line in East Africa. The rationale of the modernization project was to provide faster access from Ethiopia to the port of Djibouti. Constructed in 2011, the line was inaugurated for freight and passenger services in 2015 and 2016 respectively.

However, in general, the pace of provision of railway infrastructure in Africa is low. Although Eswatini has the highest rail density among African LLDCs (Figure 2-6), the total African railway network of 74,775 km (mostly situated in North Africa and Southern Africa) has very low density and there are over 26,362 km of missing links (UN-OHRLLS, 2018). The network is deteriorating due to poor maintenance. This makes railway unattractive to transit traffic and cannot compete with road transport. Bulk goods that ideally should be moved by rail, are being moved by road, which has not only negative impact on road surfaces, but also on the environment. This situation, in a vicious cycle, further reinforces the decline in rail transport and in the railway's finances. Moreover, trade volumes of most LLDCs are relatively modest and below the threshold of profitability of commercially run rail infrastructures. The Africa Union (AU) Commission and the NEPAD Agency have undertaken several initiatives to achieve AU's Vision 2040 for Railway Revitalization in Africa, adopted by the AU Member States in 2014. Under the framework of PIDA, projects have been commissioned to revitalize and upgrade railway networks in Africa. Those located in African LLDCs are listed in Table 2.5.

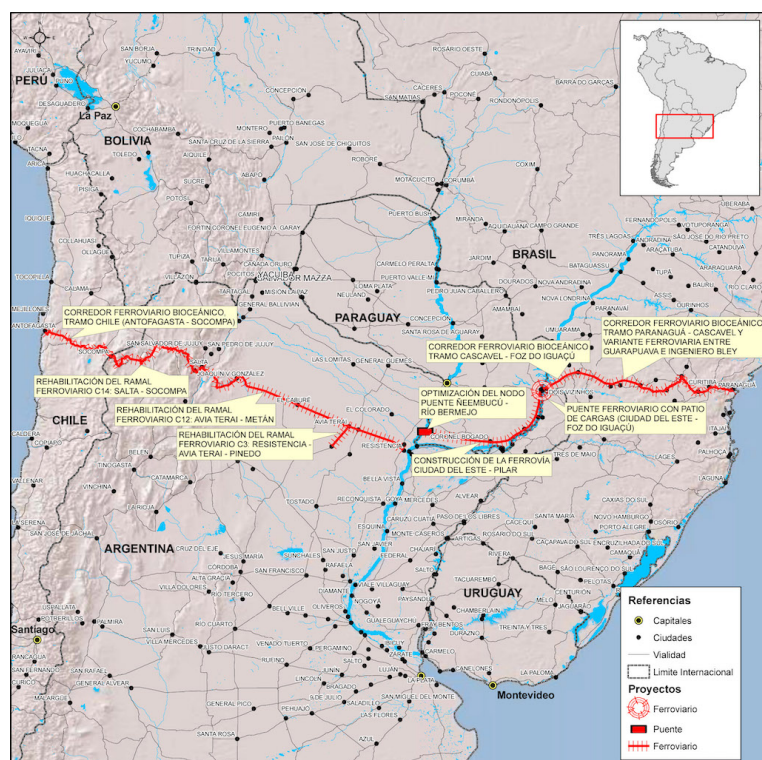
Table 2.5: Railway development projects in African LLDCs

Country	Description	Status
Burkina Faso	Upgrading of 1,200 km narrow gauge railway between Abidjan and Ouagadougou	No data
Burundi	New high-speed railway from Mombasa to South Sudan, DR Congo and Burundi for US\$5.2bn (will be mostly funded by China).	To be constructed
Chad	Construction of ± 2,000 km Douala to N'Gaoundéré to N'Djamena	No data
Mali	Upgrade the Mali section of the 1,228 km to standard gauge between Bamako and the border with Senegal	Feasibility
Rwanda	Construction of Mirama Hills to Kigali standard gauge railway (part of Mombasa - Kigali Railway Project)	Project structuring
South Sudan	New railway Juba-Bor-Malakal-Renki-Sudan border	Project definition
Uganda	Construction of Kampala to Kasese standard gauge railway (part of Mombasa - Kigali Railway Project)	Project structuring
	Construction of Kasese to Mirama Hills standard gauge railway (part of Mombasa - Kigali Railway Project)	Project structuring
	Construction of Malaba to Kampala standard gauge railway (part of Mombasa - Kigali Railway Project). Length: 1084 km.	Tendering
	Construction of Tororo to Gulu to Pakwach standard gauge railway (part of Mombasa - Kigali Railway Project).	Project structuring
Zambia	Extend Chingola - Solwezi Railway to the border with Angola (length 536 km) as part of North-South Multimodal Transport Corridor.	Feasibility
Zimbabwe	Beira-Harare (part of the Beira-Nacala Multimodal Transport Corridors)	Construction

Source: African Union (n.d.). PIDA website (<https://www.au-pida.org/pida-projects/>), accessed on 12 February 2021.

Latin America has the lowest rail density. Bolivia and Paraguay only have 3,000 km and 400 km functional railways respectively. The feasibility of the Bi-Oceanic Railway Corridor is currently being studied. This corridor will connect Bolivia, Brazil and Peru, while Paraguay plans to build a feeder line to connect to the corridor via Bolivia.

Figure 2-7: Bioceanic Railway Corridor



Source: IDB (2015)

More than 46,000 kms of railways would need to be constructed in LLDCs to reach the global average of railway density (Table 2.6).

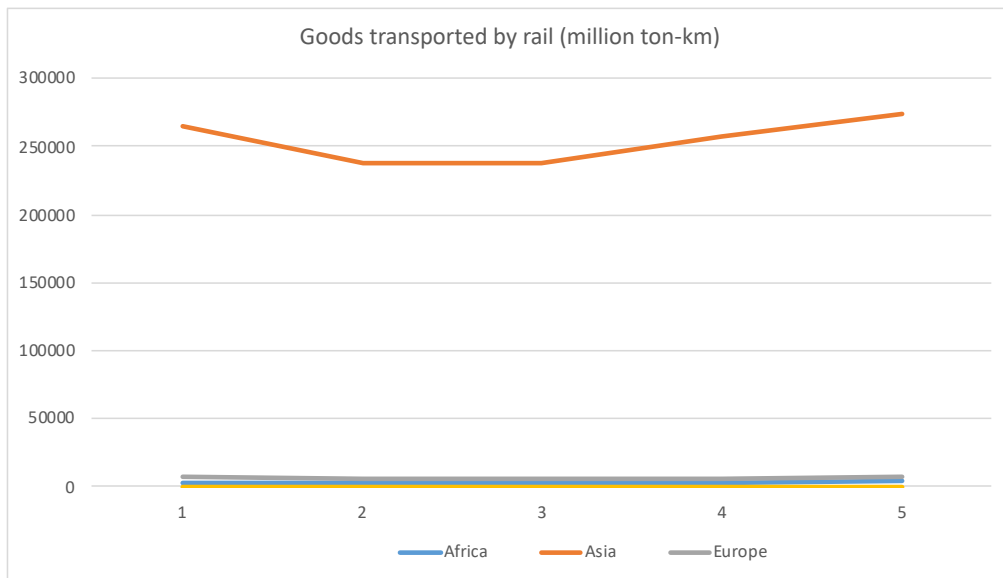
Table 2.6: Additional railways needed in LLDCs

Region	Additional rail length (km)
Sub-Saharan Africa East	12,700
Sub-Saharan Africa West	8,000
East Asia	5,100
South Asia	4,700
Eastern Europe and central Asia	13,900
Latin America	1,800
Total LLDCs	46,300

Source: UN-OHRLLS (2018)

Rail freight generally decreased in the last five years in many LLDCs, most probably due to increased competition from road. There is no data available for the Latin American LLDCs. UN-OHRLLS (2019c) outlined that railways are responsible for transporting approximately 20% of exports in Bolivia.

Figure 2-8: Rail freight in LLDCs in the last 5 years



Source: World Bank Open Data. Available at <https://data.worldbank.org/indicator/IS.RRS.GOOD.MT.K6>. Accessed on 12 February 2021.

Note:

- Data is 5 last years available, ranging from 1996 to 2019.
- No data available for Latin America.

Despite the highest rail density they have, European LLDCs have very low rail freight volume, as their railway is mostly used for passenger transport. While for Asian LLDCs, particularly in Central Asia, railway plays a central role in regional transport network to transport goods. A common set of technical standards and operating procedures enjoyed by the national railways of the CIS countries plays a role in their cross-border rail traffic.

Kazakhstan makes up for 80% of the total rail freight volume in the region⁴. In this country, railway transports higher volume of goods than road due to its heavy industry and long distances to seaports. The mode share, air transport and inland waterway excluded, is 58% and 42% respectively⁵. Kazakhstan has heavily invested in building transit infrastructure along five established international rail transit corridors passing through Kazakhstan that make the country the main transit country between Europe and Asia. Moreover, the cost of crossing Kazakhstan by rail is far less than by road. The latest data⁶ shows that the rate is around US\$45 per ton (not including loading and other handling charges), compared to at least US\$120 per ton by road.

Finally, the common challenges faced by LLDCs to increase their rail connectivity are:

1. Increasing the provision of railway network

Increasing the provision of railway network is very important, yet this remains a challenge to this day. Maintenance, upgrading, and rehabilitation of rail infrastructure typically rely on public funds, while most LLDCs seem to prioritize road infrastructure investments over rail transport due to the large amount of capital investment needed for rail infrastructure and rolling stock. As

⁴ Rail freight volume data is available for Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan.

⁵ Source: United Nations SDG Indicators Database

⁶ Based on online interview with experts in Kazakhstan (February 2021).

a result, aging track and inadequate maintenance are characterizing the railway network in LLDCs.

2. Increasing the transport planning and economics capacity

Transport economics is not strongly represented in the rail sub-sector while it is more common in the road subsector. There is a case for increasing the capacity of LLDCs' rail subsector transport planning and economics capacity. Beyond that urgent efforts are required to mobilize public and/or private investment to ensure adequate working capital and investment for rehabilitating and upgrading existing infrastructure.

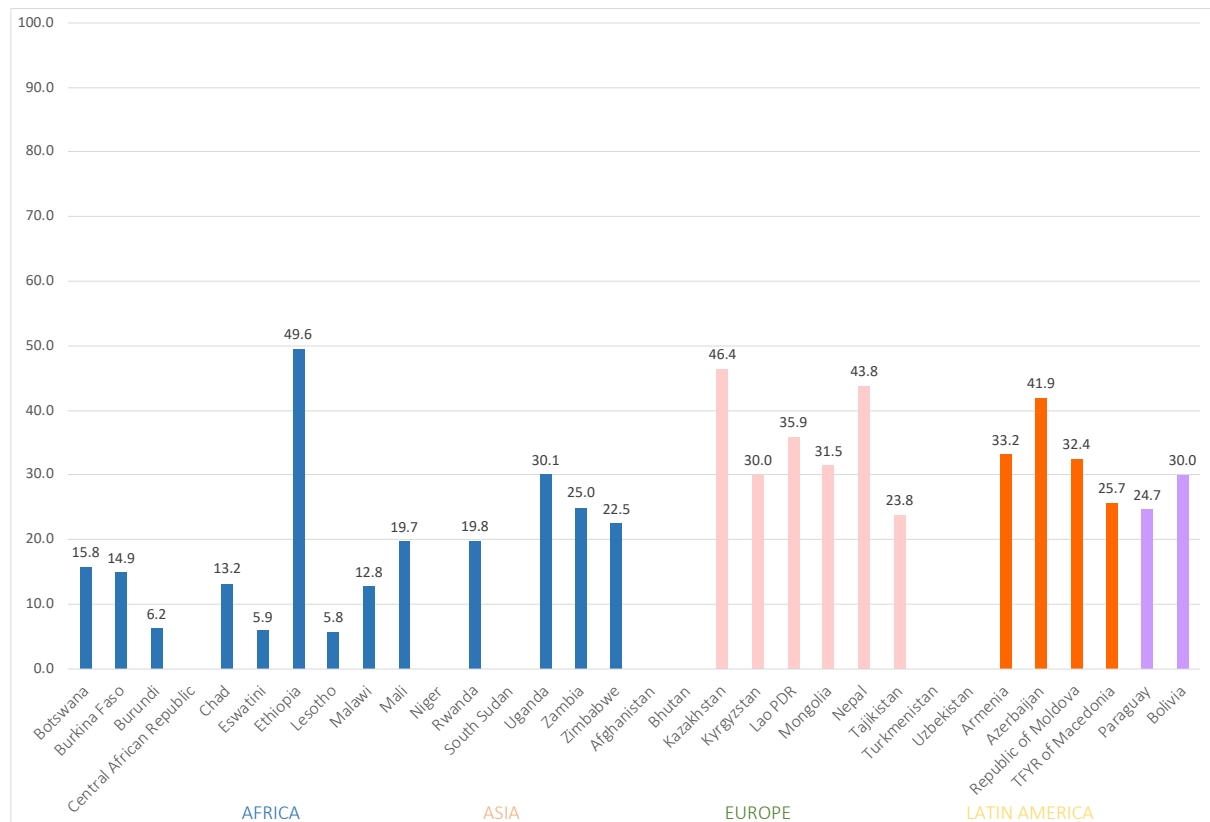
2.4. Air Transport

Air transport has a vital role in promoting connectivity of LLDCs, due to its character that is not subjected to borders and other impediments as in the case of surface transport modes. Air connectivity matters not only to foster exchange of goods and services, but also matters to boost the productivity and growth of economies (OECD/ITF, 2018). Expanding air transport infrastructure demands very high investment and is suited for high value or time-sensitive goods, which are in contrast with low value addition of export commodities of many LLDCs. Securing financial capital is then mostly the main bottleneck to carry out such expansion projects in LLDCs.

The International Air Transport Association (IATA) Airport Connectivity Indicator measures the degree of integration of a country within the global air transport network. The figures for the LLDCs are presented in Figure 2-9 as the weighted scores, where 100 represents the optimal situation.

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Figure 2-9: Weighted score airport connectivity 2019

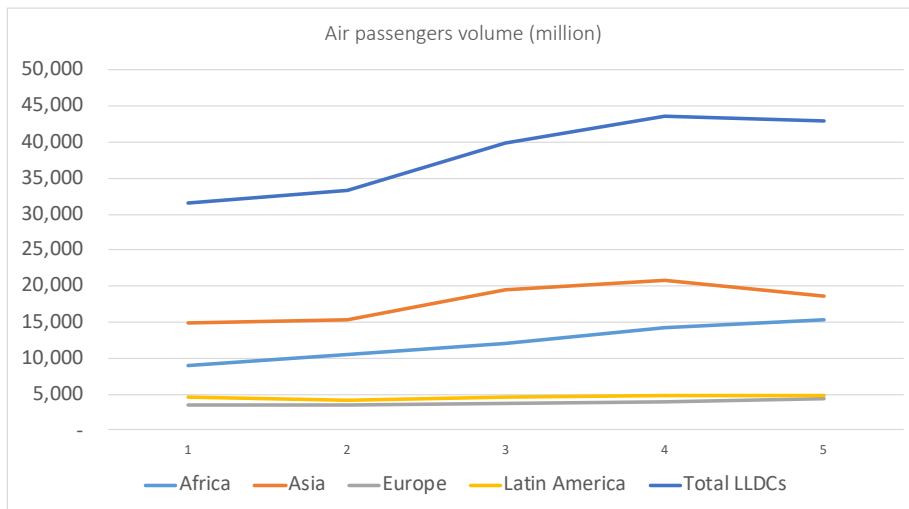


Source: World Economic Forum (2019)

The figure shows that all LLDCs scored less than 50, indicating their limited air connectivity, most probably because most airports in LLDCs receive limited number of flights a week. Furthermore, the low willingness of LLDCs and transit countries to liberalize their air transport services hinders the development of the LLDCs’ aviation industry. This limited market access impedes the growth and competitiveness of local carriers. This poor air connectivity results in low traffic that cannot sustain profitable operation.

Ethiopia is however an exception. It performs best among all LLDCs because Ethiopian Airlines, together with Kenya Airways and Rwandair, have been granted Fifth Freedom Rights that enable airlines to carry passengers and cargo from a home country to another intermediate country (A), and then fly on to third country (B) with the rights to load and unload passengers and freight in the intermediate country. This also contributes to the consistent growth experienced by the African LLDCs in terms of air passenger volume (**Error! Reference source not found.**). Over the past five years, Africa’s air passenger volume has increased by 70%.

Figure 2-10: Air passenger volume in LLDCs in the last 5 years



Source: World Bank Open Data. Available at <https://data.worldbank.org/indicator/IS.AIR.PSGR>. Accessed on 15 February 2021.

Note:

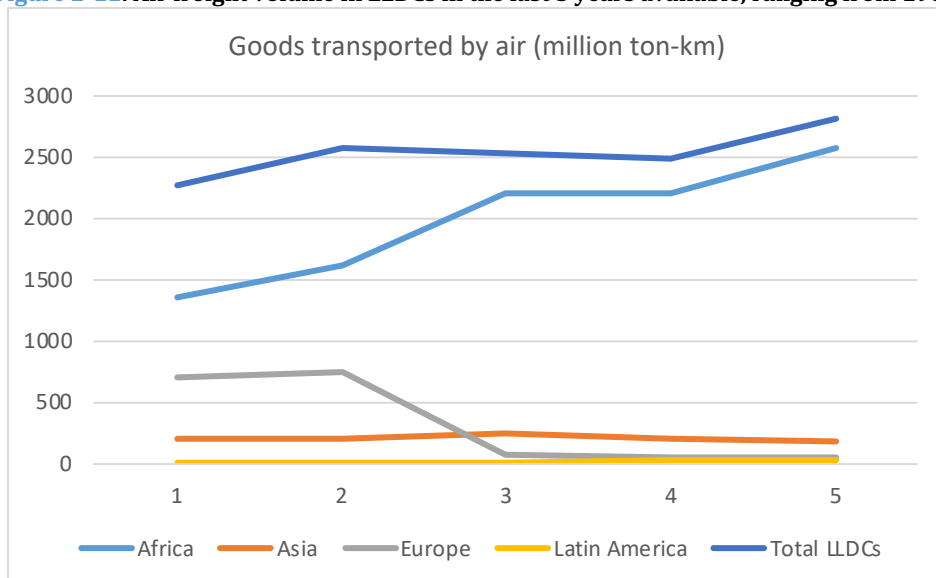
Data is 5 last years available, ranging from 1994 to 2019.

Box 1: Ethiopia’s air connectivity

Ethiopia has had a long standing policy of pursuing liberal air service rights (on a reciprocal basis) with other countries both within and outside of Africa. It has signed bilateral air service agreements with over 90 countries and this has contributed to Ethiopian Airlines become one of the largest and most profitable airlines in Africa. Research has found that on intra-African routes with more liberal bilateral relations, Ethiopians benefit from 10-21% lower fares and 35-38% higher frequencies (compared to restricted intra-Africa routes).

Source: InterVISTAS (2014)

Figure 2-11: Air freight volume in LLDCs in the last 5 years available, ranging from 1980 to 2019



Source: World Bank Open Data. Available at <https://data.worldbank.org/indicator/IS.AIR.GOOD.MT.K1>. Accessed on 12 February 2021.

Except for Africa, very little movement seems to have taken place in terms of air freight volume in LLDCs (

Figure 2-11). Afghanistan, Kazakhstan and Uzbekistan have the highest air freight volume among the Asian LLDCs. For Azerbaijan, this could be the result of the commissioning of four modern international airports recently. Latin American LLDCs also have relatively low air freight volume compared to the other regions. This is most probably due to the same challenge faced by other LLDCs: difficulties in securing financial capital to expand the aviation infrastructure. Viru Viru airport, for instance, which is considered Bolivia's main airport for the distribution of freight and passengers, has experienced delays in the air terminal hub project due to the improvements needed in its financial proposals (UN-OHRLLS, 2019c).

The Africa region has the highest air freight, although 95% of the total volume is transported by Ethiopia⁷. Within the framework of the Single African Air Transport Market (SAATM), launched in 2018, the African Union has been putting effort to push for further liberalization of the skies through the implementation of the Yamoussoukro Decision⁸. This decision acknowledges the benefit of liberalizing air traffic, particularly the fifth freedom. The implementation of SAATM is expected to increase intra-African connectivity and the growth of African airlines.

As of July 2019, there are 29 states party to SAATM, including 10 LLDCs i.e. Botswana (50%), Burkina Faso (100%), Central African Republic (20%), Chad (0%), Ethiopia (75%), Lesotho (25%), Mali (95%), Niger (100%), Rwanda (100%) and Zimbabwe (0%). The figures between brackets are the implementation status of measures directed by SAATM. The progress of half of these 10 LLDCs is still less than 50%. The main measures to be implemented, among others, are (Simana, 2019):

- publish their commitment to implement the Yamoussoukro Decision in accordance with their national laws;
- review of Bilateral Air Services Agreements to ensure conformity with the Yamoussoukro Decision;
- constitute their National Implementation Committees for the Yamoussoukro Decision and the establishment of a SAATM, and designate a dedicated focal point.
- sign the Memorandum of Implementation (MoI) of the Yamoussoukro Declaration

African Civil Aviation Commission (AFCAC), as the executing agency of SAATM, stated that one of the challenges of the SAATM implementation is the reluctance by some Member States to sign the MoI and unnecessary local procedures to sign MoI after signing the Yamoussoukro Decision (Simana, 2019).

⁷ Based on World Bank Open Data. Available at <https://data.worldbank.org/indicator/IS.AIR.GOOD.MT.K1>. Accessed on 4 December 2019.

⁸ Yamoussoukro Decision is a treaty that allows for open skies among most African countries.

Box 2: Kazakhstan's Open Skies Policy

In October 2019, Kazakhstan's Minister of Industry and Infrastructure Development started to pilot an "open skies" aviation policy, which will promote the ease of access to and rules for national airports for foreign airlines in order to boost passenger traffic to the country. It is also expected to increase the competitiveness of Kazakhstan's domestic aviation market. At the time of writing, the Kazakh Government also plans to introduce the fifth freedom.

Source: *Caspian News*¹

According to ICAO (<https://www.icao.int/Pages/freedomsAir.aspx>), Fifth Freedom of the Air refers to the right or privilege, in respect of scheduled international air services, granted by one State to another State to put down and to take on, in the territory of the first State, traffic coming from or destined to a third State.

The common challenges faced by LLDCs to increase their air connectivity can be summarized as follows:

- The need to liberalize air transport services
- The need to have access to funds and need to improve their capacity in mobilizing sufficient financial resources to finance the improvement of aviation infrastructure (such as runway expansion and telecommunication equipment) that is in line with the ICAO Global Air Navigation Plan (GANP) and policies.
- The need to improve airport infrastructure related to support services such as passenger terminals, freight sheds, cold storage facilities as well as security and handling systems.
- Shortage of skilled manpower such as air traffic controllers, engineers and other technical personnel to manage aviation infrastructure and airports operations.

2.5. Inland Water Transport

Inland water transport could be an ideal mode for LLDCs due to its competitive freight rates for low-value high-bulk commodities, not to mention the positive impact on the environment. Furthermore, investment per kilometer to improve the navigation condition of inland waterway is less than that of road and rail infrastructure. Investment in river ports tends to be similar to that for rail terminals performing similar functions, and storage costs at river ports are lower as they are normally situated in locations with low land costs. Fifteen LLDCs have navigable inland waterways with various utilization levels (Table 2.7).

Table 2.7: Inland waterways in LLDCs (km)

Asia		Africa		Latin America	
Afghanistan	1,200	Burundi		Paraguay	3,442
Kazakhstan	4,000	Central African Rep.		Bolivia	5,784
Kyrgyzstan	600	Rwanda			
Lao PDR	4,600	Uganda			
Mongolia	580				
Tajikistan	200	Europe			
Turkmenistan	1,300	Moldova	558		
Uzbekistan	1,100				

Source: UN-OHRLLS (2019a; 2019b; 2019c)

For Asian LLDCs, inland water transport is being utilized to transport passengers and bulk goods to hinterland and remote areas. In Lao PDR, the Mekong River is key to its inland water transport. However, during the dry season, the navigable length gets reduced from 2,000 km to 1,300 km. In

1995, an agreement was signed between the governments of Cambodia, Lao PDR, Thailand and Viet Nam to establish the Mekong River Commission (MRC) as a joint effort to manage the shared water resources and developing the economic potential of the river.

In Central Asia, the Caspian Sea (with the Volga and Don Rivers) gives access to Azerbaijan, Kazakhstan, and Turkmenistan. In Europe, the Danube River (that connects to the Rhine) gives access to the Republic of Moldova (World Bank, 2011). Several African LLDCs also have navigable waterways such as Lake Victoria to Burundi, Rwanda, and Uganda, and the Congo River to the Central African Republic (no data on the IWW length available). Under the PIDA framework, inland port and waterway projects have been initiated (Table 2.8).

Table 2.8: Inland port and waterway projects in African LLDCs

Country	Description	Status
Burundi	Upgrading of Bujumbura Lake Port (modernization, navigation aid, dredging and sedimentation protection), as part of the Northern Multimodal Transport Corridor	Tendering
Uganda	Upgrading of Port Bell (modernization, navigation aid, dredging and sedimentation protection), as part of the Northern Multimodal Transport Corridor	Project definition
	Upgrading of Port Jinja (modernization, navigation aid, dredging and sedimentation protection), as part of the Northern Multimodal Transport Corridor	Project definition
Central African Rep., Dem. Rep. of Congo, Rep. of Congo	Navigation on the Congo river and its tributaries the rivers Oubangui and Sangha	Feasibility

Source: PIDA website (<https://www.au-pida.org/pida-projects/>). Accessed on 15 February 2021.

For Latin American LLDCs, the Paraguay-Paraná Waterway (PPW) is of great importance. Inland Water Transport (IWT) is a principal means for the international trade of these countries after road transport, not only as their primary import and export channel, but also to access the maritime ports in the transit countries. The density of inland waterways of Bolivia is 1.3 km per 100 km², while that of Paraguay is 0.8 km per 100 km² (Durán, 2017). IWT is of importance for Bolivia to export its bulk commodity, while Paraguay utilizes it to export its soybeans.

Together with Brazil, Argentina and Uruguay, Bolivia and Paraguay signed several intergovernmental agreements in 1969 (as part of the Cuenca del Plata Treaty) to provide investments to carry out works, promote feasibility studies for the implementation of new terminals and to guarantee the sustainability of the use of the Paraguay and Paraná rivers (Teixeira and Dávid, 2017). Of the two Latin American LLDCs, Paraguay has been more active in improving its section of the PPW. Apart from three state-owned ports, Paraguay also has 51 privately-owned ports along the PPW as a result of the creation of incentives for private investment established by Law No. 419/1994 of December 8, 1994, which authorizes and establishes the legal framework for the construction and operation of private ports (UN-OHRLLS, 2019). The efforts put by Paraguay might probably be due to the intensive use of its IWT. As such, the savings in freight rates from freight originating in and destined to the country, as a result of the project implementation, are relatively high (World Bank, 2010).

In spite of the international agreements and efforts, the PPW is still not able to fulfill its potential to be the greatest axis for freight movement in this region. As many others, waterways in Latin American LLDCs face several constraints related to variability of weather conditions, changes in water levels (e.g. low water level at certain periods of the year) that create obstacles to navigation, draft limitations and low predictability. These environmental constraints can largely be addressed through technical solutions, notably dredging, although it involves high investment costs. Other constraints related to port infrastructure and transport facilitation that lack adequate transfer facilities between rail and barges.

Generally, challenges faced by LLDCs in developing IWT can be summarized as follows:

- There is no complete and updated inventory of the current and potential capacity of inland waterway networks needed to plan this transport infrastructure. As a result, IWT gets lower priority than other transport sectors like road and rail.
- As a result of the previous point, investment channeled to IWT normally cannot cover the high initial dredging costs and maintenance costs.
- Most LLDCs do not have dedicated institutions in charge of the waterway's development and division of responsibilities and coordination mechanisms has not been effective. Where navigable waterways exist from LLDCs through maritime countries to the sea, it would be expedient for the LLDCs to build its capacity based on those of the maritime country.

2.6. Dry Ports

A **dry port of international importance** refers to an inland location as a logistics center connected to one or more modes of transport for the handling, storage and regulatory inspection of goods moving in international trade and the execution of applicable customs control and formalities (ESCAP, 2015). As such, dry ports are also often referred to as inland ports or inland container depots (ICDs).

Many experts argue that establishing dry ports creates the following benefits for LLDCs:

- It has high economic prospects as activities are moved from coastal area to hinterland.
- It can increase logistic performance of LLDCs as dry ports are at the heart of multimodal transport systems.
- It reduces transport and trade logistic costs as customs clearance can be done at dry ports to relieve capacity constraints at seaports.
- It has positive impact on the environment through the promotion of intermodality. The high costs are mainly attributed to the reliance on road transport and inefficient seaports, therefore promoting intermodality will contribute to cost reduction.

In the Intergovernmental Agreement on Dry Ports (2013), which 5 Asian LLDCs have ratified, 247 dry ports in 27 ESCAP member countries are identified. Of these, 44 existing and 28 potential dry ports are situated in 10 Euro-Asian LLDCs. This agreement sets common strategies and provides consistency across the region in the approach to dry port development and operation.

Efforts are ongoing to improve the performance of dry ports in Asian LLDCs:

- Afghanistan: connecting the Zaranj dry port with Delaram (India) through a 218 km road link;
- Kazakhstan: in partnership with China, it established the Khorgos Inland Dry Port with a full range of transport and logistics services at the border with China as part of the Khorgos-Eastern Gate Free Economic Zone initiative;
- Nepal: three dry ports with a full range of transport and logistics services have been built, improving Nepal's logistic performance. Its LPI moved up 10 places from rank 124 in 2016 to 114 in 2018.



Figure 2-12: Dry port in Ethiopia
Photo by Construction Review Online

For Armenia and Azerbaijan, potential dry ports of international importance are listed in Annex I of the International Agreement on Dry Ports. There are four dry ports identified in Armenia. Of these, three were already built. One of the locations is in Yerevan (close to Zvartnots airport), where two international logistic centers built as an integrative part of the TRACECA network. While for Azerbaijan, 21 dry ports are listed in the Agreement. One of them is Baku International Sea Trade Port in Alyat, in which the first of the three phases has been completed with a capacity of 15 million tons of cargo and 100,000 containers a year. It is located on the intersection of East-West and North-South transport corridors with direct access to main railways and highways of the country (Azerbaijan, n.d.).

Half of the African LLDCs have dry ports. Eswatini, Uganda, Zambia and Zimbabwe have dry ports. ICDs in both Burundi and Rwanda perform customs clearance. Ethiopia has so far established two well-run inland dry ports (Modjo and Semera) and planned to build another five. Modjo dry port currently handles 80 percent of the country's import-export market along the Ethiopia-Djibouti trade corridor. Modjo and Semera Dry Ports, were built in 2013 through PIDA.

The Government of Niger established a Dry Port Authority in 2014 to oversee the development of dry port facilities and intermodal transport infrastructure in the country. Priority is given to the dry ports development along the key transport corridor aiming at reducing red tape and transportation costs for users in Niger, and moving the time-consuming sorting and processing of merchandise inland, away from the congested seaports in Benin, Togo, Ghana, and Côte d'Ivoire. These countries are its main access to the sea. (Abdoulkarim et al., 2019)

Inland ports in Latin America are characterized as river ports. In Paraguay, all inland ports are situated along the Paraguay River and Paraná River. Paraguay has a bilateral agreement with Argentina to establish a Free Zone in Rosario Port for Paraguayan exports.

The major challenges facing development of dry ports in LLDCs include:

- Securing funding to cover the high initial costs for establishing the facility
- Determining good locations with adequate network of road, rail transfer points and/or inland waterways.
- Shortage of skilled manpower to manage the dry port operation
- Lack of coordination between different stakeholders.

2.7. Sea ports

Challenges faced by LLDCs to access world markets are multifold. Not only due to their geographical locations of lack of direct access to the sea, but their access to the sea are often made complicated by the transit countries, for instance by limiting access of LLDCs' road carriers to their sea ports. Some LLDCs even need to cross multiple transit countries to access sea ports, which leads to higher transport costs and transit times.

LLDCs wanting to invest in sea ports might want to do so to: create an alternative conduit for the transportation of goods to and from overseas; strengthen multi-modal solutions and create opportunities for new services; reduce total transport and logistics costs as well as journey times; provide a catalyst to their economy by creating appropriate infrastructure, processes and a supportive regulatory environment to encourage international trade.

Having cooperation agreements with transit countries can be very beneficial for LLDCs. Afghanistan, for instance, has signed the Chabahar Agreement with its transit countries, India and Islamic Republic of Iran, regarding the Iran's Chabahar port that will link the country to Afghanistan and Central Asia. Nepal also has such a cooperation agreement with India (to access the Visakhapatnam port), Bangladesh and China. Resource rich LLDCs, that have sufficient financial means, normally cooperate with their transit countries in joint development of sea ports to derive significant benefits. Kazakhstan for example, has joined forces with Islamic Republic of Iran to build a terminal in the port of Bandar

Abbas, and has also been looking to cooperate with India for building a terminal in the port of Mundra. Kazakhstan's National Railway Company owns a terminal in the Port of Lianyungang (China) and regular train services are provided from/to Kazakhstan⁹.

In Africa, concerted efforts are ongoing to construct new sea ports and rehabilitate/upgrade the existing ones that serve African LLDCs such as¹⁰:

- Mombasa Port (Kenya), which has been upgraded with a new container terminal in 2018.
- Lamu Port (Kenya), which is being constructed under the LAPSSSET Project.
- Beira Port (Mozambique), which has been upgraded in 2019.
- Maputo Port (Mozambique), which has been rehabilitated to have the design capacity of 50 million ton per annum and serve Botswana, Zambia, Malawi and Eswatini.
- Port of Walvis Bay (Namibia), where a new container terminal is being constructed to have the design capacity of 837,000 TEUs per annum and will serve Botswana, Zambia, and Zimbabwe.
- Dar es Salaam Port (Tanzania), which is being modernized with new berths and a planned new container terminal to accommodate larger vessels.

In Latin America, Paraguay and Bolivia utilize the maritime ports of Montevideo and Nueva Palmira (Uruguay), Buenos Aires (Argentina), and the port of Paranaguá (Brazil). Bolivia also utilizes the ports of Arica, Iquique and Antofagasta (Chile), the ports of Matarani and Ilo (Peru), the port of Santos (Brazil), and ports in the area of Rosario – San Lorenzo in Argentina.

Finally, having no seaboard should not preclude LLDCs from taking a material interest in ports development, although this endeavor might be challenged by:

- the lack of financial capacity to jointly develop sea ports in host nations or to have a share in the ports.
- the type of ownership of the port (a 100% state-owned port means no possibility for LLDCs to have a share in the port).

2.8. Transport Corridor Infrastructure Development

Transit transport corridors can be described as designated routes (unimodal, multimodal/intermodal) between two or more countries along which the corridor partners have agreed to cooperate, to apply and facilitate procedures and to provide support services, and promote regional integration and economic cooperation between neighboring states (Youssef, 2019). Multi-national transport corridors are viewed in a context of agreements between states facilitating trade through infrastructure investments and development of commercial services for moving freight.

There is a mutual relation between transport corridors and trade. They are fostering each other and connected in the same way as the connection between economics and infrastructure. The main components of a transport corridor are typically a gateway port, hinterland road and rail networks, inland ports or dry ports and border controls. The planning and management of international transport corridors is a well-established principle in developing trade, improving international relations and even furthering the cause of regional integration. Transport corridor development in many cases is either a part of a process of regionalization or a precursor to it.

The existence and development of transport corridors constitutes a new opportunity for LLDCs to access the sea and to participate in global trade. It has the potential of lowering trade costs, thereby

⁹ Kazakhstan National Report on Implementation of the Vienna Programme of Action

¹⁰ Summarized from the website of PIDA (<https://www.au-pida.org/pida-projects/>). Accessed on 28 December 2019.

increasing trade-leveraging investment creating employment and thereby reducing poverty. Improving connectivity lies at the heart of such a strategy. Because of this, improving international connectivity is not a new concept, yet much progress can be made, because LLDCs still remain behind in development.

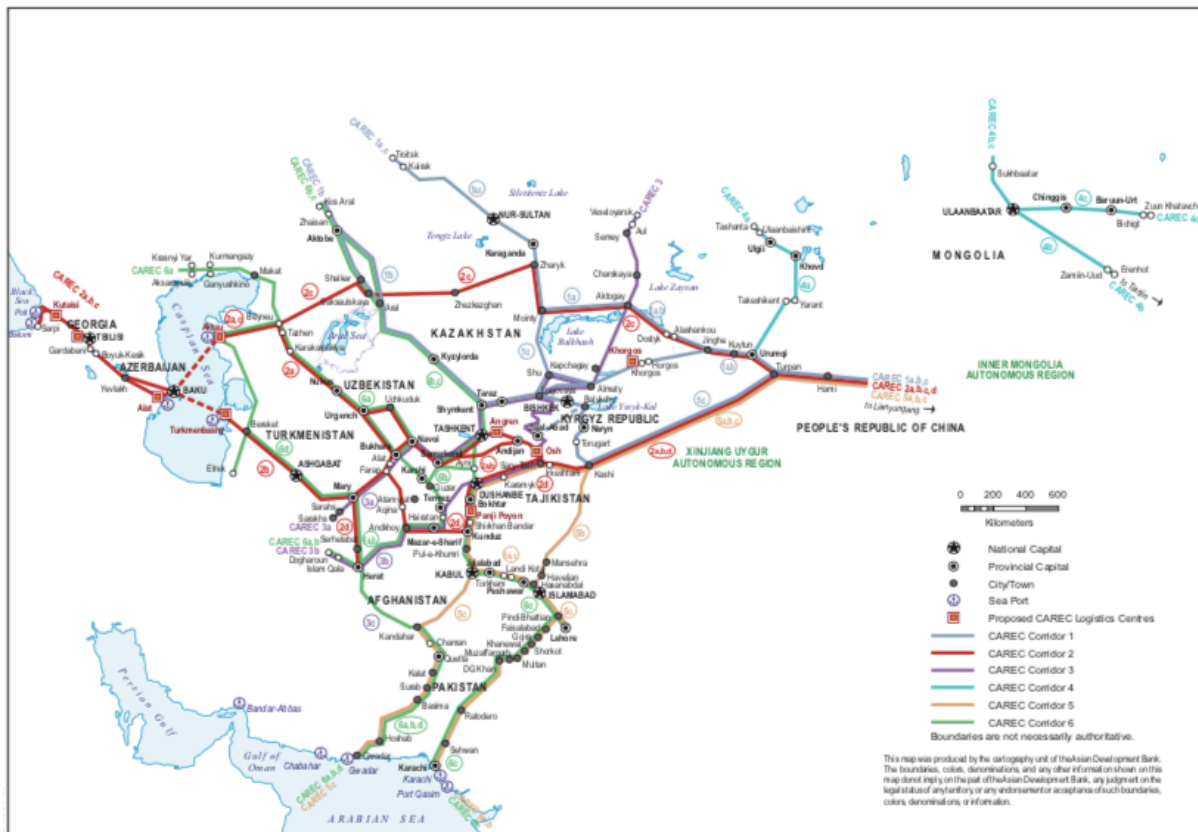
A transport corridor brings together infrastructure facilities and investments related to them. This will include utilities, energy supply internet and also land use planning along the corridor. International Corridors are normally established using treaty between partner countries that makes cross border investments possible. Having joint objectives that focus, for example on, removing bottlenecks and constructing missing links will benefit the participating countries. Adopting the corridor approach is more efficient and effective than isolated efforts and interventions from an individual country.

Africa has been adopting the corridor concept as a mechanism for development of transport networks. Examples of key transport corridors that have led to the development of good road and border infrastructure in Africa are listed below:

- Trans-African Highways, the transcontinental road network being developed by UNECA.
- Abidjan-Ouagadougou-Bamako Multimodal Transport Corridor
- Central Multimodal Transport Corridor connecting Burundi, Democratic Republic of Congo, Rwanda and Uganda
- Dakar-Bamako-Niamey Multimodal Transport Corridor
- Douala-Bangui Douala-NDjamena Multimodal Transport Corridor
- Pointe Noire- N'Djamena Multimodal Transport Corridor
- North-South Multimodal Transport Corridor (connecting South Africa, Botswana, Mozambique, Zambia, Zimbabwe, Tanzania, and Malawi)
- Northern Multimodal Transport Corridor connecting Burundi, Democratic Republic of Congo, Kenya, Rwanda, South Sudan, Tanzania and Uganda
- Corridors established through bilateral agreements such as Djibouti-Addis transport corridor, the Beira corridor (Mozambique and Zimbabwe), Maputo corridor (Mozambique and South Africa).

In Asia, major corridor initiatives include the Euro-Asian Transport Links (EATL), Central Asia Regional Economic Cooperation (CAREC) Program, and Greater Mekong Subregion (GMS) economic corridors. CAREC for example, has extended its six-road corridor network from 24,999 km by 2015 to 29,350 km by 2020. The strategic transport projects have also been determined for each transport corridor and international organizations ranging from the World Bank and Asian Development Bank to Islamic Development Bank have contributed to the financing of these projects. CAREC has even established an economic corridor between Almaty and Bishkek in Central Asia. While a transport corridor requires connected physical infrastructure, an economic corridor goes beyond that by promoting regional economic integration between economic agents along a defined geography.

Figure 2-13: CAREC multimodal corridors



Source: ADB (2019b)

In Europe, Armenia and Azerbaijan are part of the Transport Corridor Europe-Caucasus-Asia (TRACECA), a set of routes connecting Europe with Asia through countries located in a band south of Russia. It was initiated by the European Union in 1993 to stimulate economic development and political stability in the involved Commonwealth of Independent States (CIS) countries after the collapse of the Soviet Union. Armenia and Azerbaijan, together with Tajikistan, are also part of the International North-South Transport Corridor (INSTC), a multimodal transnational transport corridor established by the Islamic Republic of Iran, India, and Russia, as a result of tightening relationships of these three countries.

Several corridors in Asia and Europe overlap with the Belt and Road Initiative (BRI). This massive infrastructure project is expected to cut trade costs and enhance foreign investment in Central Asia and South Caucasus countries by building transport and trade infrastructure in the Eurasian continent to connect Asia to Europe¹¹. The BRI economic corridors across Eurasia are top priorities of this initiative¹².

Active corridors in Latin America are the Ciudad del Este (Paraguay) – Ponta Grossa (Brazil) and the Santa Cruz (Bolivia) – Arica (Chile) corridors, and certainly the inland waterways of the Paraná and Paraguay Rivers. For the latter, bridges are planned to be built over these rivers to serve as the

¹¹ <https://www.worldbank.org/en/news/feature/2019/03/11/belt-and-road-initiative-in-central-asia-and-the-caucasus>

¹² <https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/belt-and-road-in-latin-america-a-regional-game-changer/>

primary socioeconomic logistics corridor between Paraguay and Brazil (UN-OHRLLS, 2019c). Another upcoming corridor project in the region is the Bi-oceanic railway corridor that will connect Bolivia, Brazil and Peru (Figure 2-7).

Finally, the success of a transport corridor depends on the provision of physical infrastructure and the corridor management that oversees the performance of the corridor. The corridor management refers to an organization established by diverse actors including the government and the private sector. Therefore, it is important to build the capacity of the corridor management staff in the areas of:

- Coordinating the roles of participating countries and other agencies such as ports, railway companies, road authorities, shipping lines and other logistic players.
- Providing training for stakeholders in trade and transit
- Assisting participating countries to domesticate the corridor policies into their national laws and legislations.
- Measuring the corridor performance to assess how corridor goals can be achieved and to identify under-performing areas.

Box 3: CAREC Corridor Performance Measurement and Monitoring

Since 2009, CAREC Corridor Performance Measurement and Monitoring (CPMM) captures trade facilitation indicators to assess the efficiency of transport and border-crossing points across CAREC corridors. These indicators are: TFI1: Time taken to clear a BCP (hour); TFI2: Cost incurred at border crossing clearance (\$); TFI3: Cost incurred to travel a corridor section (\$ per 500 km, per 20-ton cargo); and TFI4: Speed to travel on CAREC corridors (kph). Data series of these indicators are presented in Table 2.9.

CPMM is published annually based on nearly 3,000 collected data samples of commercial shipments across Central Asia submitted by participating carrier and forwarder associations from CAREC countries. Based on trip samples, CPMM analyzes the relative performance of each CAREC corridor using time/cost-distance methodology and identifies the bottlenecks and constraints in the movement of goods across the region.

CPMM findings are of great interest to both policy makers and the private sector operators as it answers questions as: What are the causes of delays in the CAREC corridors? Where do delays occur and what can be done to address those problems?

Table 2.9: Trade Facilitation Indicators along the CAREC corridors in 2012-2019 (average value)

Indicator	2012	2013	2014	2015	2016	2017	2018	2019
Road Transport								
TFI1 (hours)	8.8	5.6	9.9	9.3	11.3	16.9	12.0	12.2
TFI2 (US\$)	145	236	177	149	160	159	156	162
TFI3 (US\$ per 500 km, per 20-ton cargo)	1,068	1,596	1,359	1,341	1,174	947	953	901
TFI4 (kph without delay)	39.4	37.8	42.0	40.2	41.7	45.0	46.3	43.6
TFI4 (kph with delay)	25.9	22.3	22.9	23.2	22.3	22.2	23.4	22.6
Rail Transport								
TFI1 (hours)	25.3	29.9	32.6	27.4	25.9	26.2	23.2	20.6
TFI2 (US\$)	280	229	148	208	215	202	196	198
TFI3 (US\$ per 500 km, per 20-ton cargo)	468	911	1,364	1,250	966	976	970	820
TFI4 (kph without delay)	34.4	31.7	32.2	38.3	38.6	37.6	35.4	45.0
TFI4 (kph with delay)	14.8	13.3	11.4	14.0	14.3	14.8	15.9	19.0

Source: ADB (2019a)

Summary

The inadequacy and low quality of transport infrastructure have been traditionally pointed out as the cause of the high costs and low competitiveness of LLDCs. Missing links and poor maintenance hinder the LLDCs' greater integration into regional networks. In terms of quantity, the paved road density in LLDCs in Latin America and Africa is lower than the LLDCs' averages. Furthermore, poor road surface quality results in longer transit time, higher transport costs, high investment, and limited access during the rainy season. Therefore, climatic scenario and sustainability should be taken into consideration when planning, designing, operating and maintaining infrastructure.

The majority of LLDCs have rail density that is lower than the average in lower and upper middle income economies. Asian LLDCs utilize their railways to transport goods, while their European counterparts use it mainly to transport passengers. The pace of provision of railway infrastructure in Africa remains very low. As is the case in the road sector, railway network in LLDCs is inadequate in terms of its quantity and quality, which makes railway unattractive to transit traffic, resulting in modal shift to road, which negatively impacts not only road surfaces but also the environment. Furthermore, unharmonized gauges between LLDCs and transit countries cause the need for rolling stocks interchange, which results in longer transit time.

Air transport remains the most challenging mode to develop as it involves very high investment. Structural improvements in airports are needed to meet the expected demand growth. Furthermore, this transport mode is suitable for high value goods, while most LLDCs have low value addition to export commodities. However, the example of Ethiopian Airlines demonstrates that carriers can thrive in a more liberalized environment. Negotiating bilateral air service agreements with the destination countries' government will increase air connectivity. The impacts will extend beyond the benefits to passengers and cargo shippers. This is of utmost importance because including fifth freedoms has been a greater challenge for countries with limited passenger volumes.

Inland water transport is mainly developed in Latin American and Asian LLDCs. Due to its characteristics, this transport mode has high potential to address the challenges faced by LLDCs, such as low infrastructure investment and low freight rates. However, inland waterway is bounded by natural restrictions and to address this, involvement of all countries along the waterway is indispensable.

Many Euro-Asian and African LLDCs have built dry ports/ICDs to improve transit efficiency, however more is needed especially along transit corridors. Lack of investment is again being a challenge along with the shortage of skilled manpower in LLDCs.

Finally, many LLDCs have paid insufficient attention to maintaining their infrastructure assets, creating economic inefficiencies. Prioritizing maintenance is not only preventing assets to deteriorate, but also decreasing the costs of operation and minimizing disruption.

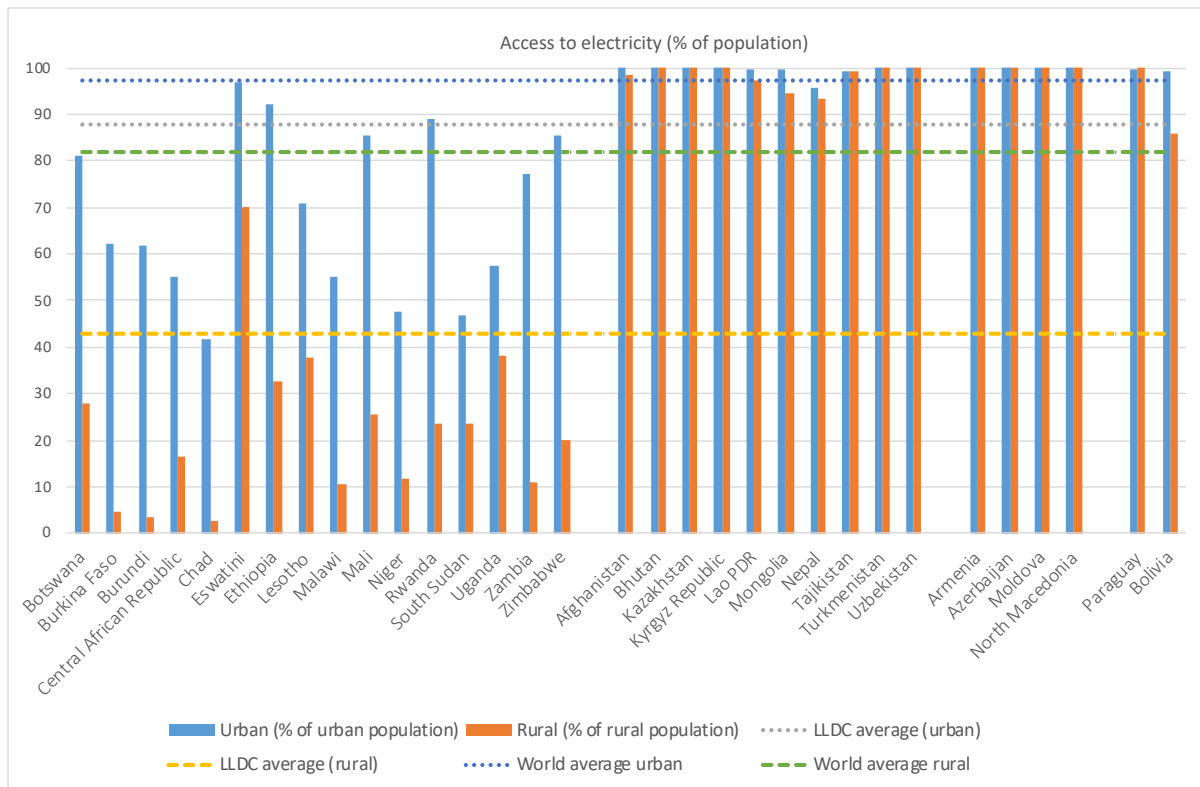
3. Status of Development of Complementary Infrastructure to Transport Connectivity

This chapter discusses energy infrastructure and ICT connectivity in LLDCs as crucial parts to increase efficiency in transport and transit systems, hence to reduce trade costs and improve the competitiveness of LLDCs to become fully integrated in the global market. The share of renewable energy will also be discussed in the spirit of SDG 7 (*Ensure access to affordable, reliable, sustainable and modern energy for all*).

3.1. Energy Infrastructure

As outlined in the VPoA, energy infrastructure and access to affordable, reliable and renewable energy and related technologies are critically important for facilitating trade. Electricity shortages cause goods to be held up at the borders because work to inspect and clear traffic can be done only during daylight hours. Energy is also needed to modernizing information and communications technology and transit systems, and enhancing productive capacity to achieve sustained economic growth and sustainable development. Their impact is synergetic.

Figure 3-1: Access to electricity in 2018



Source:

- World Bank Open Data. Available at <https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS> and <https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS>. Accessed on 15 February 2021.
- United Nations SDG Indicators Database (<https://unstats.un.org/sdgs/indicators/database/>). Accessed on 3 January 2020.

European LLDCs already achieved 100% electricity coverage, while most of Asian and Latin American LLDCs in 2018 have nearly reached the same level, means only a small percentage of the population, primarily in rural areas, does not have access to electricity. Bolivia still needs to close some gaps and some efforts are being done by having developed a long-term energy development policy (entitled “Electricity Programme to Live with Dignity”) to grant universal electricity access by 2025 and having bilateral agreements with adjoining countries to achieve energy integration (UN-OHRLLS, 2019c).

Despite the good coverage achieved by these three regions, the average electricity coverage of LLDCs is still behind the world average (Figure 3-1), due to the low coverage of the African LLDCs. They lag behind their counterparts in terms of both access to electricity and the urban-rural electricity gap. The gaps in energy consumption, as indicated by nighttime electricity use, are most self-evident from satellite as shown in Figure 3-2.

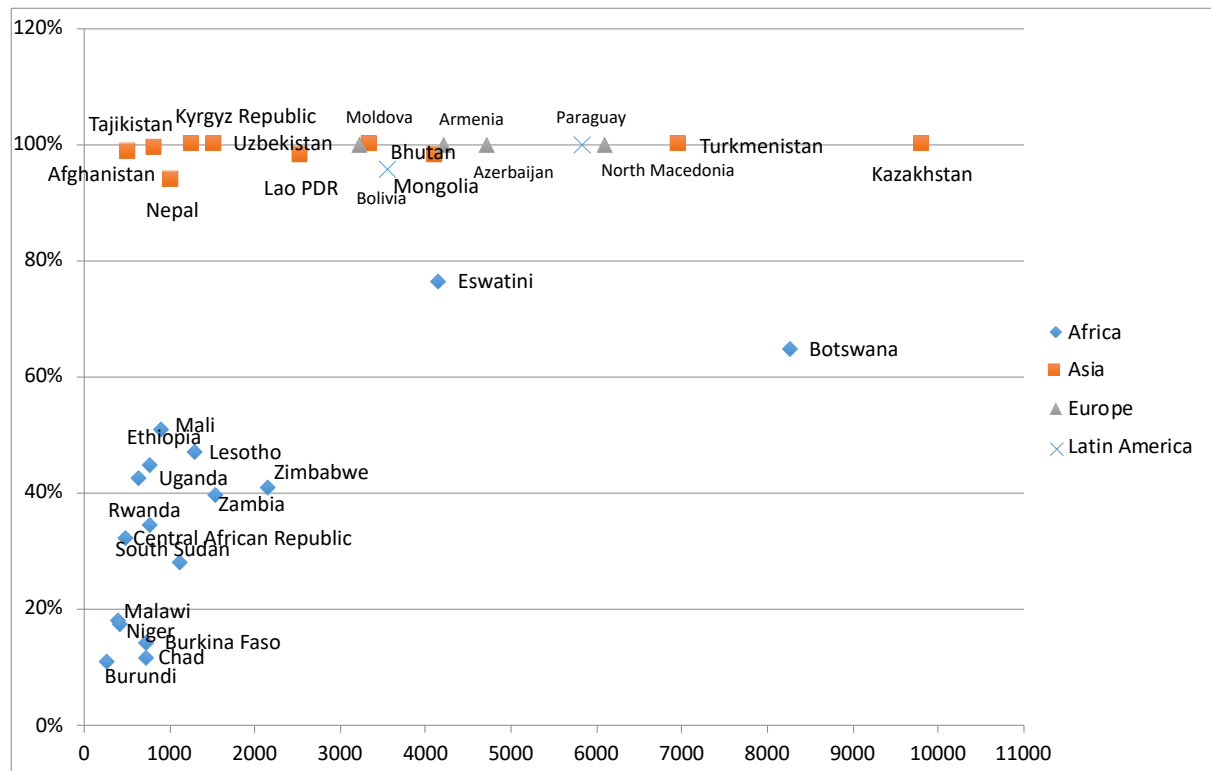
Figure 3-2: Global energy distribution 2018



Source: *Forbes*. Available at <https://www.forbes.com/sites/jamesconca/2018/06/27/ans-all-energy-forum-brings-a-sobering-analysis-to-energy-and-climate-plans/#29a9e3283953>.

Looking at Figure 3-3, it is clear that access to electricity is related to income (GDP per capita). Energy access is low in poorer countries. This explains the low access in African LLDCs. It is therefore critical to scale up energy investments, especially in rural areas (where the vast majority of poor people live), to provide reliable and modern energy services, which are critical to enhance connectivity and productivity, and ultimately to alleviate poverty and attain economic growth. However, this goal will be challenged by high investment needs. Ethiopia, which has the highest urban electricity access among African LLDCs, would need to dedicate 16 percent of GDP to electricity access over the next 15 years (Oxford Economics, 2017). The proportion would be even higher for other African LLDCs, and these investment needs have not even included the SDG targets.

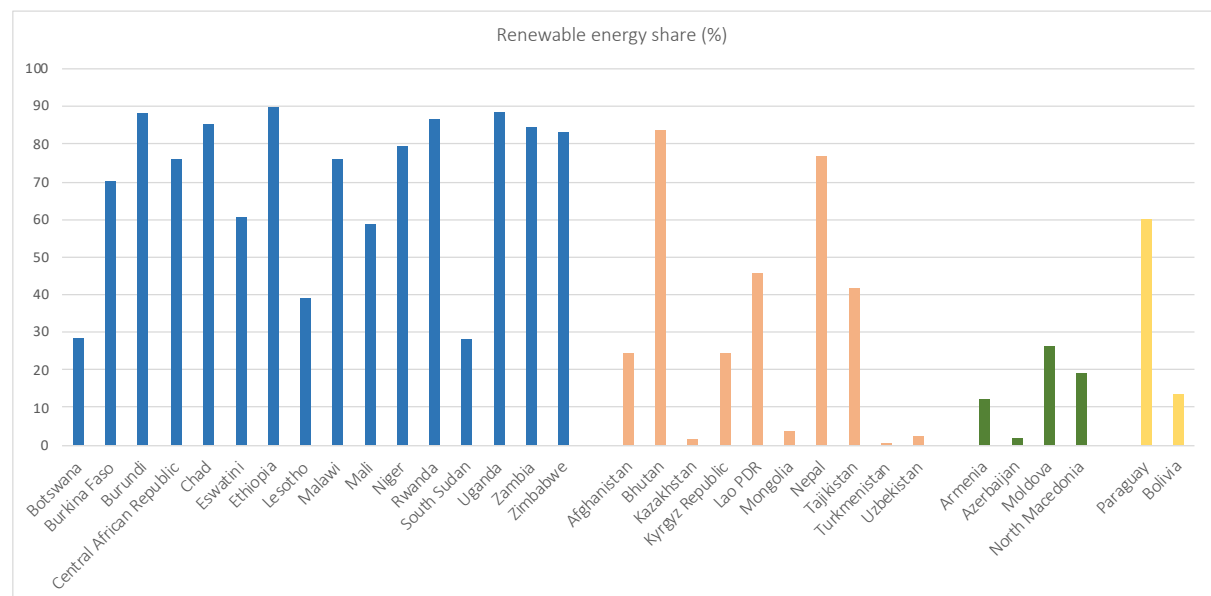
Figure 3-3: Access to electricity vs. GDP per capita in 2018



Source: World Bank Open Data. Available at <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD> and <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>. Accessed on 15 February 2021.

In order to gain higher environmental benefits to achieve SDG 7 (Ensure access to affordable, reliable, sustainable and modern energy for all), the additional energy demand can be met with renewable energy sources, instead of fossil fuels.

Figure 3-4: Renewable energy share in the total final energy consumption in LLDCs in 2017



Source: United Nations SDG Indicators Database

African LLDCs have the highest share of renewable energy market compared to the other regions. This is because most of the energy source for LLDCs is from sustainable sources in particular hydro power (UN-OHRLLS, 2019). Most African nations have introduced National Energy Plans (NEPs) to meet growing energy demand with affordable, sustainable energy services that enable socio-economic development. NEPs generally aim at, among others, developing a strategy for diversification of the energy mix, ensuring energy security by using all existing resources, and improving energy access by establishing rural electrification programmes, extending the national grid and improving the quality of electricity supply for the households that are connected. Implementing NEPs can be challenging for LLDCs that are characterized by small energy sectors spanning large geographic areas with poor infrastructure. Therefore regional cooperation needs to be promoted to overcome these barriers (IRENA, 2015). Efforts are ongoing to address this. African regional economic communities, such as COMESA, EAC, ECCAS, ECOWAS and SADC, have adopted a number of national power generation and cross border interconnector plans as regional projects into the master plans under the auspices of the Programme for Infrastructure Development in Africa (PIDA). The main challenge faced in implementing the projects is the long gestation periods, that resulted in slow project pace and slow increase in electricity access in LLDCs.

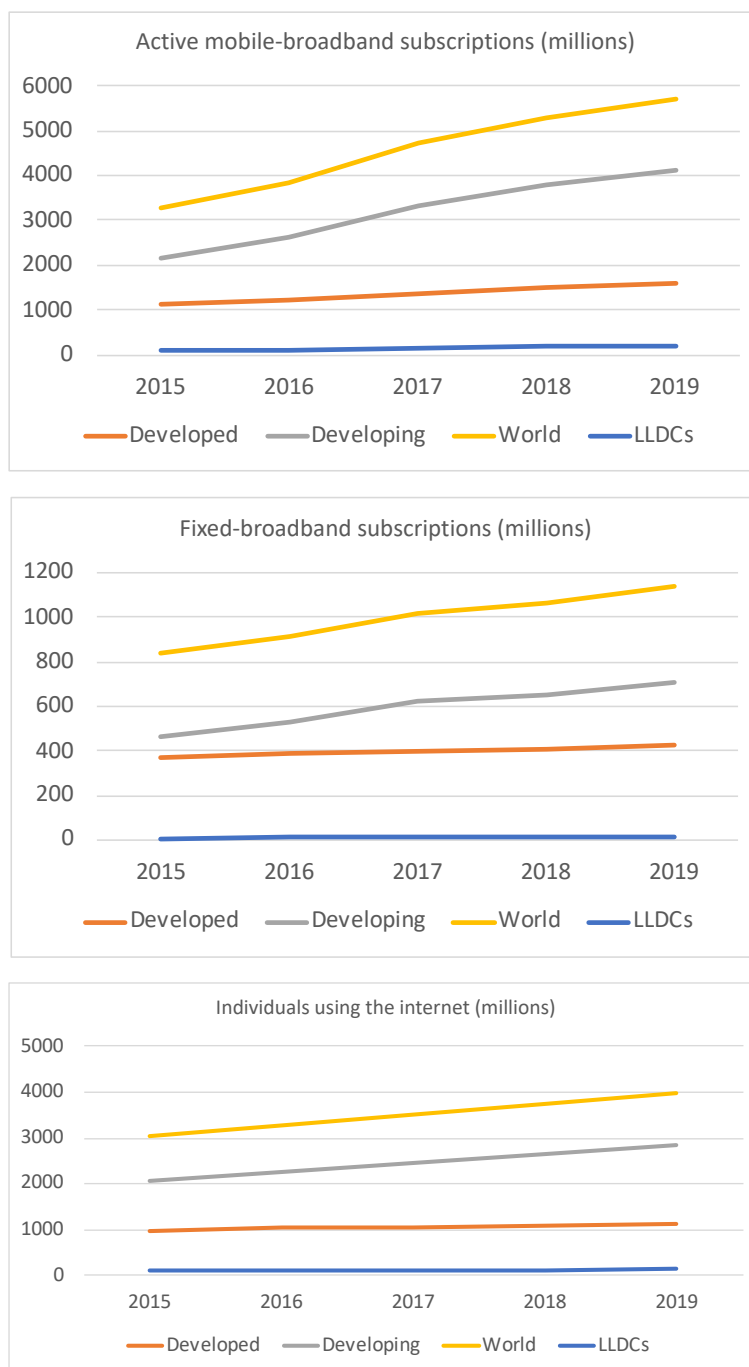
Euro-Asian LLDCs' renewable energy consumption is the lowest of all LLDCs. However, efforts are ongoing to increase the supply. Bhutan has adopted the Sustainable Hydropower Development Policy 2008. Lao PDR and Nepal have been developing projects to empower their enormous potential of hydropower generation. Hydropower plant projects in Armenia are also ongoing or already completed. In Latin America, Paraguay performs best due to its high production of hydropower and it also manages to export the energy.

3.2. ICT Connectivity

When considering connectivity, it is important to have due regard to transport demand and to note that most value-added services do not depend primarily on highways and railways but on fast and efficient internet and telecommunications. Telecommunications infrastructure is essential for border crossing facilitation, boosting the competitiveness of enterprises and facilitating international trade. Therefore, it is vital that transport connectivity goes hand in hand with internet and telecommunications network and service enhancement. Low ICT connectivity hinders the optimization of trade facilitation tools, such as automated single windows, automated system of customs data, and advance cargo information (see section 6.1).

LLDCs have been making progress in the past decade in terms of mobile subscription rates, the number of internet users and fixed broadband subscription rate, as shown in Figure 3-5.

Figure 3-5: ICT connectivity trend in LLDCs 2015-2019



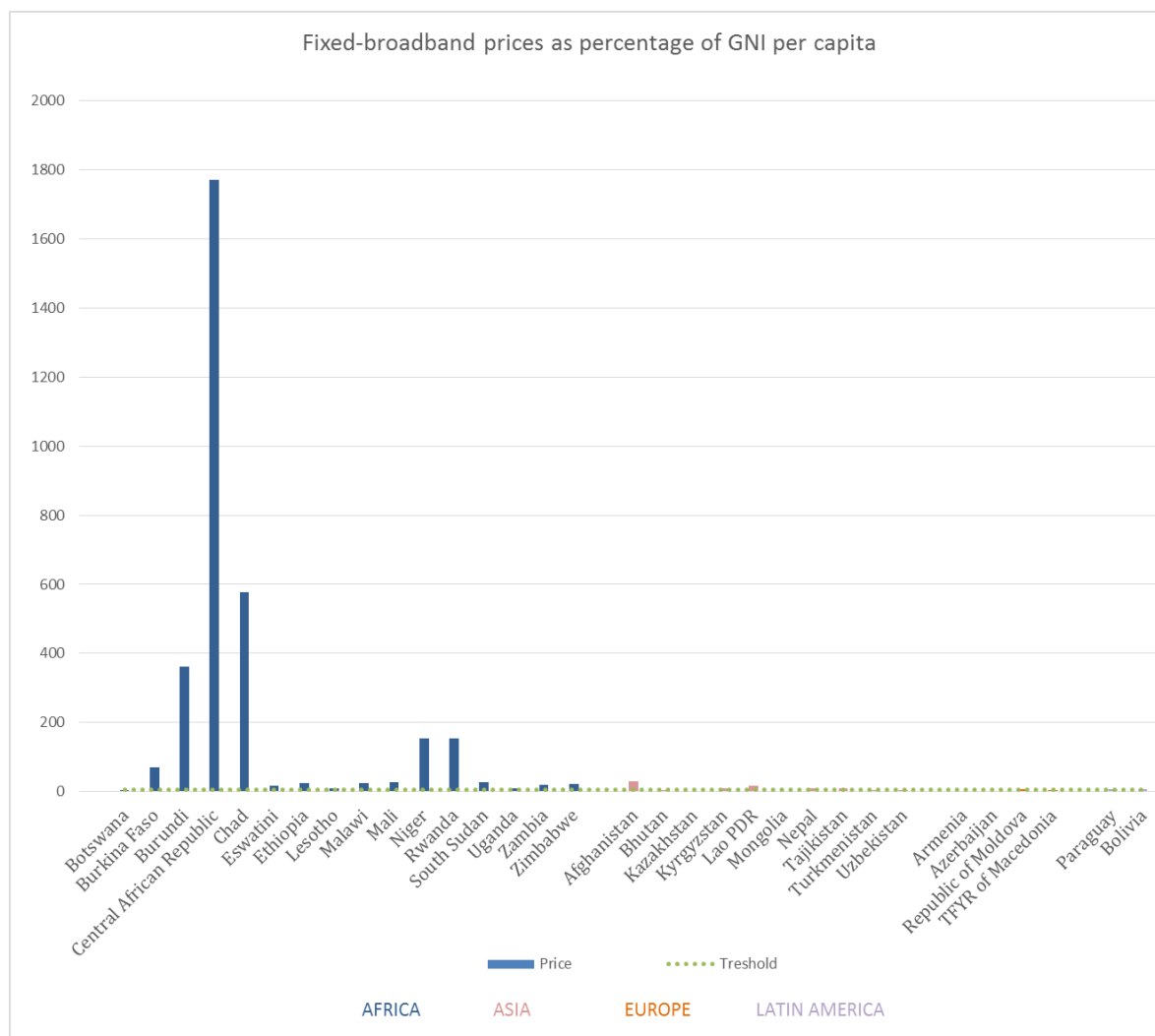
Source: ITU. Data available at <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>. Accessed on 15 February 2021.

Note: LLDCs included in the charts are 16 LLDCs (12 in Africa and 4 in Asia)

Despite this progress, LLDCs still lag behind other developing countries and developed countries. The relatively high cost of ICT services is responsible for this situation.

Figure 3-6 depicts fixed-broadband prices in LLDCs as percentage of GNI per capita, which refer to the monthly price for an entry-level fixed-broadband plan with a minimum monthly data allowance of 1 GB and for a minimum advertised download speed of 256 kilobits per second (kbit/s).

Figure 3-6: Fixed-broadband prices in 2019 as percentage of GNI per capita



Source: ITU (2020)

The UN Broadband Commission set a target for affordable entry-level service as 2 per cent of GNI per capita (ITU, 2020). Only Kazakhstan and Azerbaijan have met this target. Kazakhstan has the lowest fixed-broadband prices of all LLDCs, which is most likely due to its status as a middle-income country. Furthermore, it launched “Digital Kazakhstan 2020” that aims to boost the economy through accelerated digitization by creating a digital platform to increase competitiveness of sectors of the economy while increasing connectivity of the rural population (COMCEC, 2017).

Half of the Asian LLDCs is nearly meeting the target and none for the African counterpart. Eight African LLDCs even have broadband prices that are much higher than the developing countries’ average, which is about 35% of GNI per capita. These prices range from 40% to 1,770% of GNI per capita in Burkina Faso and in Central African Republic (CAR) respectively, which means that internet prices are very high and not affordable. These high prices are the result of lack of direct access to submarine communication cables. Another reason is a non-competitive environment of the ICT markets in LLDCs and because open-access principles are not fully implemented (World Bank, 2018).

This situation is in line with the state of trade facilitation in LLDCs (see

Table 6.1), where the implementation rate of single window is higher in European and Asian LLDCs than in Africa and Latin America, confirming the importance of internet connectivity to facilitate trade.

At time of writing, the Central African Backbone project was just launched, and aims to install terrestrial optical fiber links that interconnect the countries of Central Africa in order to provide high-speed broadband internet access and to eliminate the missing links¹³. This project is blend financed by the EU, the African Development Bank and the World Bank as part of the Africa-Europe Alliance. Other initiatives are also being implemented such as the African Internet Exchange System (AXIS) project (financed by Euro-Africa Infrastructure Trust Fund and the Government of Luxembourg) and the implementation of the Pan African e-network (PAeN). The African Union Commission has also led the process of promoting cyber security in Africa as well as launching the Dot Africa programme (UN-OHRLLS, 2019a).

Except for Eswatini, Mali and South Sudan, all other African LLDCs have adopted national broadband policies (UNECA, 2017).

In order to increase the penetration level of fixed-broadband, increasing the affordability is critical. COMCEC (2017) estimated the increase in household penetration as a result of a price reduction in Asia and Africa (Table 3.1).

Table 3.1: Impact of fixed-broadband price reduction on penetration level (percentage of households)

Region	2015 Household Penetration	5% Price Reduction	10% Price Reduction	15% Price Reduction	20% Price Reduction	25% Price Reduction
Central Asia	22.87	25.36	27.84	30.33	32.81	35.30
Eastern Asia	67.80	70.09	72.38	74.67	76.96	79.26
South Asia	8.39	9.72	11.05	12.38	13.70	15.03
South-Eastern Asia	17.35	19.53	21.70	23.88	26.06	28.23
Eastern Africa	2.22	2.63	3.05	3.46	3.87	4.28
Central Africa	0.74	0.88	1.03	1.17	1.31	1.45
Southern Africa	19.61	21.93	24.25	26.57	28.89	31.21

Source: COMCEC (2017)

Summary

The African LLDCs lag significantly behind the other groups in terms of both energy and ICT connectivity. Although most of African LLDCs have developed their own national energy plans, cross-border energy trade needs to be promoted through regional cooperation in order to ensure energy security. Efforts are ongoing. Cooperation is still at its early development stage, lack of good project implementation skills has resulted in long gestation periods, slow project pace and in the end slow increase in electricity access in LLDCs. Building the capacity of LLDCs in this area will ensure adequate project management during the construction and maintenance.

In terms of ICT connectivity, the high cost of ICT services, in particular fixed-broadband services, has obviously been hindering the progress of trade facilitation in African LLDCs. Lowering the price of these services to be in line with the purchasing power of people is essential to fully harness the potential of the digital economy that facilitates trade and promote sustainable development. The high number of African countries with national broadband policies in place shows the intention to improve

¹³ <https://ec.europa.eu/europeaid/news-and-events/africa-europe-alliance-action-digitalisation-project-launched-central-african-en>

access and affordability. Several regional initiatives have been developed to increase cross-border networks.

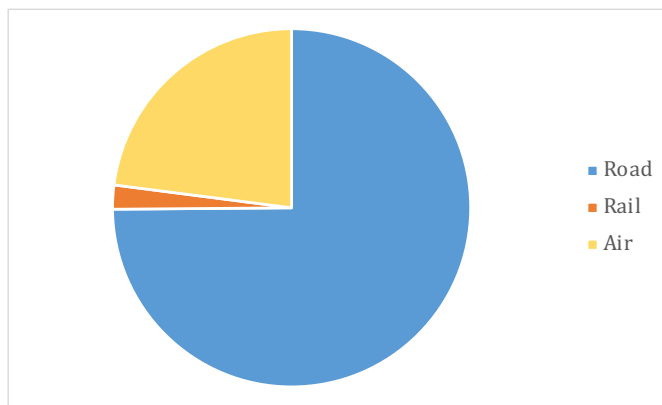
4. Development of Climate-Resilient Infrastructure

Development of climate resilient infrastructure in LLDCs will help to reduce direct losses of disruption caused by climate variability and change. It will also contribute to achieve target 9a of the SDGs (*Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States*).

4.1. Climate Change

As discussed in chapter 1, good transport connectivity and quality transport infrastructure is key to strengthen the trade competitiveness of LLDCs and their socio-economic development. Transport sector also plays a key role in facilitating the response to natural disasters (World Bank, 2017). Chapter 2 outlined that the road network is a large, if not the largest, part of infrastructure stock in most LLDCs. Road transport is also responsible for the highest freight volume in LLDCs (Figure 4-1). Road sectors also represent a very large share of the government investment.

Figure 4-1: Mode share of freight transport in LLDCs in 2017

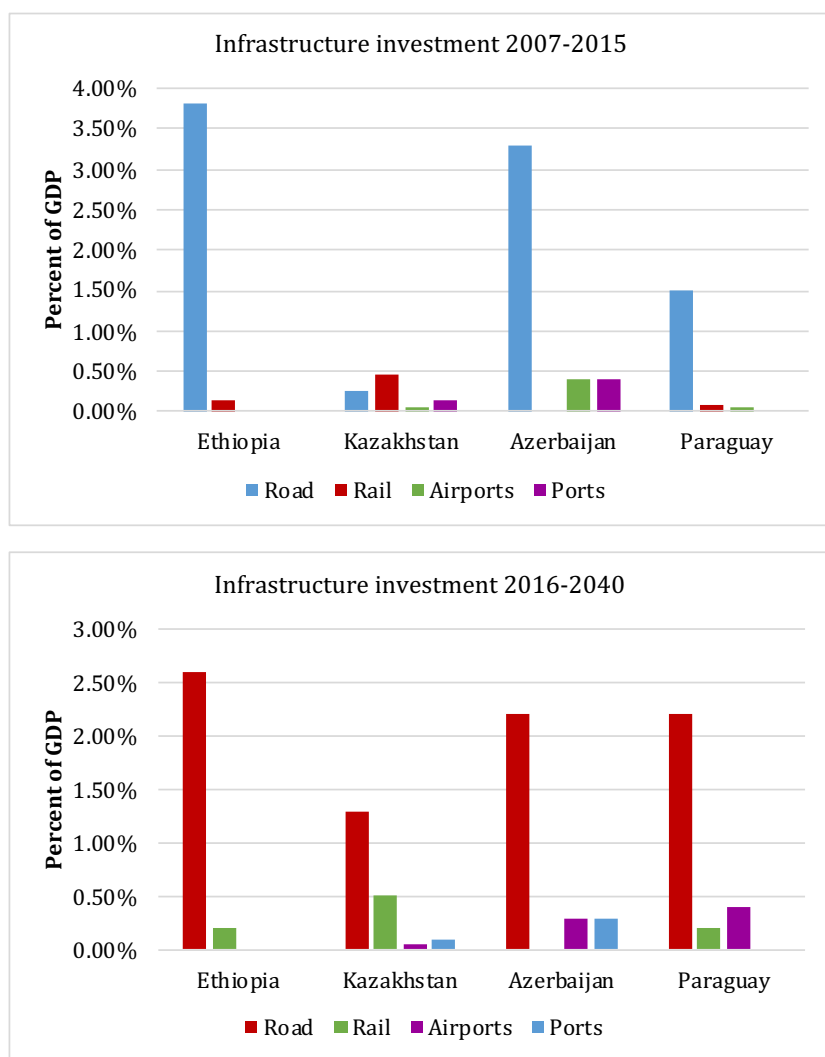


Source: United Nations SDG Indicators Database (<https://unstats.un.org/sdgs/indicators/database/>). Accessed on 16 February 2021.

Note: Inland water transport excluded

In the *Global Infrastructure Outlook: Infrastructure Investment Needs 50 Countries, 7 Sectors to 2040* by Oxford Economics (2017), figures from four LLDCs were included (Figure 4-2). It shows that road infrastructure investment in 2007-2015 was the highest among all transport infrastructure, and it will stay like this until 2040. Among these four LLDCs, the investment required as a proportion of GDP is the greatest for Ethiopia, which would need to dedicate 2.6 percent of GDP to road infrastructure until 2040.

Figure 4-2: Infrastructure investment in four LLDCs



Source: Oxford Economics (2017)

The road network is most vulnerable to the climate change impacts. Its damage will create high asset losses. But this does not mean that climate change impacts on other infrastructure such as rail, airports and waterways, can be neglected. In the transport sector, impacts of climate changes are illustrated in Table 4.1.

Table 4.1: Illustrative impacts of climate change in transport sector

Temperature changes	<ul style="list-style-type: none"> - Melting road surfaces and buckling railway lines - Damage to roads due to melting of seasonal ground frost or permafrost (pavement deterioration) - Changing demand for ports as sea routes open due to melting of arctic ice
Sea-level rise	<ul style="list-style-type: none"> - Inundation of coastal infrastructure, such as ports, roads or railways
Changing patterns of precipitation	<ul style="list-style-type: none"> - Disruption of transport due to flooding - Changing water levels disrupt transport on inland waterways - Increased frequency of landslide
Changing patterns of storms	<ul style="list-style-type: none"> - Damage to assets such as bridges - Disruption to ports and airports

- Increased accident rates

Source: OECD (2018b); Baker (not dated.)

Infrastructure contributed over half of Africa’s improved growth performance (World Bank, 2010). The World Bank already estimated that climate change is expected to take a heavy toll on the African region’s transport infrastructure, especially roads and bridges (World Bank, 2017b).

Table 4.2 shows some examples of infrastructure damage costs due to extreme events in LLDCs. The most recent one is Cyclone Idai that hit Malawi, Mozambique and Zimbabwe. It destroyed critical transport infrastructure such as Beira Port, major roads connecting the three countries, bridges, energy and ICT infrastructure. In Mozambique alone, transport asset damages and losses amount US\$ 546 millions.

Table 4.2: Examples of infrastructure damage costs associated with extreme weather events

Countries	Weather event (Year)	Cost of damage to transport infrastructure (US\$, millions)
Malawi	Cyclone Idai (2019)	36
Mozambique	Cyclone Idai (2019)	546
Belize	Hurricane Keith (2006)	40
Fiji	Flooding (2009)	28.5
Solomon Islands	Flooding (2014)	12

Source: USAID (2019)¹⁴; Mozambique Government (2019); World Bank (2017)

Figure 4-3: Washed away bridge in Zimbabwe due to Cyclone Idai



Photo: REUTERS/Philimon Bulawayo

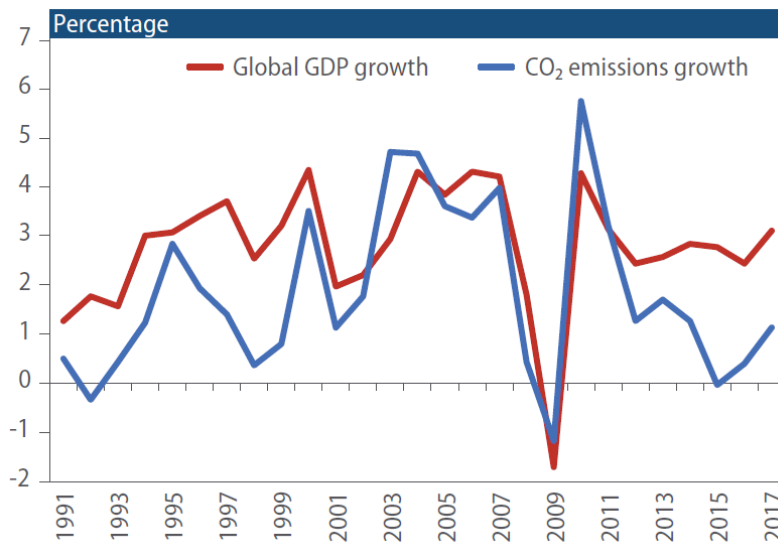
Instead of only for individual assets or certain types of infrastructure, considering climate change impacts must be done through integrated system thinking. Ensuring resilient transport infrastructure should be rooted from the planning phase to cover the direct and indirect effects of climate change.

Considering the urgency of LLDCs to improve their connectedness and to be landlinked, and the fact that they are still lagging behind in transport infrastructure provision in terms of quantity, quality, and funding, addressing climate change impacts in their transport infrastructure planning and management is essential.

¹⁴ <https://www.usaid.gov/cyclone-idai/fy19/fs10>

Finally, there is a dichotomy in promoting development and addressing global warming that must be considered. Anthropogenic climate change is driven by economic growth. Trade drives economic development and improvements in connectivity drives trade. The inescapable truth is that better connectivity drives global warming. Consequently, it is incumbent on the international community to ensure that its support to improve connectivity in LLDCs should not compromise its positions on reducing global warming. Evidence of the close correlation between emissions of CO₂ and global GDP is provided in Figure 4-4. The analysis is based on UNDESA estimates based on data from UNSD and the Netherlands Environmental Assessment Agency.

Figure 4-4: GDP and CO₂ emissions growth



Source: UNDESA (<https://www.un.org/development/desa/dpad/publication/world-economic-situation-and-prospects-february-2019-briefing-no-123/>)

Given the relationship between trade and GDP in Figure 1-1, it can be assumed that improved connectivity will increase CO_{2e} volumes that will need comprehensively addressing.

4.2. Sustainable Solutions

An emphasis on integrated thinking is vital to developing and providing sustainable solutions to improving connectivity. This means not only ensuring transport modes are integrated at various points in the network but also ensuring that transport is responsive to the needs of the productive sectors such as agriculture, tourism, mining and manufacturing. It also means ensuring that the entire value chain is carbon neutral. Increases in CO₂ through improvements in transport connectivity need to be offset through climate smart production and offsetting in re-forestation. A conundrum for development partners might be improving connectivity for coal exports from LLDCs, for example, in order to promote GDP while knowing that such exports will increase emissions. Considering the importance of ensuring transport infrastructure to keep functioning at all time, it must therefore be responsive to environmental concerns.

Infrastructure networks will be affected by the physical impacts of climate variability and change, but will also play an essential role in building resilience to those impacts (OECD, 2018b). Extreme weather will put considerable pressure on road system. The damage and accelerated aging of



Figure 4-5: Flooded road in South Sudan

Photo by Reuters

roads caused by climate change will require increased investments for maintenance and more frequent rehabilitation. Given its geographical location, the territorial distribution of its population, and its dependency upon natural resources, changes in climatic patterns have already begun impacting the infrastructure and transport systems of the Latin American LLDCs, a course which is expected to intensify at a great economic cost in the near future (UN-OHRLLS, 2019c).

The road networks of developing countries are generally more vulnerable to climate change impacts due to poor condition, a high proportion of unpaved roads and limited resources and technology to adapt (National Environment Commission, 2013), the situations that characterize the road infrastructure of LLDCs (as discussed in section 2.2). Infrastructure systems are interdependent, which means that climate change impacts on one infrastructure asset can cascade through the system (OECD, 2018b). To improve transport connectivity, it is of utmost importance that transport infrastructure can provide service at all time. Therefore, any future transport infrastructure projects in LLDCs need to be planned and built in a climate resilient manner.

Building climate resilience is a very new concept to embed into infrastructure planning, construction maintenance operations and management anywhere in the world and it is so far not at all obvious in LLDCs but must become so. For transport this means ensuring that water courses are designed for more frequent flood conditions and effectively maintained and managed in rainy LLDCs. Heavy precipitations also rapidly expose weaknesses in the road and rail maintenance regimes with washouts and, potholing becoming more frequent. In drought-stricken areas, lack of rainfall actually extends the life of transport infrastructure.

Public policy and regulation play a key role in enabling and promoting climate-resilient infrastructure development. Therefore, it is necessary to develop adaptation plans to help identify entry points for mainstreaming, and promote cross-sectoral coordination. Most OECD and G20 countries have, or are developing, national adaptation strategies and plans that address one or more core infrastructure sectors, such as transportation, energy, and water. 17 LLDCs that were supposed to submit their National Adaptation Programme of Action (NAPA) to the United Nations Framework Convention on Climate Change (UNFCCC), have already done so. It contains the assessment of countries' vulnerability to climate change and the development of a prioritized list of adaptation projects. Several examples of transport related initiatives included in NAPAs are¹⁵:

- Improve and protect navigation channels and navigation signs to rehabilitate and maintain navigation routes and signs in natural hazard prone areas (Lao PDR).
- Establish a climate monitoring and early warning system for Lake Malawi and lakeshore areas to improve decision making for related sectors including transport and energy (Malawi).

Considering the limited funding resources channeled to transport infrastructure, the first step that can be taken by LLDCs is to make a priority list of projects based on the urgency of climate change impacts on the transport infrastructure performance (see Box 4).

¹⁵ Summarized from various NAPAs available on <https://unfccc.int/topics/resilience/workstreams/national-adaptation-programmes-of-action/napas-received>. Accessed on 20 January 2020.

Box 4: Prioritization of road interventions based on flood risk in Mozambique

Mozambique is highly exposed to flooding hazards associated with river overflow and storm surges. The road network has low redundancy, resulting in disruptions that isolate communities for extended periods of time. In order to enhance the reliability of the transport network under extreme weather conditions, the Road Authority of Mozambique put efforts to prioritize road investments to maximize transport connectivity. Assisted by the World Bank, the prioritization of interventions was undertaken in four steps.

The first step was identifying critical and vulnerable roads using several criteria, such as the loss incurred on the network performance when the transport link is removed and poverty rate of adjacent districts. Step 2 was assessing the exposure of the transport network to floods for four different climate scenarios. Flood maps, for present time and future climate scenarios, were overlaid with the transport infrastructure network to identify vulnerable infrastructure, expressed as the cost of repairing and rebuilding infrastructure when flood occurs. The third step is calculating the vulnerability and hazard risk, expressed in terms of expected annual damage to infrastructure. The last step was prioritizing areas for intervention using a prioritization matrix that combines criticality and hazard risk. Areas with both high criticality and high risk can be prioritized for investment.

Source: World Bank (2017a)

Some progress in responding to climate change is also being made at the regional level. This includes the development and adoption of several regional climate change adaptation strategies such as SADC Policy Paper Climate Change and the Tripartite Programme on Climate Change Adaptation and Mitigation in Eastern and Southern Africa (COMESA-EAC-SADC). South Asian Association for Regional Cooperation (SAARC), of which Afghanistan, Bhutan and Nepal are member states, is a regional player that supports national governance responses to climate change. Although transport is not one of the sectors of concern, the effectiveness of national adaptation plans is of importance for the transport sector.

4.3. Adaptation Policy Framework

It is essential to integrate climate change scenarios when planning, designing, operating and maintaining infrastructure. This seems to be the area that has not been touched by most LLDCs. ECLAC outlined the weak position the sustainability criteria currently holds in the design and implementation of policies (UN-OHRLLS, 2019c). One of the reasons could be that policy makers have not been provided with robust data and analyses on the costs and benefits of investments in resilient infrastructure, in order to make informed decisions. Creating awareness that investments in resilient infrastructure will be cost-effective in the long run needs to be enhanced with cost-benefit analyses that:

- include assessment of the lifetime costs of infrastructure
- integrate climate change scenarios
- quantify climate-related costs

Table 4.3 outlines decision-making options for each phase of the infrastructure life cycle. In the policy and planning stage, resource-saving adaptation options include:

- Spatial planning frameworks to redirect development away from high-risk areas.
- Infrastructure project and policy appraisals, including Strategic Environmental Assessment and Environmental Impact Assessment.
- Regulatory standards, such as building codes.

Table 4.3: Adaptive decision points for each infrastructure life cycle phase

Life cycle phase	Example adaptive decision points
Policy and planning	Location of asset Capacity of asset Design life of asset Funding mechanisms and risk sharing Design codes and construction standards
Conceptual design	Conceptual design parameters Conceptual modeling Investment plans
Detailed design	Detailed design parameters Modeling Environmental impact assessment Financial evaluation Cost-benefit analysis
Construction and establishment	Construction methods/materials
Asset management	Maintenance program of the asset base
Monitoring and adaptation	Retrofitting existing assets

Source: UNDP (2011b)

Summary

Efforts on enhancing the resilience of transport infrastructure are relatively new and far from being fully developed. Yet to ensure that infrastructure spending delivers the best possible return and brings lasting development benefits, it is critical that investment plans take into account the consequences of the changing climate. As expertise is not yet readily available, technical assistance from international organizations is needed to build the capacity of LLDCs to develop policies and strategies on creating sustainable and resilient transport infrastructure.

5. Investment and Maintenance Funding for Transport Infrastructure

5.1. Keeping up with demand

In order to improve the transport connectivity of LLDCs, closing the infrastructure gap must be one of the first priorities on the agenda. Yet the world's investment on infrastructure, including transportation, continues to fall short of the expanding needs. Estimates by the AfDB published in its African Economic Outlook 2018, reveal that Africa's annual infrastructure requirements amount to \$130bn–\$170bn with a financing gap in the range of \$68bn–\$108bn (UN-OHRLLS, 2019a). For Euro-Asian LLDCs (excluding North Macedonia and Moldova), it has been estimated that \$5,604 million would be required to meet their transport investment needs (UN-OHRLLS, 2019b). For Latin America, Bolivia is currently investing at levels that would enable it to close the infrastructure gap, while Paraguay would need to bridge an investment gap equal to 2.34% of GDP to close the horizontal gap (UN-OHRLLS, 2019c).

As shown in Table 5.1, the estimates of road and rail infrastructure needs vary greatly among the LLDCs' regions, ranging from 1.4% of GDP in Eastern Europe and Central Asia to 4.5% in Sub-Saharan Africa West. It confirms the figures presented in chapter 2 that show the highest road and rail density in Eastern Europe and Central Asia among LLDCs, and the lowest in West Africa. Transport investment typically requires up to 3% of GDP for developing countries, with a rather higher share for LLDCs. The OECD estimated in 2017 that global transport (roads including reconstruction, railway including suburban, port and airports) infrastructure needs were about US\$ 2.7 trillion (UN-OHRLLS, 2018). This is about 3.4% of GDP in 2017 current prices. The Asian Development Bank (2017) estimated in 2017 that meeting the transport development needs of its developing member countries (urban transport excluded) would require about 2.6% of GDP between 2020 and 2030. The investment need in Latin America is the lowest after Eastern Europe and Central Asia.

For LLDCs to reach the global average paved road and railway densities, nearly 200,000 kms of paved roads and over 46,000 kms of railways would need to be constructed at a cost of about US\$ 0.51 trillion. The investment cost of building this transport infrastructure would be of the order of 2% of GDP over a period of 20 years. The estimates made here do not include non-paved roads, urban transport infrastructure, aviation infrastructure, any cost for recovering the deteriorated condition of current transport infrastructure and the cost of maintaining the expanded transport networks in good condition.

Table 5.1: Investment cost to bring road and rail infrastructure of all LLDCs to global benchmarks

Region	Additional length		Cost	
	Road km	Rail km	US\$ billion	% of GDP
East Asia	8,300	5,100	37.2	4.2
Eastern Europe and central Asia	57,900	13,900	171.6	1.4
Latin America	15,200	1,800	37.7	1.7
South Asia	7,700	4,700	34.1	3.9
Sub-Saharan Africa East	53,900	12,700	158.5	1.9
Sub-Saharan Africa West	53,100	8,000	70.3	4.5
Total LLDCs	196,100	46,300	509.3	2.0

Source: UN-OHRLLS (2018)

These figures only give a first indication of the challenges faced by LLDCs to close their infrastructure gaps. LLDCs will require all sources of infrastructure financing, including traditional funding sources such as public budget and official development assistance (ODA), and innovative sources of financing through for instance public-private partnership and South-South and Triangular Cooperation. Yet, the business environment of most LLDCs is not ideal in attracting funding, as shown by the Doing Business ranking, in which 21 LLDCs, out of 190 assessed countries, are ranked below 80th.

Table 5.2: Doing Business ranking of LLDCs in 2020

LLDC	rank	LLDC	rank
South Sudan	185	Malawi	109
Central African Republic	184	Tajikistan	106
Chad	182	Nepal	94
Afghanistan	173	Bhutan	89
Burundi	166	Botswana	87
Ethiopia	159	Zambia	85
Lao PDR	154	Mongolia	81
Burkina Faso	151	Kyrgyz republic	80
Bolivia	150	Uzbekistan	69
Mali	148	Moldova	48
Zimbabwe	140	Armenia	47
Niger	132	Rwanda	38
Paraguay	125	Azerbaijan	34
Lesotho	122	Kazakhstan	25
Eswatini (Swaziland)	121	North Macedonia	17
Uganda	116		

Source: World Bank

Moreover, LLDCs perform low in the Corruption Perceptions Index (CPI), which can harm the trust in the government. It creates perception among investors about the existence of corruption in the countries, which make private market players believe that equal and competitive environment is not guaranteed. According to Transparency International, more than 80% of LLDCs have CPI ranks below the world's average (the bottom half of 180 countries)¹⁶.

5.2. Traditional Funding Sources

5.2.1. Domestic resource mobilization - Public Finance

Domestic financial resources are critically needed to meet the infrastructure investment needs in LLDCs. Direct and indirect taxes have been the traditional sources of domestic revenue. Increasingly, many LLDCs are using innovative approaches to raise revenue and finance part of their infrastructure development. As incomes rise in LLDCs, government efforts to raise revenue should ease over time. Resource-rich LLDCs can also use part of their resource-rents to finance their infrastructure needs (UN-OHRLLS, 2019b). Except for Afghanistan, Azerbaijan, Lesotho and North Macedonia, expenses of LLDCs as % of GDP are below world average (Table 5.3). Infrastructure projects are generally long-

¹⁶ Transparency International (<https://www.transparency.org/en/cpi/2020/index/nzl>)

term in nature and require lumpy investments, which require additional funding from other private, bilateral and multilateral sources.

One of the key challenges faced by LLDCs is the availability of a sustainable plan for infrastructure maintenance, as newly commissioned infrastructure often suffers from dilapidation due to lack of provision for proper maintenance. This is especially true in the African LLDCs (World Bank, 2010a) because their low volume of traffic does not allow for recovery of the costs of maintenance.

Maintenance funding is generally drawn from fiscal funding mechanisms, and owing to the huge social demands, the pressure on the fiscus continues to grow, with states failing to provide for maintenance of infrastructure. Most infrastructure is accessible to the public as public goods with little, if any, cost recovery mechanisms. Efforts continue to be made to cater and provide for maintenance by most state-owned enterprises, but can hardly meet the prescribed national, regional and international maintenance standards and benchmarks. A large number of projects on the national and regional plans that entail rehabilitation of infrastructure had been neglected for decades.

Table 5.3: Expenditures, Revenues and Tax Revenues as % of GDP in LLDCs

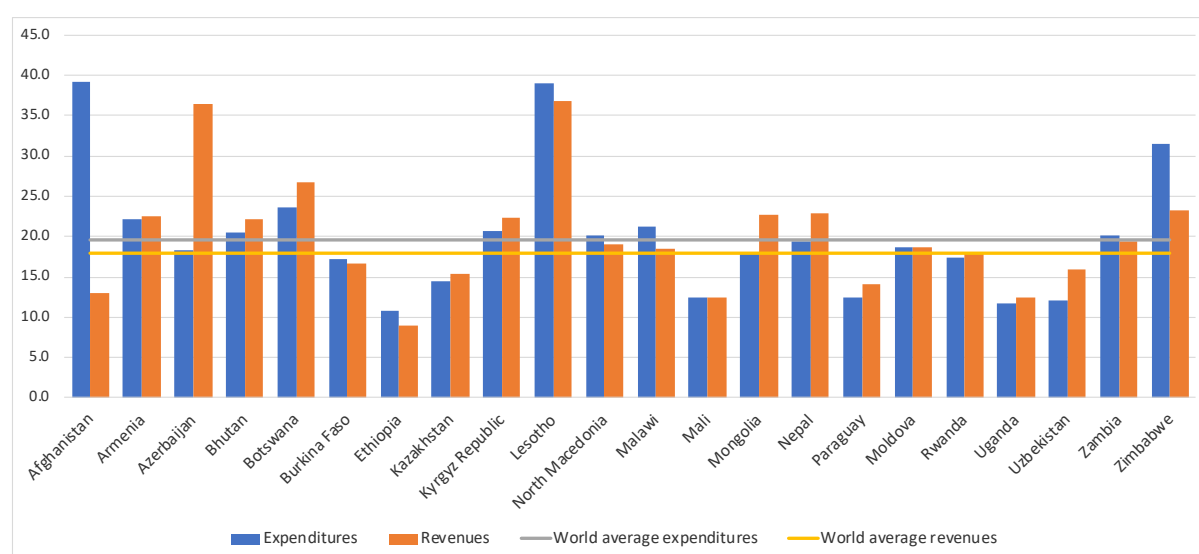
% of GDP	Expenditure			Revenue			Tax revenue		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
Afghanistan	36.8	43.9	39.2	10.0	12.7	13.0	7.6	9.5	9.9
Armenia	25.7	22.6	22.1	22.8	22.5	22.5	21.3	20.8	20.9
Azerbaijan	24.0	24.9	18.4	31.7	32.1	36.4	14.6	13.2	13.0
Bhutan	19.2	18.6	20.4	18.8	18.7	22.2	13.0	12.5	16.0
Botswana	25.8	26.1	23.6	33.5	31.1	26.7	20.9	22.1	19.5
Burkina Faso	14.7	18.5	17.2	16.2	16.8	16.6	14.1	15.3	15.1
Ethiopia	10.1	11.2	10.8	9.4	9.4	9.0	8.1	7.6	7.5
Kazakhstan	16.0	18.7	14.4	13.0	15.5	15.3	9.9	10.3	11.7
Kyrgyz Republic	21.9	21.6	20.7	22.2	22.9	22.3	16.9	17.0	18.0
Lesotho	39.6	38.1	39.0	34.6	36.8	36.7	28.6	31.7	31.6
North Macedonia	20.2	20.2	20.1	18.7	18.6	19.0	16.8	17.0	17.4
Malawi	17.9	18.8	21.3	16.3	18.5	18.5	15.5	17.3	17.4
Mali	12.3	12.5	12.4	16.0	17.4	12.4	15.4	15.9	11.7
Mongolia	22.3	19.8	17.9	15.6	19.4	22.7	11.3	13.6	16.8
Nepal	15.9	16.5	19.4	19.3	21.5	22.9	16.7	18.7	20.7
Paraguay	12.0	13.2	12.5	13.7	14.2	14.1	9.6	10.0	10.0
Moldova	18.2	18.2	18.6	17.2	18.4	18.7	16.2	17.4	17.7
Rwanda	17.1	17.3	17.4	17.3	17.1	17.9	14.4	13.5	14.3
Uganda	11.4	11.3	11.8	12.0	12.4	12.5	11.2	11.6	11.7

Uzbekistan	9.1	9.5	12.1	14.7	12.5	15.9	13.2	10.9	13.5
Zambia	22.4	20.9	20.1	18.1	16.9	19.4	13.4	15.2	16.6
Zimbabwe	25.2	28.4	31.4	17.2	17.3	23.2	15.5	15.9	20.7
World average	20.0	19.7	19.6	17.1	17.5	17.9	13.8	14.2	14.4

Source: World Bank Open Data. Available at <https://data.worldbank.org/indicator/GC.XPN.TOTL.GD.ZS>, <https://data.worldbank.org/indicator/GC.REV.XGRT.GD.ZS> and <https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS>. Accessed on 17 February 2021.

Note: No data available for Bolivia, Burundi, Chad, Lao PDR, Niger, South Sudan, Eswatini, Tajikistan, Turkmenistan, and Central African Republic.

Figure 5-1: Expenditures and revenues (%GDP) in 2018



Source: World Bank Open Data. Available at <https://data.worldbank.org/indicator/GC.XPN.TOTL.GD.ZS>, <https://data.worldbank.org/indicator/GC.REV.XGRT.GD.ZS> and <https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS>. Accessed on 17 February 2021.

Note: No data available for Bolivia, Burundi, Chad, Lao PDR, Niger, South Sudan, Eswatini, Tajikistan, Turkmenistan, and Central African Republic.

Expanding road networks and maintaining them under appropriate conditions of service and safety require vast and increasing resources. This situation puts pressure on governments that must address many other economic and social needs with limited resources.

Governments have a variety of options to fund road construction and maintenance. These options have different effects on social equity and provide different incentives on road usage and the use of fuel-efficient vehicles. It is useful to look at the most common options and their implications to frame tolling schemes in the wider context of road sector policies (ADB, 2018).

Table 5.4: Sources of Road Funding and their Implications

Source of fund	Implications
Income taxes	All taxpayers pay proportional to their income regardless of whether they drive or not, and their level of utilization
Petrol taxes	All drivers pay in proportion of road usage (more kilometers driven means more fuel consumed) and fuel efficiency of their vehicles (drivers of fuel-guzzling vehicles will pay more). Petrol taxes have the capacity to raise huge amounts of revenue and provide incentives for more environmentally friendly use of roads. However, as indirect taxes, their impact is proportionally higher on the low-income population as well as on transportation companies and professionals.
Tolls	In principle, tolls are paid by users of a particular infrastructure in proportion to their level of utilization. However, since tolls are not generalized to all roads, users of toll roads will pay but users of “free” roads will not. This may create comparative imbalances among people living and/or working in different areas. Moreover, as fixed charges, their impact is proportionally higher on low-income populations.
Vignettes	Users of infrastructure pay, irrespective of their level of use. Due to how the scheme is built, vignettes may have the same drawbacks as tolls and other indirect taxation. However, they may provide incentives for the use of more efficient and less polluting vehicles (cheaper or no vignette required for these). Vignette-based systems may be interesting for countries that lie in the middle of transport corridors and whose roads are used by a great number of foreign trucks and cars that do not pay taxes and sometimes do not even fill their tanks in these countries.
Oil, mining, or pension funds	Some governments may be tempted to tap funds prepared for future needs to avoid the political consequences of setting charges or increasing taxes. This may lead to the illusion that no one pays for the roads now, but future generations must pay for the infrastructure their predecessors used.

Source: ADB (2018)

Considering the high costs of maintenance of highways and motorways, one way to finance the road infrastructure improvement and maintenance is by charging users for using roads through tolling systems. According to the criteria to set them, tolls can be classified into four main categories (ADB, 2018).

- Distance-based: users pay in proportion of the distance traveled on a particular road. This type of system may be referred to as closed tolls or open tolls.
- Point-based: payment is made for a single use of a particular section (common for bridges or tunnels and tolls collected under an open tolling system).
- Time-based: allow users to drive along some roads for a period of time irrespective of the level of use. These charges are sometimes referred to as “vignettes”. Vignettes may be applied to all vehicles or just to some of them, typically heavy vehicles. They may be applied to the whole network or to just a part of it, typically major motorways and other high capacity and/or high performance roads.
- Perimeter-based: fees charged to any vehicle that wishes to circulate inside a defined perimeter, normally the central area of a city, and sometimes referred to as congestion charges. They can be time-based (such as the London Congestion Charge) or cordon-based (such as for Oslo, Norway; Singapore; or Stockholm, Sweden).

Several examples of the implementation of tolling systems in LLDCs are:

1. Kazakhstan first introduced tolls on the 224-kilometer (km) long Astana–Schuchinsk motorway in the spring of 2013 after investing US\$4.7 million in toll collection equipment. The operator is

the National Roads Company, KazAvtoZhol¹⁷. Although there were initial concerns about users' reactions to paying for the use of infrastructure. In 2015 more than 2.5 million vehicles used the toll road and paid fees was about US\$2.98 million. Revenue does not recover construction costs, but only maintenance and operation costs. After this pilot experience of tolls under public sector management, the Government of Kazakhstan prepared the first toll 66 km Almaty Ring Road PPP Project (BAKAD). The estimated budget of the new project is 680 million US\$ and will reduce travel times by up to an hour. The project is planned to be supported by International Finance Cooperation (IFC) and The European Bank for Reconstruction and Development (EBRD), which were to set up the processes from feasibility studies to completion of the transactions between all the stakeholders.¹⁸¹⁹²⁰ Government will compensate the private-sector partner with annual availability payments, set against strict performance criteria. As a result of legislative amendments, standard project finance features, including payments in case of early termination of the contract, international arbitration, lender step-in provisions, are present in the contract. Importantly, this is the first infrastructure PPP of its type and magnitude in Kazakhstan and Central Asia.

2. Poor infrastructure and extreme weather conditions were key reasons of great investment needs in Tajikistan road network. The 345-kilometer Dushanbe–Khujand–Chanak road that links the capital to its second city and to neighboring Uzbekistan is one of the country's main economic corridors. Export Import Bank of China financed 95% of rehabilitation program carried in 2007-2010 and remaining 5% - by the Tajikistan budget. Total size of the project was 295.9 million US\$. The operations and maintenance of the road was awarded to a private operator (International Road Solutions-IRS) under a 30-year concession. There were public concerns and complaints about the transparency and effects of tolls on local businesses. In this regards, the government issued free electronic payment cards (ET-Cards) on the operator for the local residents (ADB, 2011; CAREC²¹; Eurasianet²²; Innovative Road Solutions²³).

Tolls have advantages and disadvantages that must be considered by the governments of LLDCs during the decision-making process.

Table 5.5: Pros and Cons of Tolling System

Pros	Cons
<ul style="list-style-type: none"> • New source of revenue. Tolls create a new source of revenue for road construction and/or maintenance without raising taxes or excise. • Revenue not tied to the budget and national accounts. Tolls may create a stable source of revenue not tied to the budget that allows financing or maintaining road infrastructure outside the national accounts. 	<ul style="list-style-type: none"> • Diversion of traffic. Tolls can promote the diversion of traffic from toll roads to “free” ones (usually secondary or local ones) causing congestion in roads not prepared to cope with it. • Congestion at toll booths. Stopping at toll booths may cause congestion if traffic is heavy. Efficient electronic tolling systems may reduce significantly, but not eliminate, this risk.

¹⁷ <http://kazautozhol.kz>

¹⁸ <http://www.IFC.org>

¹⁹ <https://en.tengrinews.kz>

²⁰ <http://astanatimes.com>

²¹ www.carecprogram.org

²² www.eurasianet.org

²³ <http://irs.tj/>

<ul style="list-style-type: none"> • Internalize external costs. Tolls make drivers internalize the external costs associated with road use (the user pays principle) and, thus, sets a price incentive to make a more efficient and responsible use of roads. • Toll schemes can be set to permit cross-subsidization, e.g., (i) support roads with higher construction costs with surpluses from other roads with lower construction costs, (ii) tolls in motorways raise revenue to maintain “free” roads (collector roads or other), or (iii) tolls in better-off regions finance infrastructure in less developed ones. • Future toll revenue can be used as collateral in loans or can be securitized. 	<ul style="list-style-type: none"> • Collection costs. Toll collection involves costs and they may become not negligible in the total operating costs. How tolls are collected may create unfair situations. • Social impact. Since tolls are fixed tariffs, they may be a proportionally bigger burden on poor than rich people. • Political opposition. The introduction of tolls is most often unpopular, and opposition may turn schemes unworkable.
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Source: ADB (2018)

The introduction of tolls does not necessarily equate to privatization of roads. In many countries, tolls are completely in the public sector domain under different forms, whereas many other countries have experienced various degrees of the private sector’s involvement. A gradation of the options involving private sector participation in toll roads is shown in Table 5.6.

Learning from the experience of Tajikistan, to implement toll systems, it is essential to increase the institutional capacity of LLDCs to undertake PPP projects and to build the necessary negotiations, commercial and communications skills.

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Table 5.6: Options of Private Sector Participation in Toll Roads

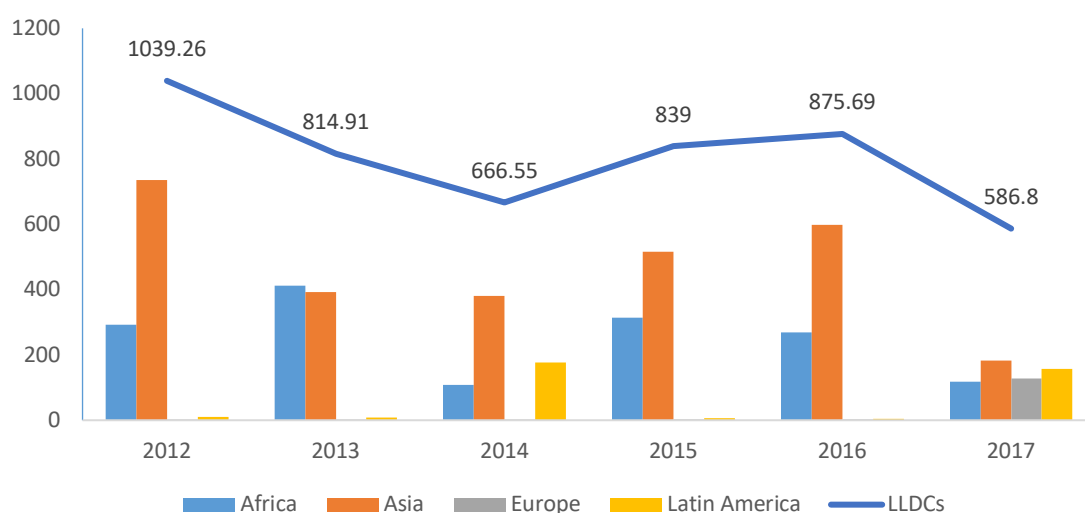
#	Owner	Investment finance	Responsibilities			Description	Use
			Construction	Maintenance	Toll collection		
1	Private sector	Private sector	Private sector	Private sector	Private sector	This is fully private road	Very rare. Only found in private premises
2	Public sector	Private equity and debt	Private sector	Private sector	Private sector	This is a build-operate-transfer (BOT) scheme with a fully private operator. The infrastructure will be handed over to the public sector after a period of time stipulated in a concession contract.	Very common
3	Public sector	Equity with minority participation from public sector and private debt	Predominantly private sector	Predominantly private sector	Predominantly private sector	In this case, the operating company under a BOT contract is a joint venture between public and private partners. The public sector may sell its stake during the concession period (full privatization) or not.	Rather common
4	Public sector	Equity with a majority (or full) participation from the public sector Private debt	Predominantly public sector	Predominantly public sector	Predominantly public sector	In this case, the operating company is acting under a license or franchise contract. Total or partial privatization may be envisaged in the medium or long term.	Common in countries with little experience and/or incipient public-private partnership markets.
5	Public Sector	Government budget	Public Sector	Private sector	Private sector	Government entrusts the full operation and maintenance of an existing road to a private company for a period. This is commonly referred to as an operation and maintenance concession.	Rather common (e.g., in Latin America).
6	Public Sector	Bonds financing a public sector corporation	Public Sector	Public Sector	Public Sector	National or state governments create a public sector corporation allowed to issue government-backed debt. The corporation stakes cannot be sold to the private sector.	Common in the United States, rare elsewhere.
7	Public Sector	Government budget	Public Sector	Public Sector	Private sector	This is the case when the authority in charge of roads outsources toll collection to private specialized companies. Usually it will not involve commercial risk. It may be a variation of models 4 and 6, where public or semipublic companies outsource toll collection.	Rather uncommon.
8	Public Sector	Government budget	Public Sector	Public Sector	Public Sector	This is the case of a 100% public funded and operated road where tolls are collected directly by staff from the roads authority or other civil servants.	Rather uncommon.

Source: ADB (2018)

5.2.2. Official Development Assistance

Official Development Assistance (ODA) has been critical in meeting infrastructure investment needs of the LLDCs. There are various forms of ODA: multilateral, bilateral and blended. The following figure depicts the ODA received by LLDCs in 2012-2017²⁴ for the transport and communications sectors. In this period, ODA disbursements has increased in Europe and Latin America, but in total the amount of such assistance has decreased.

Figure 5-2: ODA disbursements to transport and communications sector in 2012-2017 (US\$ million)



Source: OECD.Stat (<https://stats.oecd.org/Index.aspx?DataSetCode=TABLE2A>). Accessed on 17 February 2021.

As the international community aims to fully achieve the SDGs, sustained support to LLDCs, especially to meet their considerable needs for economic infrastructure, will require increased attention. Concessional financing to LLDCs remains critical and development partners will need to maintain strong support. Knowing more about the scope and nature of the broader set of financial flows that could directly or indirectly impact development (by incentivizing investments) through metrics such as TOSSD (Total Official Support to Sustainable Development) is increasingly important.

LLDCs rely on concessional finance more heavily than other countries (OECD, n.d.). In 2015, LLDCs received US\$ 27 billion in concessional finance from bilateral and multilateral partners, representing 54% of their total external flows (compared to 26% for other developing countries). ODA to LLDCs has grown at an average rate of 6% per year since 2000 (compared to 4% for other developing countries). ODA to LLDCs currently represents 15.5% of global ODA. In LLDCs, providers focus on infrastructure slightly less than in other developing countries. In 2015, the infrastructure sector (water, transport, storage, energy and communications) represented 22% of all ODA flows (compared to 25% for other developing countries).

In 2015, the top ten providers of concessional finance to LLDCs accounted for 79% of the total envelope provided to LLDCs (Table 5.7), with the US, the World Bank IDA and the EU representing

²⁴ Latest available data is for year 2017

47% of the total. The LLDCs received the bulk of the funding in 2017 are Ethiopia, Afghanistan, and South Sudan, with 15%, 14% and 8% of total ODA respectively.

Table 5.7: Bilateral and multilateral ODA flows to LLDCs in 2019

	US\$ billion	% of total ODA received
United States	5.6	18%
International Development Association	5.5	18%
EU Institutions	2.7	9%
United Kingdom	1.8	6%
Japan	1.3	4%
Germany	1.7	6%
Global Fund	1.2	4%
Asian Development Bank	0.9	3%
African Development Fund	0.6	2%
France	1.0	3%

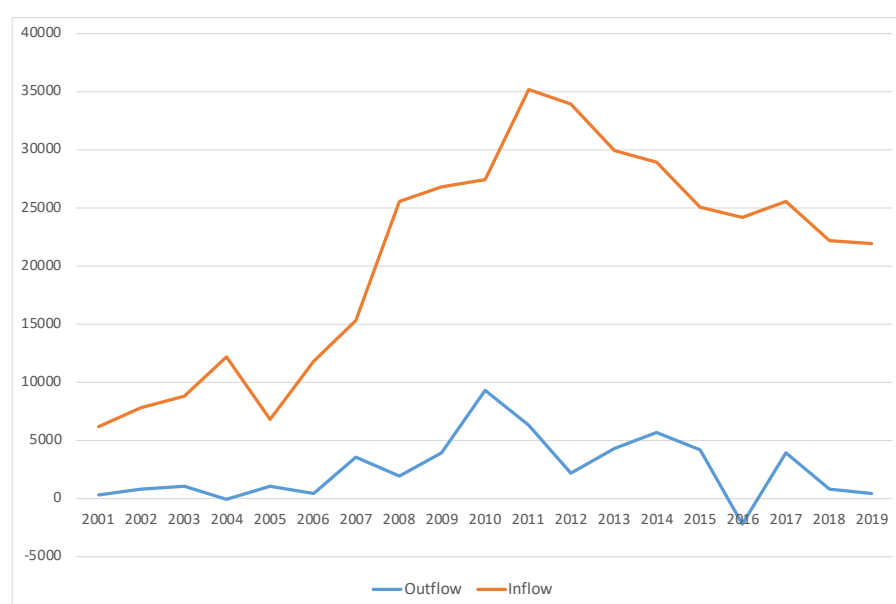
Source: OECD.Stat (<https://stats.oecd.org/Index.aspx?DataSetCode=TABLE2A#>). Accessed on 18 February 2021.

5.2.3. Private Sector Financing and Foreign Direct Investment

There has been phenomenal growth in private sector financing of infrastructure in recent years, with the communications and ICT sectors taking a lead in attracting private sector investment, given demonstrable adequacy of cash flow and acceptable rate of return. The structure of private sector financing has been the constitution of consortiums with a defined equity structure in the investment based on a Built-Own-Operate (BOO) framework. This option avoids crowding out of private sector by government and facilitates confidence building between government and private sector. It ultimately sends out positive signals within the international setting and relieves state of infrastructure financing and maintenance, thereby availing capacity for mandatory social welfare spending. The option reduces frontiers of state in infrastructure financing, thereby creating more space for private sector and entrepreneurial culture in infrastructure provision and management.

Figure 5-3 shows that FDI inflows had increased in the 2000s, but began to decrease in 2012. Overall, the top five host economies in 2019, in terms of value of inflows, were Kazakhstan (US\$3.12 billion), Ethiopia (US\$2.52 billion), Mongolia (US\$2.44 billion), Uzbekistan (US\$2.29 billion) and Turkmenistan (US\$2.16 billion).

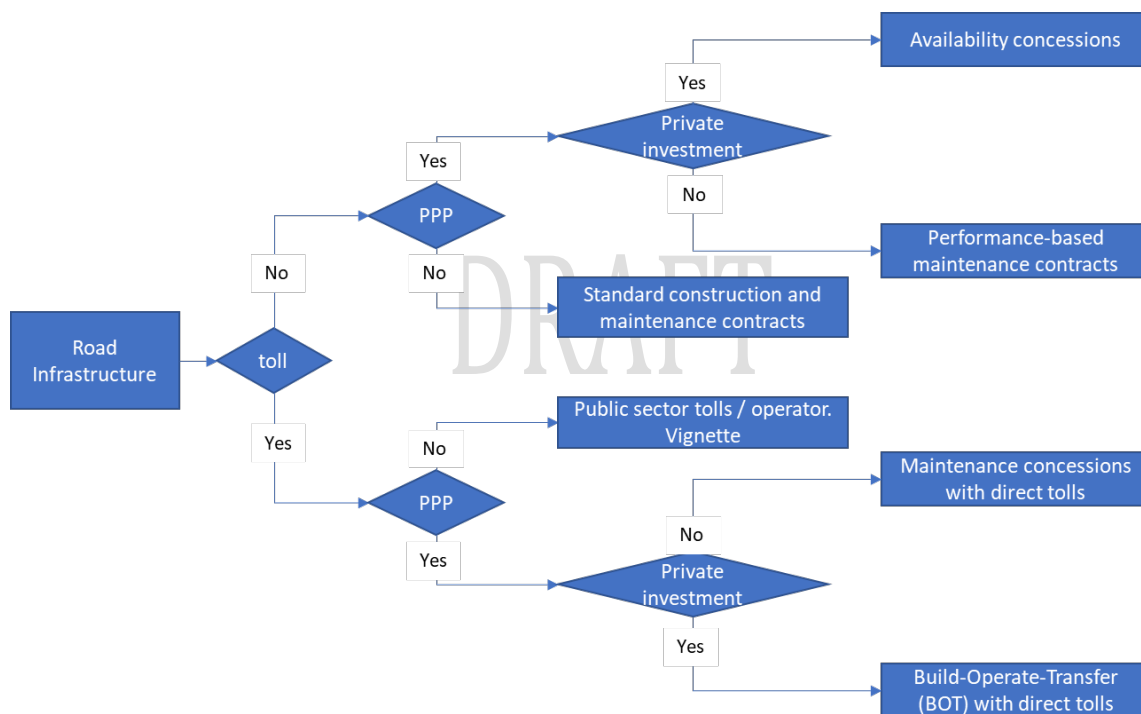
Figure 5-3: Foreign Direct Investment inflow and outflow in LLDCs, 2000-2018 (US\$ million)



Source: UNCTADstat (<https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=96740>). Accessed on 17 February 2021.

Regarding private sector participation, some governments may be more eager than others to engage with private partners because of factors such as ideology, the existence of successful or failed past experiences, familiarity with PPPs, or maturity of the country’s banks and contractors. According to the willingness to accept tolls, PPPs, or both, a variety of schemes are available (**Error! Reference source not found.4**). The priorities of different ministries (finance, transport, environment, and others) may not coincide. Generally, ministries of finance will be more interested in the capacity of tolls or PPPs to reduce capital and operations spending in the roads sector. Ministries of transport will be more concerned about technical standards, the mobility implications of tolls, and their effects on the rest of the network. Ministries of transport may also think privately operated toll roads may reduce their capacity to plan and manage the road network. The discussed circumstance seems to be a challenge and there is a possibility to deal with it by establishing special joint unit consisting all related stakeholders to ensure efficient coordination and decision-making process related to financial and technical aspects.

Figure 5-4: Private sector participation schemes in the road infrastructure construction and maintenance



Source: ADB (2018)

5.2.4. Funding by Commercial Banks

A number of banks have opened up and financed infrastructure, in some cases as equity financing. However, this is more likely in cases where there are smart projects with more or guaranteed high return on investment as banks are risk averse.

Corporate finance supports investments are undertaken by established corporate entities, such as public or privately owned utilities. Such projects are carried on balance-sheet, or may be incorporated in a dedicated project company whose debt is guaranteed by its shareholders. The creditworthiness of these corporate borrowers can be assessed based on past financial results and available collateral, or by taking into account future cash flows. The borrowing capacity is determined by the debt-to-equity ratio (as a lending norm, seldom higher than 60:40) and ultimately by the “EBITDA”. Corporate finance loans can be (plain) “vanilla”, with final maturity usually not exceeding 5 years, or they can be

“structured” to allow for larger amounts and longer maturities. Sources of such kind of funding are the International Finance Corporation (IFC), Netherlands Development Finance Company (FMO), German Investment and Development Corporation (DEG), *Kreditanstalt für Wiederaufbau* (KfW), European Bank for Reconstruction and Development (EBRD), Asian Development Bank (ADB), and other international donors.

There are several infrastructure investment funds already actively involved in the LLDCs infrastructure development and investment. In Africa, PIDA and the NEPAD Infrastructure Champion Initiative (PICI) are supporting infrastructure development. In the Asian region, examples of sources of infrastructure funding are the Asian Development Bank, the ASEAN Infrastructure Fund and the Asian Infrastructure Investment Bank (AIIB). In its first year of operation (2016), AIIB approved more than US\$27 million for a project in the transport sector in Tajikistan. Project finance refers to financing where loans are extended to a project company with limited (or no) recourse to the balance sheet of the project sponsors. Instead, loans are expected to be repaid from future project cash flows. The key metric to determine the borrowing capacity of a project is its projected debt service coverage ratio (DSCR). Project finance requires careful structuring of project contracts so that project risks are well identified and allocated to the parties best placed to bear them. During the origination, structuring, negotiation and documentation stages, the host governments need to be advised by experienced project finance advisors. The lack of LLDCs’ capacity to develop bankable projects is indicated by many experts as one of the key challenges that need to be addressed.

One of the best practices of infrastructure funded by commercial banks in LLDCs might be the 753km Ethiopia-Djibouti Railway Line Modernizations project²⁵, also known as the Addis Ababa-Djibouti railway, the first modern electrified railway line in East Africa. The project is jointly owned by the governments of Ethiopia and Djibouti and constructed by China Railway Group and China Civil Engineering Construction Corporation (CCECC). The railway connecting Ethiopia with Djibouti via Dire Dawa is a 780km railway line opened in 1917. It is the only railway line that connects landlocked Ethiopia with Djibouti Port, a major cargo entry point, but deteriorated due to a lack of maintenance and management. The Ethiopia-Djibouti project was constructed with a total investment of \$4bn. The Ethiopian section of the line cost \$3.4bn, 70% of which was provided by China Exim Bank and 30% by the Ethiopian government. The Djibouti Government contributed \$878m for the project.

5.2.5. Public-Private Partnerships

In many cases, when the government feels the infrastructure is strategic, it will buy equity directly or indirectly within the project and provide guarantees in order to reduce risk and team up with the private sector within the Build Operate and Transfer (BOT) framework, where after many years, the private sector wholly transfers the assets and management to the state, assuming that all costs and reasonable returns have been recouped. There are also cases of the Build-Own-Operate-Transfer (BOOT), Lease-Rehabilitate-Operate-Transfer (LROT), Build-Transfer-Lease (BTL) and Joint Ventures (JVs). The Bulawayo Beitbridge Railway, Gautrain (RSA) and Sena Rail Line (Mozambique) are typical examples of PPP.

An appropriate reform of national and regional regulatory frameworks is necessary to create an enabling environment for private companies to invest in large-scale infrastructure projects in LLDCs.

PPP, with substantial public investment and strong guarantees for private investors, is currently the most suitable form for inland water transport because inland waterway network is not yet seen as an

²⁵ <https://www.railway-technology.com/projects/ethiopia-djibouti-railway-line-modernisation/>

important part of the transport infrastructure by multilateral development banks (MDBs) and bilateral donors (UN-OHRLLS, 2019a).

There are many different examples of PPP in the transport sector worldwide (UNECE, 2008):

- Construction, operation and maintenance of transport infrastructure
- Refurbishment and enhancement of existing transport facilities
- Redevelopment of railway stations and adjoining real estate
- Procurement of rolling stock for railways
- Operation and maintenance of transport infrastructure

An advantage of PPP in the transport sector is that investment in infrastructure and services can be delivered quickly and to specified standards, without resulting in high levels of government capital expenditure. Infrastructure is developed and services are delivered to objective standards, or private providers suffer financial and operational penalties that can lead to contract termination. The disadvantages of a PPP programme in the transport sector generally result from contracts that are not well specified or executed. This can include a lack of flexibility or inappropriate transfer of risk, leading to high costs or poor value for money.

Examples of PPP investments in the transport sector are elaborated here below. Some of them are already finalized and the others are in progress.

Shar-Oskemen Railway (Kazakhstan)

Shar-Oskemen Railway in East Kazakhstan has been in operation since 2009 under a BOT concession. The construction of the new railway line between the Shar station and the city Oskemen began in 2005. The length of the railway line is 151 km and is used for passenger and freight traffic through the region, bypassing nearby Russian territory. Being the first concession in Kazakhstan, the project was proposed as a PPP in order to bring investment to a specific stretch of railway and to create revenue from both passenger and freight traffic. Whilst the PPP contract was with the Ministry of Transport and Communications, a company called Doszhan Temir Zholy was established to operate the concession. This company is largely owned by two government organizations: Kazakhstan Temir Zholy, which is the national railroad company (46%), and the Investment Fund of Kazakhstan (49%).(Mouraviev and Kakabadse, 2017)

Skopje and Ohrid Airports Concession (North Macedonia)²⁶

Realizing the necessity for airports modernization, the government of North Macedonia gave the concessions of the international airports of “Alexander the Great” in Skopje and “St. Paul the Apostle” in Ohrid to TAV (a Turkish company). Based on the concession agreement, TAV was obliged to modernize the airports in Skopje and in Ohrid, thus increasing the quality of services and the interest of airline companies and decreasing the transport price. With the investment amounting over 100 million euros from TAV, Macedonia has been since 2011 enjoying two renovated and modernized airports in Skopje and Ohrid with modern technological equipment according to international standards.

Kenya-Uganda Railway

²⁶ <http://www.caa.gov.mk/en/2019/11/14/modernisation-of-airports-and-renewal-of-the-public-transport/>

The Kenya–Uganda rail line, linking Kenya’s sea-port of Mombasa and Uganda’s capital city Kampala, is the oldest and most important rail link in East Africa. The 2,350 km rail line played a key role in the early development of East Africa by serving for decades as the most important means of transport. The Kenyan and Ugandan governments attracted investment by concession of the line to Rift Valley Railways (RVR) in November 2006. Under the concession, the states remained the owner of the existing assets and transferred the rolling-stock responsibility for operating and maintaining the railway to RVR. The RVR concession deal closed successfully and went on to become Euro-Money Project Finance Magazine’s Africa Deal of the Year in 2010. (Ndonye et al., 2014)

Beitbridge - Bulawayo Railway²⁷

Beitbridge Bulawayo Railway Ltd. (BBR) is a full-fledged, private, railway company incorporated and registered in Zimbabwe in 1997. The Beitbridge - Bulawayo railway line was constructed using funds amounting to US\$ 85 million, raised from shareholders as well as from South Africa’s Rand Merchant Bank. The 350 kilometres railway line, linking the North South Corridor, between Beitbridge (at the border of Zimbabwe and South Africa) and Bulawayo into hinterland, was commissioned in 1999. BBR shareholding comprises leading foreign, private investors and financial institutions under the umbrella of NLPI Limited (NLPI). NLPI holds 85% interest while the government of Zimbabwe through National Railways of Zimbabwe holds 15% share in the company. It was the first BOT mechanism in the SADC region and a good PPP practice that reflects one of the SADC initiatives to “increasing private sector involvement in railways investment with a view to improving rail network and service standards”.

Bolivia Airport Concession²⁸

The Bolivia Government is looking for a “strategic” partner for the design, construction, operation, maintenance and financing of Viru Viru International Airport, amid plans to create a transport hub in Santa Cruz. This DBFOM project will be the first PPP asset built under the new Bolivian constitution (2009). The expansion of the Viru Viru terminal has been in the agenda since 2015. The plan for the Viru Viru expansion has already grasped attention from international investors. At the time of writing, the Ministry of Planning has released the names of six companies from different continents that are under consideration to be the concession holder.

5.3. Innovative Funding Sources

5.3.1. Pension Funds and Insurance Reserves

Owing to the increasing demand for funding of infrastructure, there is high propensity to utilize pension funds and insurance reserves. The main challenge for these options is the need to ensure that the funds get good returns from such investments. In any case, these two funding modalities have been applied to develop numerous real estate projects, and there are expectations that some viable infrastructure projects could compete aggressively in terms of returns. However, given that this is new terrain, these funds largely remain in exploratory stages.

In 2017, NEPAD under the guidance of Continental Business Network (CBN), initiated a revolutionary campaign, called 5% Agenda, which aimed at increasing the allocations of African asset owners to African infrastructure from its currently low base of approximately 1.5% of their assets under management (AUM) to an impactful 5% of AUM. The goal is to work with Pension and Sovereign Wealth Funds including Ministers of Finance to gradually increase infrastructure investments, using

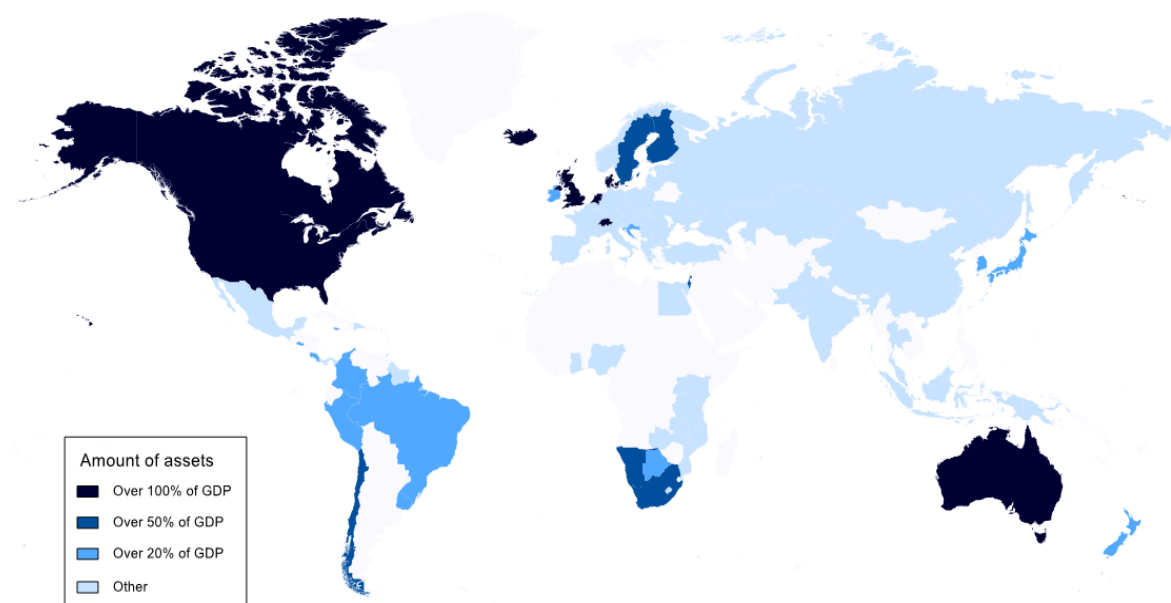
²⁷ <https://bbr.co.zw/about-us/>

²⁸ <https://www.inframatiogroup.com/bolivia-launches-its-first-ppp-airport-expansion>

financial resources available on the continent and strengthen public-private partnerships to mobilize financial and global institutional investments.²⁹

Pension assets in several OECD countries are over 100% of their economy. While the amount of pension assets was lower than 20% of GDP in 54 out of 87 reporting jurisdictions, where reporting LLDCs belong, for example Kazakhstan.

Figure 5-5: Size of assets in funded and private pension plans as a percentage of GDP



Source: OECD (2019)

Note:

- The map shows the amount of assets in funded and private pension plans in a selection of jurisdictions in 2018, except for Gibraltar (2013), India (2016), Isle of Man (2016), Lesotho (2012), Liechtenstein (2017), Malta (2017), Mauritius (2017), South Africa (2016), Tanzania (2017), Trinidad and Tobago (2012), Uganda (2016) and Zambia (2015).
- Some LLDCs colored as “white” are not on the list of reporting jurisdictions

5.3.2. Specific initiatives

The shared concern for the infrastructure deficit in Africa has led to a proliferation of initiatives. Among the various multilateral initiatives in the African countries are the following (Africa Growth Initiative et al., 2017):

- The New Partnership for Africa’s Development (NEPAD), established in 2001 under the African Union (AU), supported the Programme for Infrastructure Development in Africa (PIDA) in 2011 as one of its flagship initiatives to identify and assess key cross-border infrastructure investments over the period 2012-2040. In the shorter term, PIDA focuses on its Priority Action Plan (PAP), which includes 51 regional and continental infrastructure projects to be implemented by 2020. These projects are designed to meet Africa’s more immediate regional and continental infrastructure needs. To accelerate the implementation of PIDA, African leaders gave their political impetus to eight regional infrastructure projects under the Presidential Infrastructure Champions Initiative (PICl), which was adopted in 2012. In the same vein, African leaders

²⁹ <https://www.au-pida.org/news/page/12/>

adopted the Dakar Agenda for Action in June 2014 to leverage public-private partnerships and mobilize financing around 16 infrastructure projects to be realized by 2020. Concrete steps have also been taken by the NEPAD Agency to ensure acceleration of infrastructure projects on the continent. For instance, the Africa Global Partnership Platform (AGPP), a dialogue platform that acts as an “umbrella” for Africa’s rapidly expanding international partnerships was endorsed by African countries at both the NEPAD Heads of State and Government Committee and the African Union Summit in 2014. The AGPP contributes to a greater coherence of Africa’s international partnerships and serves as a platform for feeding Africa’s interests and perspectives into wider global processes. The NEPAD Agency also established the Continental Business Network (CBN), which is an African Union Heads of State and Government response to facilitate private sector engagement and leadership in important continent-wide infrastructure projects, particularly the regional infrastructure projects under PIDA. The CBN aims to crowd in financing and support for infrastructure projects by creating a platform for collaboration between the public and private sectors. The second CBN High-Level Leader’s Dialogue hosted in May 2016 examined the role of the private sector in de-risking PIDA projects and paved the way for the subsequent launch of the “NEPAD Continental Business Network Report on De-Risking Infrastructure and PIDA Projects in Africa,” (hereafter, “2016 De-Risking Report”).

- The Regional Infrastructure Development Master Plan (RIDMP) of the Southern Africa Development Community (SADC) of 2012 is anchored on the six pillars of energy, transport, ICT, meteorology, trans-boundary water resources, and tourism (trans-frontier conservation areas). Its Short-term Action Plan (STAP) 2013-2017 included projects that were considered ready for implementation during the next five years as well as projects related to capacity building, and regulatory and institutional strengthening. The RIDMP is aligned with PIDA and with the COMESA-EAC-SADC (tripartite) Inter-regional Infrastructure Master Plan.
- The World Bank, in partnership with the African Development Bank (AfDB), developed the Africa Infrastructure Country Diagnostic (AICD) that provides a detailed series of infrastructure investment needs by sub-region in 2011. In 2014 the World Bank launched the Global Infrastructure Facility (GIF) as a “platform” for identifying, preparing, and financing large complex infrastructure projects. This facility will thus also cover infrastructure financing in Africa.
- Africa50, a recent infrastructure investment platform promoted by the AfDB, aims at accelerating project preparation and financing on the continent. In particular, it seeks to shorten the time between project idea and financial close from a current average of seven years to at most three years. Africa50 held its Constitutive General Assembly in 2015 and 20 African countries, and the AfDB have subscribed for an initial amount of \$830 million in share capital.

Similar initiatives have been also ongoing in the other regions with LLDCs:

- Under the Master Plan on ASEAN Connectivity 2025, ASEAN Member States, in cooperation with the Government of Australia and the World Bank, selected 19 priority infrastructure projects in the transport, energy, and ICT sectors to enhance sub-regional cross-border connectivity. The priority projects in LLDCs are in Lao PDR, i.e. two road-upgrading projects on the Asian Highways and two projects on power transmission lines between Lao PDR and Viet Nam (ESCAP, 2019).
- Launched in 2010, the Investment Facility for Central Asia (IFCA) aims to blend EU budget grant funding with loans by the financial institutions (the EIB, the EBRD and other European multilateral and national development finance institutions) for Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Its main purpose is to promote additional investments and key infrastructures with an initial priority focus on **energy**, environment, SMEs and social infrastructure. Based on the development of the Central Asia Strategies, a later extension to

transport could be envisaged³⁰. As of September 2017, several projects were ongoing in Asian LLDCs in the framework of IFCA. These include Kazakhstan Sustainable Energy Financing Facility (€5.2 million) and Kyrgyzstan Sustainable Energy Efficiency Financing Facility (€12.69 million) (WECOOP2, 2017).

- In the framework of the Integration of the Regional Infrastructure of South America (IIRSA), initiatives are developed through transport, energy and communications projects to promote integration and socioeconomic development in the region. The portfolio projects are financed by public funds (63%), private funds (19%), and public-private initiatives (18%). In 2015, 52 anchor projects (i.e. projects to address bottlenecks and missing links in the infrastructure network) were identified with the total estimated investment of US\$19,780.5 million. It involves various transport subsectors including road (38.2% of the total investment), rail (58.9%), river (1.7%), multimodal (0.1%), and border crossings (1.1%). Bolivia participates in the Sub-Group on the Central Bio-Oceanic Railway Corridor (CFBC) that has completed four studies related to the development of this railway corridor. While Paraguay participates in the Working Sub Group on the Bio-Oceanic Railway Corridor Paranaguá – Antofagasta (UNASUR COSIPLAN, 2015).

5.3.3. South-South and Triangular Cooperation

South-South Cooperation (SSC) refers to developing countries' engagement in mutually beneficial activities on the basis of solidarity, self-help and self-reliance. SSC promotes a demand-driven development process in a number of areas, including trade and investment, financial, technical and technological cooperation and the sharing of knowledge, experiences, policies and best practices. Essential guiding principles of SSC are respect for national sovereignty, national ownership and independence, equality, non-conditionality, non-interference, and mutual benefit.

Cooperation between LLDCs and transit countries in terms of transit and transport is necessary in order to facilitate trade and assist with overall integration into the world economy. In particular, since most LLDCs neighbor with other developing countries, cooperation between LLDCs and global South countries is both evident and necessary for the development of the transit transport sectors of LLDCs and transit transport corridors. Such cooperation is necessary in the areas of infrastructure development, joint efforts to construct transport corridors, as well as harmonization of documentation and legal regulations.

South-South institutions examples are the New Development Bank and Asian Infrastructure Investment Bank (AIIB). Also, under South-South cooperation, China has supported infrastructure investment in several African LLDCs. The contribution of China to transport infrastructure development in LLDCs, particularly through its One Road One Belt initiative is very important especially in Central Asia.

Traditional donor agencies are increasingly adopting the triangular cooperation modality to increase the impact of development projects through innovative joint-funding programmes.

The 'Silk Road Economic Belt and 21st Century Maritime Silk Road' (or Belt and Road Initiative) was launched in 2016 by the Government of China to connect Asia with Africa and Europe via land and maritime networks along six corridors with the aim to promote economic cooperation among countries on the proposed routes and to improve regional integration. The initiative was designed to enhance efficient allocation of resources, achieve greater market integration and create a regional economic cooperation framework for the benefit of all. The Belt and Road Initiative was developed based on existing bilateral and multilateral cooperation mechanisms. A United States Dollars Silk Road

³⁰ https://www.eib.org/en/projects/regions/central-asia/technical_assistance_and_grants/index.htm

Fund of \$40 billion was established to finance the Belt and Road Initiative, particularly, in infrastructure projects, and in industrial and financial cooperation. The fund was set up as a limited liability company in December 2014. The founding shareholders include the State Administration of Foreign Exchange, the China Investment Corp., the Export-Import Bank of China and the China Development Bank. The new multilateral development bank – Asian Infrastructure Investment Bank (AIIB) – was set up to complement and cooperate with the existing multilateral development banks to address infrastructure needs in Asia. AIIB was expected to focus on developing transport infrastructure and logistics, and telecommunications and urban development. The Belt and Road Initiative would connect Asia, Europe and Africa with five routes (United Nations, 2019):

- The Silk Road Economic Belt:
 1. China to Europe through Central Asia and the Russian Federation
 2. China to the Middle-East through Central Asia
 3. China through Southeast Asia, South Asia to the Indian Ocean
- The 21st Century Maritime Silk Road:
 4. Chinese coastal ports with the South China Sea and the Indian Ocean to Europe
 5. China coastal ports with countries in the South Pacific Ocean to the South China Sea

The routes were developed from existing international transport routes, core cities and key ports to further strengthen collaboration in international economic areas.

At present there are ongoing and completed 16 different investment projects in the transport sector in LLDCs in the framework of BRI (

Table 5.8).

Despite the success, the full potential of South-South and Triangular cooperation is yet to be achieved. Challenges that need to be addressed include heterogeneity and complexity of South-South cooperation modalities; the asymmetric ability of countries to manage and participate in South-South and Triangular Cooperation, as well as partial understanding of the externalities, policy incoherence and lack of institutional capacities available in Southern countries (UNDP, 2016).

Table 5.8: Transport infrastructure projects in LLDCs in the framework of BRI

Project	Country
Europe-China – Rail Link I & II	Multiple
Khorgos Gateway Dry Port	Kazakhstan
Sino-Thai – High-Speed Railway	Multiple
Single Gauge Trans-Asian Railway	Multiple
Pap Angren Railway	Uzbekistan
Budapest–Belgrade Railway	Multiple
Addis Ababa Light Rail	Ethiopia
Khartoum-Port Sudan Railway	Sudan
Djibouti-Ethiopia Railway	Multiple
Vientiane-Boten Railway	Laos
Savannakhet-Lao Bao Railway	Laos

Kuala Lumpur-Singapore High Speed Rail	Multiple
Dushanbe-Uzbekistan Border Road Improvement	Tajikistan
Harare Airport Expansion	Zimbabwe
Port Aktau	Kazakhstan
“Khorogos – Eastern Gate”	Kazakhstan

Source: <https://www.beltroad-initiative.com/projects/>

5.3.4. Financing climate-resilient infrastructure (Climate Finance)

Another challenge for LLDCs is to invest in sustainable and resilient transport infrastructure, which is prerequisite to support economic growth and to achieve SDG targets. The infrastructure needs will be greater so as to respond to climate change. United Nations entities, multilateral development banks, and other international and regional organizations provide financial support and technical assistance to LLDCs to address this challenge through the following investment channels (UNDP, 2011):

1. Bilateral Channels - This will likely remain the largest source of financing, and will be channeled through a variety of bilateral and multi-bilateral channels (e.g. Germany’s International Climate Initiative/ICI);
2. Multilateral Channels - The UN and the multilateral development banks currently act as fund managers for a number of multi-donor climate change funds (e.g. the World Bank’s Climate Investment Fund/CIF).
3. The Global Environment Facility (GEF) - This multi-donor fund serves as an operating entity of the UNFCCC financial mechanism and is expected to remain important due to the GEF’s unique role in creating synergies between different multilateral environmental agreements.
4. The Adaptation Fund (AF) - Under the Kyoto Protocol, the AF will continue to receive funding from a 2% levy on the CDM, as well as ad hoc donor grant contributions. In addition to its innovative source of finance, the AF takes a groundbreaking approach to project implementation, making both national and multilateral implementation arrangements.
5. The Green Climate Fund (GCF) – This is a unique global platform aimed at responding to climate change through investing in low emission and climate resilient development. The fund, headquartered in Korea, was established to limit or reduce GHG emissions in developing countries and help vulnerable societies adapt to avoidable impacts of climate change. This fund will likely be capitalized at a significant annual amount (potentially 20 percent of total public resources).

One of the innovative ways of funding infrastructure is the application of climate funding, in the form of GCF and GEF. In the area of infrastructure, GCF supports energy, transport and water security projects for both public and private sectors. About 26% of projects approved by GCF are for the Africa region focusing on adaptation, mitigation and cross cutting sectors. The GCF programme supports the entire value chain of a project, from preparation, feasibility, project financing and attendant transaction management support. The support takes the form of direct funding, blending and co-funding with other partners. In 2018, GCF approved 42 new projects and those related to LLDCs are outlined in Table 5.9, where only 19 LLDCs have cooperation with GCF.

Table 5.9: GCF funded projects in LLDCs approved in 2018

Country	Project size (US\$ million)	GCF investment (US\$ million)	GCF investment (%)
Armenia	29.8	20.0	67%
Bhutan	176.3	51.9	29%

Burkina Faso	84.0	49.5	59%
Ethiopia	50.0	45.0	90%
Kazakhstan	557.0	110.0	20%
Kyrgyzstan	59.6	38.6	65%
Lao PDR	83.5	26.8	32%
Malawi	16.3	12.3	75%
Mali	65.4	51.6	79%
Mongolia	643.1	183.7	29%
Nepal	47.3	39.3	83%
Niger	12.7	9.4	74%
Paraguay	183.3	98.1	54%
Rwanda	33.2	32.8	99%
Tajikistan	187.4	73.8	39%
Uganda	44.3	24.1	54%
Uzbekistan	34.4	9.5	28%
Zambia	291.3	84.5	29%
Zimbabwe	10.0	8.9	89%
Total LLDCs	2,608.9	969.8	37%

Source: www.greenclimate.fund

For the transport sector in LLDCs, GEF mainly finances urban transport projects to combat climate change (Table 5.10).

Table 5.10: GEF Trust Fund transport projects in LLDCs

Country	Title	Replenishment Period	Grant (US\$)/ Co-financing (US\$)	Implementing Agencies
Armenia, Azerbaijan, Bangladesh, Brazil, Cote d'Ivoire, China, Costa Rica, Georgia, India, Jamaica, Montenegro, North Macedonia, Mauritius, Mexico, Peru, Philippines, Russian Federation, Uruguay, Viet Nam	Stabilizing GHG Emissions from Road Transport Through Doubling of Global Vehicle Fuel Economy: Regional Implementation of the Global Fuel Economy Initiative	2010-2014	2,261,819/ 9,203,606	UNEP
Bangladesh, China, Mongolia	Asian Sustainable Transport and Urban Development Program	2010-2014	0/153,842,000	ADB
Bhutan	Bhutan Sustainable Low-emission Urban Transport Systems	2014-2018	2,639,726/ 10,318,000	UNDP
Botswana	Incorporating Non-Motorized Transport Facilities in the City of Gaborone	2002-2006	891,630/0	UNDP
Burkina Faso	Ouagadougou Transport Modal Shift	2006-2010	909,000/ 3,590,000	The World Bank

Ethiopia, Kenya, Uganda	Promoting Sustainable Transport Solutions for East Africa	2006-2010	2,850,000/ 4,335,000	UNEP
Kazakhstan	Sustainable Transport in the City Of Almaty	2006-2010	4,886,000/ 76,526,000	UNDP
Lao PDR	Vientiane Sustainable Urban Transport Project	2014-2018	1,840,000/ 76,450,000	ADB
Mongolia	Mongolia Urban Transport Development Investment Program	2010-2014	1,389,000/ 76,900,000	ADB
Nepal	Kathmandu Sustainable Urban Transport Project	2006-2010	2,520,000/ 27,900,000	ADB
Regional	GHG Assessment Methodologies in Public Transport	2006-2010	1,000,000/ 1,000,000	ADB
Tajikistan	Support to Sustainable Transport Management in Dushanbe	2006-2010	970,000/ 5,861,127	UNDP

Source: <https://www.thegef.org/projects>

Summary

More than US\$ 500 billion investment is needed to bring LLDCs' road and rail infrastructure to the level of global benchmarks. The main issue faced by LLDCs to close this gap is funding limitation since the investment needs far outweigh the resources available from any single source. Attracting finance from many sources is therefore necessary, such as PPP, South-South and triangular cooperation, also funding by commercial banks, pensions funds and insurance reserves. Although concerted efforts have been going on, LLDCs need to ensure that they can keep attracting additional investments. Possible challenges that need to be addressed by LLDCs include:

- Improving the business environment in order to give assurance to potential investors. This includes improving the Doing Business ranking, the Corruption Perception Index, and other relevant international rankings.
- Although there are several examples of good PPP practices, many PPP projects in LLDCs failed due to not only lack of experience and knowledge, but also lack of relevant legislations and institutional framework.
- Lack of bankable infrastructure projects caused by the small size of the market and low level of economic development (as a result of less developed transport infrastructure), which makes it difficult to attract interests of commercial banks, pension funds and insurance reserves.
- Increasing the LLDCs' institutional capacity to manage the complexity of South-South and Triangular Cooperation.
- Only 19 LLDCs have projects co-funded by Green Climate Fund. Other LLDCs should be encouraged to cooperate with climate funds for the benefit of infrastructure development and to ensure the achievement of the SDG targets.

6. Improving Soft Infrastructure for Transport Connectivity

Provision of physical transport infrastructure is of utmost importance to ensure adequate capacity, to facilitate the efficient movement of goods, passengers and vehicles, and to reduce transport costs. However, improving the soft infrastructure components is not less significant as it deals with policy and regulatory reforms to facilitate faster movement along transport corridors and at border crossings, by streamlining administrative procedures, harmonizing and standardizing rules and documentation and simplifying border control and procedures. Effective and efficient transport corridors are those who successfully link hard infrastructure and soft infrastructure.

6.1. Trade Facilitation

One of the most complicated elements in international trade and transport transactions is to move products across borders. The effort it takes to move these products from one country to another, across borders, and by means of various modes of transport, is time consuming and costly (UNECE, 2015). Non-physical barriers, delays and inefficiencies associated with border crossings and ports, including customs procedures and documentation requirements, uncertainty in logistical services, weak institutions and widespread lack of human and productive capacities, continue to make transport costs high. Generally waiting and processing times at borders represent up to 50% of total transit times along international trade routes (Yang, 2017). Such delays due to pre clearance and border processing delays add considerably to the transit time and, because of this, the reliability of logistics chain also reduces (Hausman et al., 2005).

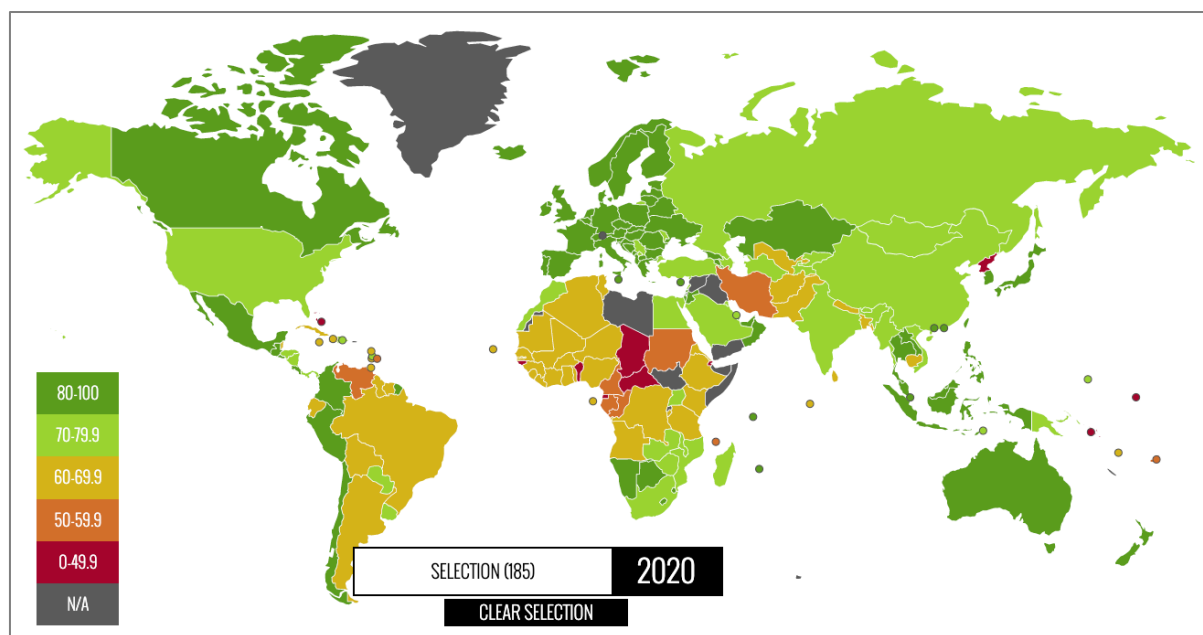
What is revealed from literature is that facilitation of trade is as important, some may say more important, than infrastructure, when planning transport corridors. Certainly, the investment needed in transport infrastructure to reduce transit time by one hour is infinitely more than that needed to reduce border crossing processing time by 1 hour. This is exemplified by Stone and Strutt (2010) in the ASEAN region, by Teravaninthorn and Raballand (2009) in Africa and by Banomyong and Beresford (2000) in South East Asia.

Figure 6-1 shows the trade freedom, one of the 12 factors of the Index of Economic Freedom, an annual index by The Heritage Foundation to measure the degree of economic freedom in the world's countries. Trade Freedom measures the degree to which government promotes the free flow of foreign commerce. Kazakhstan, Lao PDR, and Botswana are the most open LLDCs. They fall under the highest category together with most of European developed countries. Several LLDCs fall under the lowest two categories, which may seem ironic, as it means they operate very tight trade controls and protection when the opposite is needed.

Trade facilitation eases the cross-border movement of goods by cutting costs and simplifying trade procedures. It refers to a specific set of measures that streamline and simplify the technical and legal procedures for products entering or leaving a country to be traded internationally. As such, trade facilitation covers the full spectrum of border procedures, from the electronic exchange of data about a shipment, to the simplification and harmonization of trade documents³¹.

³¹ <http://www.oecd.org/trade/topics/trade-facilitation/>

Figure 6-1: Trade Freedom



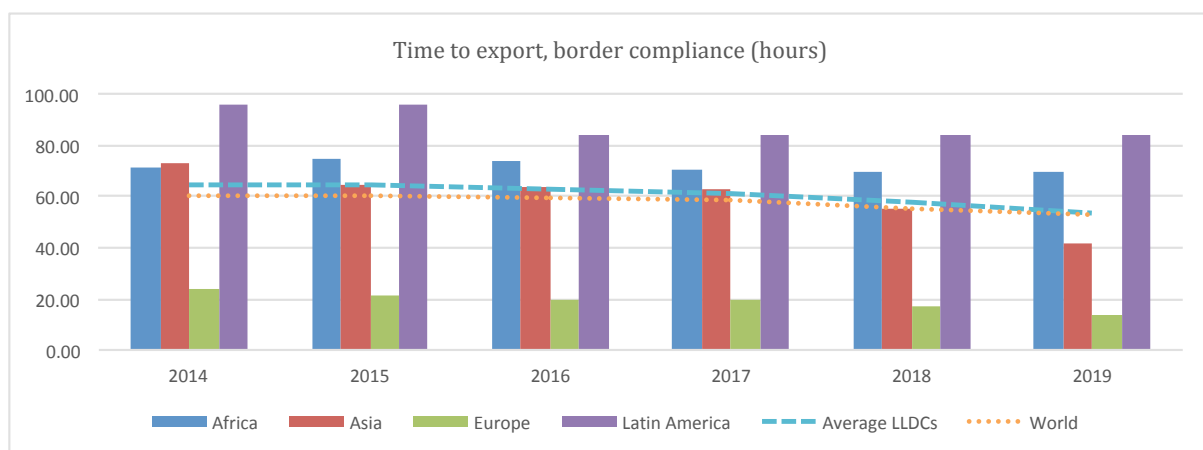
Source: The Heritage Foundation. Available at <https://www.heritage.org/index/heatmap>. Accessed on 17 February 2021.

6.1.1. Border crossing efficiency

Doing Business

In order to assess the efficiency of LLDCs in trading across borders, the annual Doing Business data can be used. It is an index developed by the World Bank to define the ease of doing business in a country measured by 11 sets of indicators representing 11 areas of business regulations. One of them is Trading Across Borders that assesses the logistical processes of export and import. It measures the Time (hours) and Cost (\$) to export and import, associated with three sets of procedures—documentary compliance, border compliance and domestic transport—within the overall process of exporting or importing a shipment of goods.

Figure 6-2: Time to export (border compliance) in LLDCs

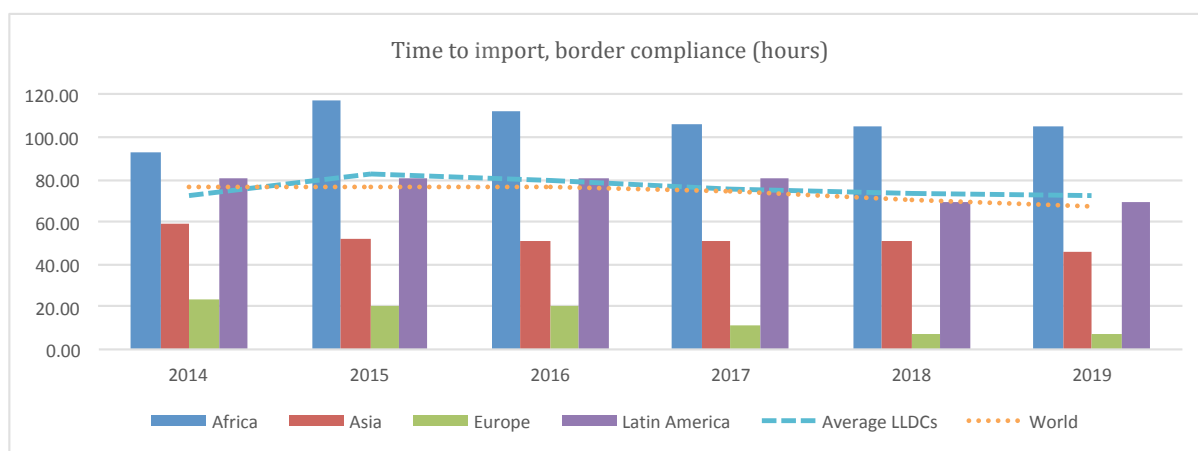


Source: World Bank Open Data. Available at <https://data.worldbank.org/indicator/IC.EXP.TMBC>. Accessed on 17 February 2021.

Border compliance time for exports in LLDCs is slightly longer than the world average. The difference got smaller from 4 hours in 2014 to 0.5 hour in 2019, due to improved performance in European and

Asian LLDCs. The latter shows a downward trend with the highest time reduction of 33% from 2018 to 2019.

Figure 6-3: Time to import (border compliance) in LLDCs

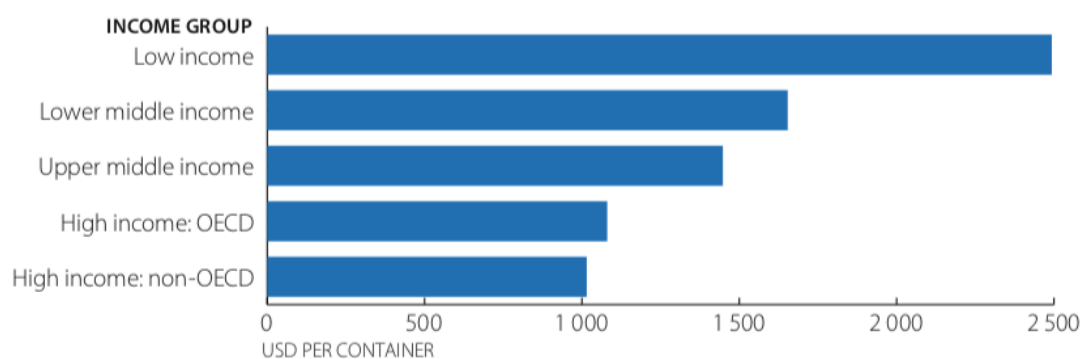


Source: World Bank Open Data. Available at <https://data.worldbank.org/indicator/IC.IMP.TMBC>. Accessed on 17 February 2021.

In terms of border compliance time for import, only European LLDCs show a decreasing trend. They also perform better than the other regions and the world average. The low performance of the African LLDCs shows the cumbersome customs clearance in this region.

WTO (2015) notes that the cost of shipping container is 2.5 times more in low income (where most LLDCs belong to) than high income OECD countries. That means the Carriage Insurance and Freight (CIF) costs of trade are much higher for LLDCs. The various reasons for this have been provided in forgoing sections.

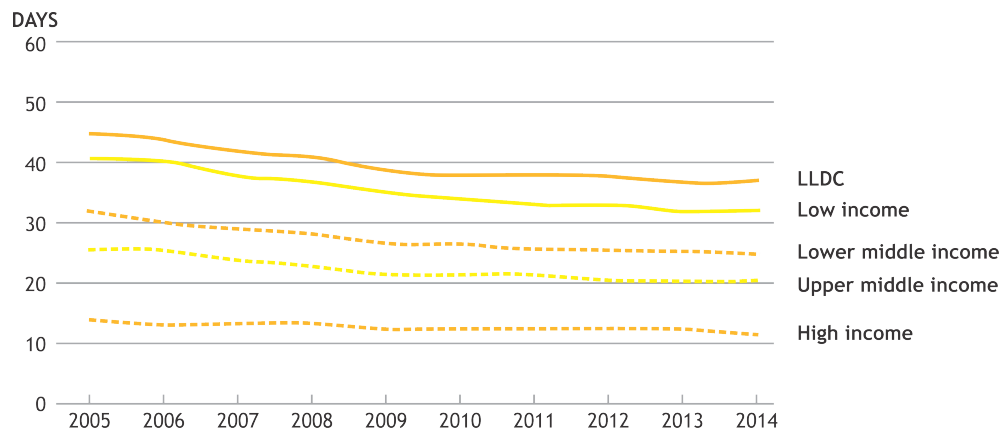
Figure 6-4: Doing Business Costs to Export in 2014 (US\$ per container)



Source: WTO (2015)

The time taken to export by income group is plotted in Figure 6-5. It is calculated based on simple averages across 16 LLDCs, 30 LICs, 48 LMICs, 49 UMICs and 46 HICs. The graph shows that the time taken for LLDCs to trade in 2014 was 38 days compared to 11 days in HICs.

Figure 6-5: Time to export by income group (days)



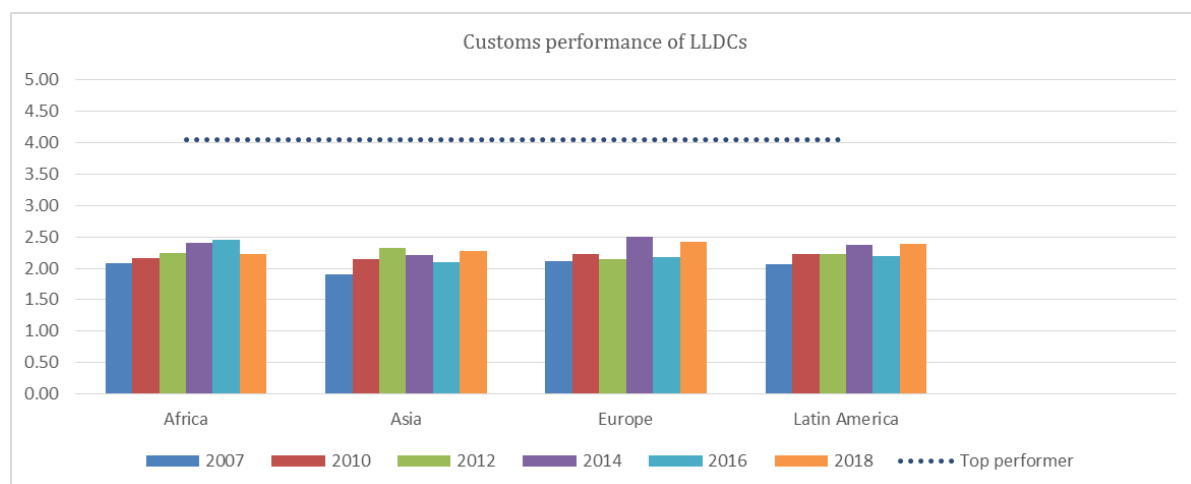
Source: Adapted from WTO (2015)

Logistic Performance Index

One of the reasons for the high cost of trade in LLDCs is the low logistics performance. To assess this, the Logistic Performance Index (LPI) can be considered. It is an interactive benchmarking tool created by the World Bank that indicates the easiness and efficiency of trade in a country, reflecting the perceptions of the international business community (freight forwarders and express carriers) regarding how countries are globally connected through their main trade gateways. The LPI is updated biennially and covers 160 economies. Data is collected through a survey in which respondents rate eight overseas markets on six core components of logistics performance from very low (1) to very high (5). These components are customs, infrastructure, ease of arranging shipments, quality of logistics services, timeliness, and tracking and tracing. Based on these the LPI score is constructed using principle component analysis. Of the six core components, customs and infrastructure are directly related to transport connectivity. Customs concern the efficiency of customs and border clearance management, while Infrastructure concerns the quality of transport infrastructure as well as ICT infrastructure.

The efficiency of customs and border clearance management in LLDCs based on LPI in the last decade is presented in **Error! Reference source not found.** It clearly shows an increasing trend for all regions, although the gap with the top performer is still very wide, showing there is still a lot of room for improvement.

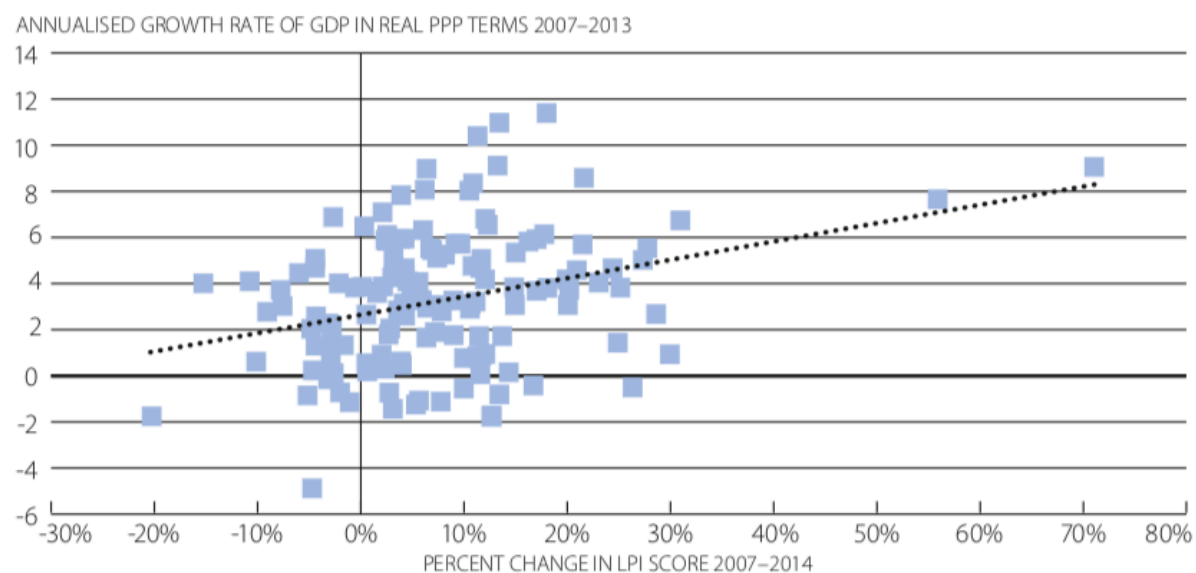
Figure 6-6: Customs performance based on LPI 2007-2018



Source: World Bank, Aggregated LPI 2012-2018.

WTO (2015) argued that countries that do more to lower trade costs – for instance, by improving logistics and trade facilitation performance – tend to grow more quickly than others. This correlation is highlighted in Figure 6-7 whereby countries on the right side of the vertical line had made improvements in their logistics performance and they had higher rates of GDP growth over the period 2007-2013. Some of them are Afghanistan, Rwanda, Armenia, and Bolivia.

Figure 6-7: Correlation between improvement in logistics performance and GDP growth rate



Source: WTO (2015)

6.1.2. Border Crossing Operation Improvement

As discussed early in this chapter, one of the most complicated elements in international trade and transport transactions is to move products across borders. Simplifying formalities and procedures of border crossing operations is therefore essential to achieve greater trade facilitation and to reduce transport costs. Below are several initiatives that have been undertaken by LLDCs, with the support from development partners, to improve their border crossing operations.

A. Coordinated Border Management

Coordinated Border Management (CBM) refers to a coordinated approach by border control agencies, both domestic and international, in the context of seeking greater efficiencies over managing trade and travel flows, while maintaining a balance with compliance requirements (WCO, 2015). It is implemented mainly in the form of One Stop Border Post (OSBP) or Joint-Border Post (JBP), the term used mostly in East and Southern Africa and West Africa respectively. OSBP aims to reduce transit time caused by long procedures involved in passing through two set of identical controls on each side of the border, which often hinders the growth of inter-regional trade. OSBP combines the activities of both countries' border organizations and agencies at either a single common location or at a single location in each direction, promoting the optimal utilization of available resources.

The best example of an OSBP is at Chirundu border post between Zambia and Zimbabwe, which is the first OSBP introduced in Africa in 2009 as part of the transit transport facilitation programme on the North-South Corridor. It has successfully reduced delays at the border from several days to hours for pre-cleared cargo (UN-OHRLLS, 2019a). Rwanda reduced border compliance time by having staff from the Rwanda Revenue Authority and the Tanzania Revenue Authority at the Rusomo one-stop border post, the result of the implementation of the Single Customs Territory (World Bank, 2019). In Africa,

various implementation of JBPs programs are also initiated by African regional economic communities such as ECOWAS and EAC.

In Asia, a best practice might be a Single-Stop Inspection facility at the Dansavanh (Lao PDR) and Lao Bao (Vietnam) commenced in 2005 as a part of the initial implementation of the 2003 Greater Mekong Subregion Cross-Border Transport Agreement. Processing time for cargo trucks crossing the border was reduced from 4 hours to 70-80 minutes and for passenger cars, from 2 hours to 30 minutes. The processing time for cargo trucks was expected to be reduced further to 30 minutes and for passenger cars, to around 10 minutes or less (ADB, 2007).

Single Window

According to WTO, one of the key elements of a CBM system is Single Window. It refers to a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single-entry point to fulfill all import, export, and transit-related regulatory requirements. If information is electronic, then individual data elements should only be submitted once (UN/CEFACT, 2005). It is an important trade facilitation tool, which is also encouraged by the WTO TFA.

UN/CEFACT (2005) stated the benefits of the implementation of a Single Window for both Governments and trade. For Governments it can bring better risk management, improved levels of security and increased revenue yields with improved trader compliance. Benefits for trade include lower costs through reducing delays, faster clearance and release, predictable interpretation and application of rules, and more effective and efficient deployment of human and financial resources. However, only around half of LLDCs implement single window, as shown here below (from various sources).

Table 6.1: LLDCs implementing single window

Region	Number of countries	% of total LLDCs
Africa	4	25%
Asia	9	90%
Europe	3	75%
Latin America	1	50%
Total	16	50%

Source: Author, compiled from various sources.

Apart from Turkmenistan (no information available), all Asian LLDCs have been implementing single window. This could have contributed to the high performance of Asian LLDCs in reducing the time to complete border compliance (see Figure 6-2). The high implementation of single windows in Asia is also due to the fact that 7 out of 10 Asian LLDCs are CAREC countries. Through its Joint Customs controls programme, CAREC member countries are implementing single window development projects. This confirms the importance of political will and support that is supported by a task force led by a multilateral body. Misovicova (2008) argued that political issues account for 90% of the success of the development of a Single Window, while the rest is technical issues.

Box 5: Implementation of Single Window in Azerbaijan

Azerbaijan has been implementing single window since 2009, with a presidential decree as its legal framework. Prior to this, each institution (e.g. Customs, veterinary services, and plant quarantine services) had their own paper-based registration system and their own database. There was no electronic data exchange among these institutions. By implementing single window, a unified and centralized database at the Customs Committee was developed. Furthermore, a system of registration of goods and vehicles at the border was adapted to the business process of each institution separately. The new system helps to increase efficiency and improve the interactions between the different controlling authorities. Checkpoints on the border are equipped with computers providing access to a database of licenses and certificates issued by the Ministries of Health, Agriculture and Transport. The implementation of single window has **decreased border-crossing time** from 180 minutes to 20 minutes.

Source: UNECE (2011); Tijan et al. (2019)

African LLDCs are lagging behind with only 4 out of 16 countries implementing or still developing Single Window projects. The reason for this could be the high cost and complexity of establishing a single window system. Another reason might be the high broadband prices in African LLDCs (section 3.2), as one of the conditions that need to be met in order to implement a single window environment is the use of ICT to maximize data flows.

B. Application of Information Technologies

Chapter 7 of the Revised Kyoto Convention (RKC), “Application of Information Technology”, states the relevance of the use of ICT in border management operations.

Box 6: Revised Kyoto Convention (chapter 7)

Revised Kyoto Convention, Chapter 7: “Application of Information Technology”

7.1. Standard

The Customs shall apply information technology to support Customs operations, where it is cost-effective and efficient for the Customs and for the trade. The Customs shall specify the conditions for its application.

7.2. Standard

When introducing computer applications, the Customs shall use relevant internationally accepted standards.

7.3. Standard

The introduction of information technology shall be carried out in consultation with all relevant parties directly affected, to the greatest extent possible.

7.4. Standard

New or revised national legislation shall provide for:

- Electronic commerce methods as an alternative to paper-based documentary requirements;
- Electronic as well as paper-based authentication methods;
- The right of the Customs to retain information for their own use and, as appropriate, to exchange such information with other Customs administrations and all other legally approved parties by means of electronic commerce techniques.

Source: World Customs Organization³²

³²http://www.wcoomd.org/en/topics/facilitation/instrument-and-tools/conventions/pf_revised_kyoto_conv/kyoto_new/gach7.aspx

The use of information technologies makes it possible to implement the following mechanisms of customs automation.

Customs Automation

Nearly all LLDCs have automated their customs system although the implementation progress varies. Around 60% of LLDCs³³ are using Automated System of Customs Data (ASYCUDA) to improve their trade portals, streamline their customs procedures and reduce paper work. The ASYCUDA software is developed by UNCTAD, taking into account the international codes and standards developed by ISO, WCO and the United Nations³⁴.

In Africa, the majority of LLDCs have adopted ASYCUDA. Lesotho made importing faster by implementing ASYCUDA, reducing documentary compliance time for imports by two hours (World Bank, 2019). Lesotho phased the implementation (2015–2018) by first organizing a pilot test to mitigate resistance to change among public and private actors, allowing customs administrators the opportunity to test implementation issues and traders to get accustomed to the new system before its full launch.

LLDCs in Latin America, like other MERCOSUR countries, have adopted SINTIA (Sistema Informático de Seguimiento de los Tránsitos en el MERCOSUR), an electronic system to integrate border control and to simplify customs documentation. It has been deployed at several border posts between Bolivia, Paraguay and their transit neighbors (UN-OHRLLS, 2017).

Advance Electronic Cargo Information

The WCO implemented the SAFE Framework of Standards to enhance the security of the international supply chain and promote trade facilitation. It establishes standards to harmonize Advance Cargo Information (ACI) requirements, which are data sets of information to identify high-risk cargo prior to loading and/or arrival by WCO Members. In this regard the WCO SAFE harmonizes the ACI information requirements for inbound, outbound and transit shipments.

WCO (2018) argued that through the appropriate application of risk management on ACI, Customs is able to separate cargo shipments into different categories and match resources to those minority shipments that require the maximum intervention, whilst facilitating the clearance of low-risk consignments. This should lead to more informed decisions on interdiction of goods at the borders, resulting in more efficient and secure supply chains as well as enhanced trade facilitation. An increasing number of countries have started to put into effect ACI conditions and to require advance electronic submission of data on goods passing their borders. According to WCO (2018), a critical component to the successful creation of an ACI programme is the sufficiency of physical infrastructure and IT needs.

³³ Compiled from various sources.

³⁴ <https://asycuda.org/en/about/>

Box 7: ICT upgrade at Zimbabwe Revenue Authority to improve customs processes

The Zimbabwe Revenue Authority (ZIMRA) was the first revenue authority in the COMESA region to migrate to the ASYCUDAWorld system. In June 2018, ZIMRA upgraded the system following the previous upgrade in 2013, applying top-of-the-range servers. These successive upgrades have contributed to positive developments such as customs and trader transactions being handled via Internet, shift from paper-based controls to electronic, faster clearance of goods at ports of entry, interfacing with Other Governmental Agencies (OGAs), e-banking payments, and simplified compilation of trade statistics. Of 45 customs offices, 42 are already computerized. In the last quarter of 2018 (3 months following the upgrade of ASYCUDAWorld), ZIMRA booked 44% increase of revenue compared to the same quarter in 2017.

Source: UNCTAD (2019)

6.2. Legal Framework

Legal instruments are important not only for facilitating cooperation and trade, but also to serve as determining factors in attracting foreign investments. Agreements at different levels – international, regional, sub-regional and bi-lateral – between LLDCs and transit countries can facilitate collaboration, cooperation and management of transit issues, which will lead to decrease in transit and trade transaction costs (UN-OHRLLS, 2018). Ratifying and effectively implementing the relevant conventions and agreements will ensure the successful implementation of the VPoA.

6.2.1. International agreements and conventions

A. WTO Trade Facilitation Agreement

Various economic studies demonstrate that the WTO Trade Facilitation Agreement will reduce trade costs. A report of the Organization for Economic Development (OECD) on trade facilitation indicators published in 2015³⁵ indicated that the implementation of the Trade Facilitation Agreement could reduce worldwide trade costs by between 12.5 and 17.5 per cent. It is also estimated that developing countries would receive two thirds of the \$1 trillion in gains from the trade expansion resulting from the Agreement. In addition, it is expected that the Agreement would likely reduce the time needed to import goods by more than a day and a half and to export goods by almost two days, representing a reduction in time of 47 per cent for imports and 91 per cent for exports over the current average.

Notifications Status

As of February 2021, 26 of the 32 LLDCs (all LLDCs that are WTO members) and 30 of the 34 transit countries had ratified the Trade Facilitation Agreement and submitted their category A measures although in different rates. The average percentages of the TFA that LLDCs notified under categories A, B and C are 35%, 27% and 39% respectively (

³⁵ OECD, “Implementation of the WTO Trade Facilitation Agreement: the potential impact on trade costs” (June 2015). Available at www.oecd.org/trade/WTO-TF-Implementation-Policy-Brief-EN-2015-06.pdf.

Table 6.2). For transit countries, the figures are 51%, 20% and 29% (

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Table 6.3).

Category A measures are those that developing members will implement by 22 February 2017, the date of entry into force of the Trade Facilitation Agreement. For least developed countries, that date was 22 February 2018. Category B entails measures that the member will implement after a transitional period following the entry into force of the Agreement.

Category C entails measures that the member will implement on a date after a transitional period following the entry into force of the Agreement and requiring the acquisition of assistance and support for capacity building, hence the largest percentage for LLDCs for this category. Out of 36 measures, those that are most notified (by at least 16 countries) under category C are listed below. It can be concluded most LLDCs need assistance and support in these areas:

- Article 1.2: Information Available through Internet
- Article 1.3: Enquiry Points
- Article 5.3: Test Procedures
- Article 7.4: Risk Management
- Article 7.7: Trade Facilitation Measures for Authorized Operators
- Article 8: Border Agency Cooperation
- Article 10.4: Single Window

National Trade Facilitation Committee

The TFA requires WTO members to establish a National Trade Facilitation Committee (NTFC) or to designate an existing mechanism that can facilitate the domestic coordination and implementation of the TFA's provisions. 20 LLDCs (

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Table 6.2) and 24 transit countries (

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Table 6.3) have formally established NTFCs. One of the key roles of the committee is to bring together representatives of public and private parties related to international trade and transport facilitation in a country, such as governmental entities, service providers and transport users, and to organize regular consultations with these stakeholders. Collaboration between public and private sectors in transit transport and trade facilitation is critical. Governmental institutions have the key roles of financing, building, maintaining and managing transport infrastructure. While the private sector, like transport services providers, has first-hand knowledge of the bottlenecks and obstacles encountered at the operational level, and as such is the best party to propose viable and practical solutions for improving transit systems. The involvement of the private sector in policy formulation and decision-making process is therefore essential.

To fulfill this role, a NTFC must be well-functioning. The adequacy of human resources might be the biggest challenge that must be addressed by LLDCs. Coordinating different stakeholders from various trade related sectors effectively, demands good negotiation and communication skills that must be maintained continuously.

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Table 6.2: Implementations status of WTO TFA in LLDCs

	Name	Notified A	% A	Notified B	% B	Notified C	% C	% Not yet notified	National Committee on Trade Facilitation established?
1	Afghanistan	A	11.3	B	27.3	C	61.3	0	FE
2	Armenia	A	50.8	B	41.6	C	7.6	0	DF
3	Bolivia, Plurinational State of	A	73.5	B	13.9	C	12.6	0	FE
4	Botswana	A	28.2	B	67.2	C	4.6	0	FE
5	Burkina Faso	A	13.0	B	17.6	C	69.3	0	FE
6	Burundi	A	35.3	B	29.0	C	35.7	0	FE
7	Central African Republic	A	26.9	B	8.0	C	65.1	0	FE
8	Chad	A	34.5	B	30.3	C	35.3	0	n.i.
9	Eswatini, Kingdom of	A	9.7	B	42.4	C	47.9	0	DF
10	Kazakhstan	A	44.5	B	47.9	C	7.6	0	No
11	Kyrgyz Republic	A	16.4	B	17.2	C	66.4	0	FE
12	Lao People's Democratic Republic	A	21.0	B	11.8	C	67.2	0	FE
13	Lesotho	A	11.8	B	24.4	C	63.9	0	FE
14	Malawi	A	63.0	B	10.1	C	26.9	0	FE
15	Mali	A	65.5	B	17.2	C	17.2	0	FE
16	Moldova, Republic of	A	57.6	B	19.7	C	22.7	0	FE
17	Mongolia	A	23.5	B	36.1	C	40.3	0	FE
18	Nepal	A	2.1	B	12.2	C	85.7	0	FE
19	Niger	A	31.9	B	6.7	C	61.3	0	FE
20	North Macedonia	A	97.5	B	2.5		0	0	FE
21	Paraguay	A	52.5	B	19.3	C	28.2	0	FE
22	Rwanda	A	26.9	B	56.3	C	16.8	0	FE
23	Tajikistan	A	55.9	B	21.8	C	22.3	0	No
24	Uganda	A	8.4	B	27.3	C	64.3	0	FE
25	Zambia	A	5.5	B	27.7	C	66.8	0	FE
26	Zimbabwe	A	34.9	B	50.0	C	15.1	0	DF

Source: TFA Database (www.tfadatabase.org/notifications/implementation); UNCTAD (<https://unctad.org/topic/transport-and-trade-logistics/trade-facilitation/national-trade-facilitation-bodies/map>). Accessed on 18 February 2021.

FE = Formally Established; DF = De Facto committee (existing committee, although not created by a legal instrument); n.i. = no information

Table 6.3: Implementation status of WTO TFA in transit countries

	Name	Notified A	% A	Notified B	% B	Notified C	% C	% Not yet notified	National Committee on Trade Facilitation established?
1	Angola	A	22.7	B	55.9	C	21.4	0	DF
2	Argentina	A	94.5	B	5.5		0	0	FE
3	Benin	A	65.5	B	21.8	C	12.6	0	FE
4	Brazil	A	95.8	B	4.2		0	0	FE
5	Bangladesh	A	34.5	B	36.6	C	29.0	0	DF
6	Cambodia	A	82.8	B	3.8	C	13.4	0	FE
7	Cameroon	A	1.7	B	45.4	C	52.9	0	FE
8	Chile	A	100.0		0		0	0	FE
9	China	A	94.5	B	5.5		0	0	FE
10	Cote d'Ivoire	A	34.0	B	5.0	C	60.9	0	FE
11	Djibouti	A	1.7	B	23.5	C	74.8	0	FE
12	DR of Congo	A	42.0	B	39.9	C	18.1	0	FE
13	Ghana	A	9.7	B	17.2	C	73.1	0	FE
14	Guinea	A	14.7	B	33.2	C	52.1	0	n.i.
15	India	A	72.3	B	27.7		0	0	FE
16	Kenya	A	7.6	B	23.9	C	68.5	0	FE
17	Mozambique	A	65.5	B	10.5	C	23.9	0	FE
18	Myanmar	A	5.5	B	9.2	C	85.3	0	DF
19	Namibia	A	51.3	B	4.2	C	44.5	0	FE
20	Nigeria	A	15.1	B	42.4	C	42.4	0	FE
21	Pakistan	A	25.6	B	42.9	C	31.5	0	FE
22	Peru	A	87.0	B	10.1	C	2.9	0	FE
23	Senegal	A	52.5	B	10.5	C	37.0	0	FE
24	South Africa	A	90.3	B	9.7		0	0	FE
25	Tanzania	A	21.8	B	17.2	C	60.9	0	FE
26	Thailand	A	91.6	B	8.4		0	0	DF
27	Togo	A	42.9	B	32.8	C	24.4	0	FE
28	Turkey	A	100.0		0		0	0	FE
29	Uruguay	A	97.1	B	2.9		0	0	FE
30	Viet Nam	A	26.5	B	48.7	C	24.8	0	DF

Source: TFA Database (www.tfadatabase.org/notifications/implementation); UNCTAD (<https://unctad.org/en/DTL/TLB/Pages/TF/Committees/default.aspx>). Accessed on 18 February 2021.

FE = Formally Established; DF = De Facto committee (existing committee, although not created by a legal instrument); n.i. = no information

Freedom of Transit

To increase the LLDC's connection to the world's market, it is essential to ensure that transit countries grant freedom of transit to LLDCs. This is regulated in Article 11 of the TFA that stipulates, among others, the establishment of physically separate infrastructure for traffic in transit, and the limitation of transit fees, formalities, documentation, customs controls and guarantee requirements.

As shown by Table 6.4, most transit countries notified Article 11 measures under category A. Countries like Chile, China, Mozambique and Turkey notified all the Article 11 measures under this category. More attention needs to be given by international entities to transit countries that need technical assistance, especially those that notified most or all Article 11 measures under category C, such as Cameroon, Djibouti, Kenya, Myanmar, Namibia, Tanzania, Togo and Viet Nam.

Table 6.4: Implementation status of Article 11 WTO TFA by transit countries

	Name	Notified A	% A	Notified B	% B	Notified C	% C	% Not yet notified
1	Angola		0	B	100		0	0
2	Argentina	Ap	95.2	Bp	4.8		0	0
3	Brazil	Ap	95.2	Bp	4.8		0	0
4	Bangladesh	Ap	66.7	Bp	9.5	Cp	23.8	0
5	Cambodia	Ap	76.2	Bp	19.0	Cp	4.8	0
6	Cameroon	Ap	4.8	Bp	9.5	Cp	85.7	0
7	Chile	A	100.0		0		0	0
8	China	A	100.0		0		0	0
9	Cote d'Ivoire	A	100.0		0		0	0
10	Djibouti		0	Bp	4.8	Cp	95.2	0
11	DR of Congo	A	100.00		0		0	0
12	Ghana		0	B	100.0		0	0
13	India	Ap	61.9	Bp	38.1		0	0
14	Kenya		0		0	C	100.0	0
15	Mozambique	A	100.0		0		0	0
16	Myanmar		0		0	C	100.0	0
17	Namibia		0		0	C	100.0	0
18	Nigeria	Ap	38.1	Bp	47.6	Cp	14.3	0
19	Pakistan	Ap	71.4	Bp	28.6		0	0
20	Peru	A	100.0		0		0	0
21	Senegal		0	B	100.0		0	0
22	South Africa	A	100.0		0		0	0
23	Tanzania		0		0	C	100.0	0
24	Thailand	Ap	81.0	Bp	19.0		0	0
25	Togo		0		0	C	100.0	0
26	Turkey	A	100.0		0		0	0
27	Uruguay	A	100.0		0		0	0
28	Viet Nam	Ap	23.8	Bp	19	Cp	57.1	0

Source: TFA Database (<https://tfadatabase.org/notifications/list>). Accessed on 18 February 2021.

B. UNECE Transport Agreements and Conventions

The UNECE manages more than 50 international transport agreements and conventions, which provide an international legal framework and technical regulations for the development of international road, rail, inland navigation and intermodal transport, as well as dangerous goods transport and vehicle construction³⁶. These legal instruments are legally binding for the States who are Contracting Parties to them, and some of the instruments also are applied by countries outside the

³⁶ http://www.unece.org/trans/about_us.html

UNECE region. This framework has contributed to a high level of efficiency, safety, environmental protection and sustainability in transport, through the harmonization of national regulations in a large and varied number of areas (OECD/UNECE, 2016). A list of UNECE international agreements and conventions related to improving transport connectivity is outlined in Appendix 1.

Table 6.5 outlines several UNECE international conventions related to transport facilitation that constitute the legal backbone of transit regimes.

Table 6.5: Status of ratification of UNECE conventions related to border crossing facilitation

Convention	LLDCs				Total
	Africa	Asia	Europe	Latin America	
1975 Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention), entered into force on 20 March 1978	0	7	4	0	11
1982 International Convention on the Harmonization of Frontier Controls of Goods (Geneva Convention), entered into force on 15 October 1985	1	7	0	0	8
1972 Customs Convention on Containers	1	3	3	0	7
1968 Convention on Road Signs and Signals	1	6	4	0	11
1956 Convention on the Contract for the International Carriage of Goods by Road (CMR)	0	6	4	0	10
1956 Customs Convention on the Temporary Importation of Commercial Road Vehicles	0	3	3	0	6
Total	2	32	18	0	

Source: United Nations (<https://treaties.un.org>). Accessed on 29 November 2019.

TIR Convention simplifies and harmonizes the administrative formalities of international road transport (can also be in combination with other transport modes) and establishes an international customs transit system with maximum facility to move goods. As the only global customs transit system, it plays an important role in cutting trade and transport costs significantly. The Geneva Convention is very much about transit facilitation by recognizing the importance of transit for countries' economic development. Article 7 promotes cooperation between adjacent countries to arrange for the joint control of goods and documents through the provision of shared facilities (see also **OSBP** under section 6.1). To date, the countries implementing TIR are still limited to Europe, Central Asia and parts of the Middle East.

UNECE Conventions also include conventions that ensure that technical standards for the transport (road, rail, inland water networks) are harmonized. It is in the interest of LLDCs that are dependent on maritime countries to minimize non-tariff barriers to trade to ensure interoperability. The more differences that exist between the LLDCs and the maritime country, the slower and costlier transport will be.

Despite its importance and benefits, many LLDCs have not yet ratified several international/regional/sub-regional agreements and some LLDCs are not yet members of WTO. These are most probably caused by lack of awareness of the benefits of ratification and the difficulties faced by LLDCs to translate the agreements into their national laws and legislations.

C. Revised Kyoto Convention

This convention is the main trade facilitation Customs convention designed to harmonize and simplify Customs procedures. It was developed by the World Customs Organization and entered into force on 3 February 2006. It is an update and revision of the International Convention on the Simplification

and Harmonization of Customs Procedures (Kyoto Convention) adopted in 1973-1974. As of November 2019, 19 LLDCs have ratified this convention (12 African and 7 Asian LLDCs).

6.2.2. Regional and sub-regional agreements

Integrating into regional economy is of utmost importance for LLDCs to promote partnerships with transit countries. While African LLDCs have low participation in international conventions on transport and transit, each of these countries participate to at least one of regional trade agreements (RTA). There are also other regional instruments related to transit transport facilitation and trade in Africa, such as those under Regional Economic Communities/RECs (

Table 6.8). Legal instruments at the continental level are established under the auspices of the African Union (Table 6.6).

Inter-governmental Agreement on the Trans African Highway endorsed by the African Union Summit of June 2014 aims to harmonize road norms and standards of the TAH network. It is important for LLDCs and their neighbors to put in place mechanisms and procedures that create harmonized and seamless logistics. RECs in Africa are implementing inter-state transportation regulations and axle load control measures.

In the Euro-Asian region, transport and transit are mainly regulated at the bilateral level and through multilateral agreements, as shown in

Table 6.8. All landlocked Asia-Pacific countries have bilateral agreements relevant for transit transport with their most important transit countries concluded before 2014 (Jaimurzina, 2019). Furthermore, ESCAP has been facilitating the establishment and adoption of the Intergovernmental Agreement on the Asian Highway Network, and the Intergovernmental Agreement on the Trans-Asian Railway Network which aim to facilitate harmonization of standards in the region. ESCAP also facilitated the Intergovernmental Agreement on Dry Ports. The ratification status of these agreements is outlined in chapter 2.

Table 6.6: Africa Regional Treaties and Conventions on Facilitation of Transit Transport and Trade

LEGAL INSTRUMENT
1963 Organization of African Unity (OAU) Addis Ababa Charter
1973 Addis Ababa Declaration on Cooperation, Development, and Economic Independence
1979 Monrovia Declaration
1980 Lagos Plan of Action and Final Act of Lagos
1991 Abuja Treaty Establishing the African Economic Community (AEC)
1993 African Maritime Transport Charter
1999 Yamoussoukro Decision
2000 Constitutive Act of the African Union
2002 New Partnership for Africa's Development (NEPAD)
2009 African Maritime Transport Charter
2010 Programme for Infrastructure Development in Africa (PIDA)
2000 ACP-EU Partnership Agreement; Second Revision 2010
2014 Agenda 2063: The Africa We Want and the First Ten-year Implementation Plan 2014-2023
2014 Inter-governmental Agreement on the Trans African Highway endorsed by the African Union Summit of June 2014 in its decision DOC. EX. CL/838 (XXV)

Source: UN-OHRLLS (2016)

A number of initiatives were also adopted in Latin America to promote partnership of countries throughout the region (Table 6.7).

Table 6.7: Transit transport and trade agreements in Latin America

1962 Latin America Association for Free Trade (ALAC)
1969 The Andean Community of Nations (CAN)
1989 Agreement of International Land Transport (ATIT)
1991 Common market of the South (MERCOSUR) Agreement
2011 Community of Latin American And Caribbean States (CELAC)

Source: UN-OHRLLS (2019c)

Table 6.8: Participation of LLDCs in regional trade agreements as notified to the WTO

Region	Number of Trade Agreements	List of Notified RTAs in Force
Africa		
Botswana	5	MERCOSUR - SACU, EU - SADC, EFTA - SACU, SACU, SADC
Burkina Faso	2	ECOWAS, WAEMU
Burundi	2	EAC, COMESA
Central African Republic	1	CEMAC
Chad	1	CEMAC
Eswatini	6	MERCOSUR - SACU, EU - SADC, EFTA - SACU, SACU, SADC, COMESA
Ethiopia	1	COMESA
Lesotho	6	MERCOSUR - SACU, EU - SADC, EFTA - SACU, SACU, SADC, COMESA
Malawi	2	SADC, COMESA
Mali	3	ECOWAS, WAEMU, COMESA
Niger	3	ECOWAS, WAEMU, GSTP
Rwanda	2	EAC, COMESA
South Sudan	1	EAC
Uganda	2	EAC, COMESA
Zambia	2	SADC, COMESA
Zimbabwe	4	EU - Eastern and Southern Africa States Interim EPA, SADC, COMESA, GSTP
Asia		
Afghanistan	2	India, SAFTA
Bhutan	3	India, SAFTA, SAPTA
Kazakhstan	9	EAEU - Vietnam, EAEU, Treaty on a Free Trade Area between member of CIS, Russian Federation - Belarus, Ukraine, CEZ, Armenia, Georgia, Kyrgyzstan
Kyrgyzstan	8	EAEU - Vietnam, EAEU, Treaty on a Free Trade Area between member of CIS, Armenia, Kazakhstan, Republic of Moldova, Ukraine, Uzbekistan
Lao PDR	8	ASEAN - India, ASEAN - Republic of Korea, ASEAN - Australia - New Zealand, ASEAN - Japan, ASEAN - China, AFTA, Thailand, APTA
Mongolia	1	Japan
Nepal	3	India, SAFTA, SAPTA
Tajikistan	2	Treaty on a Free Trade Area between member of CIS, Ukraine
Turkmenistan	5	Russian Federation, Ukraine, Armenia, Georgia, CIS
Uzbekistan	4	Russian Federation, Ukraine, CIS, Kyrgyzstan
Europe		
Armenia	10	EU, EAEU - Vietnam, EAEU, Treaty on a Free Trade Area between member of CIS, Turkmenistan, Kazakhstan, Republic of Moldova, Ukraine, Georgia, Kyrgyzstan
Azerbaijan	5	GUAM, Russian Federation, Ukraine, Georgia, CIS
Republic of Moldova	8	GUAM, Turkey, EU, Treaty on a Free Trade Area between member of CIS, Ukraine, CEFTA 2006, Armenia, Kyrgyzstan
TFYR of Macedonia	5	Ukraine, CEFTA 2006, EU, Turkey, EFTA
L. America		
Paraguay	1	Mexico
Bolivia	1	Mexico

Source: WTO RTA Database, accessed on 4 December 2019.

The trade freedom index (

Figure 6-1) and the countries' participation in international conventions and RTA have been found to be correlated. The trade freedom index shows that Asian and European LLDCs are more open (which also means that the governments promote the free flow of foreign commerce more) than most of their African counterparts. Asian and European LLDCs are also regions with the highest ratification of the UNECE conventions related to border crossing facilitation.

Kazakhstan and Lao PDR are the best performers in Asia in terms of trade freedom. These countries also have the highest participation in regional trade agreements among the Asian LLDCs. The same situation also applies to Armenia in Europe and Botswana, Eswatini and Lesotho in Africa. It can be concluded that adopting trade facilitation instruments leads to the harmonization of the trading environment. This experience can set an example for other LLDCs and transit countries to raise their awareness that their greater commitment to effectively implement their bilateral and regional agreements is required.

Summary

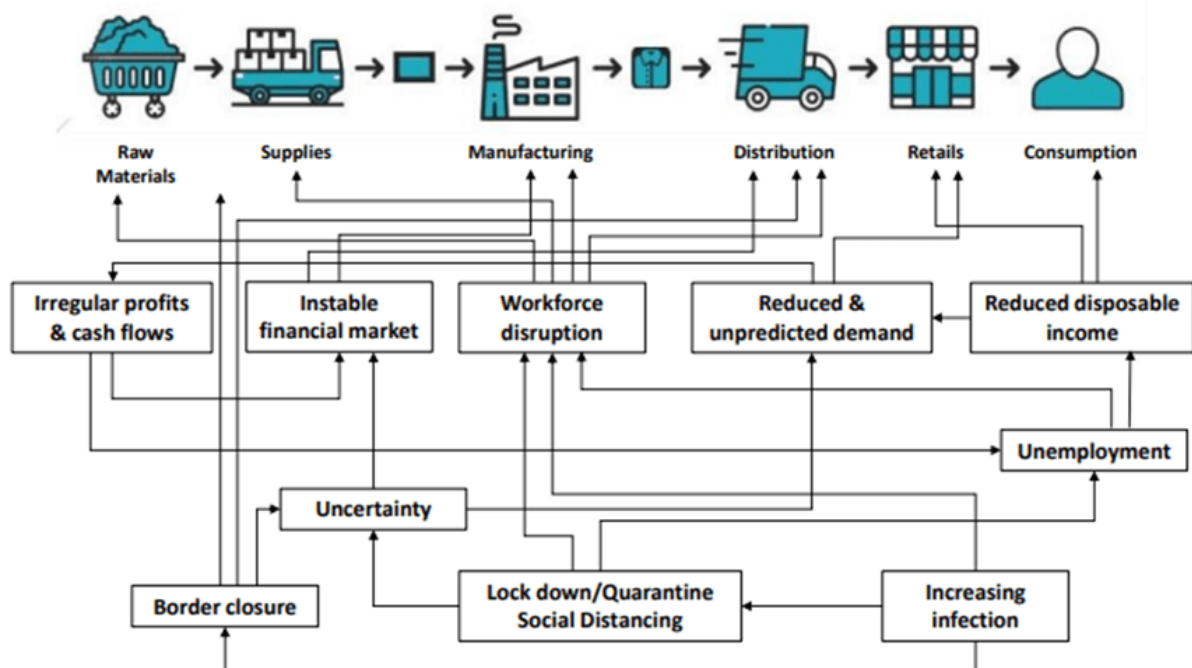
- Various strategies and initiatives have been undertaken by LLDCs to enhance their trade facilitation. Many LLDCs have established coordinated border management systems in the form of OSBP or JBP, which have proved to reduce delays at the border. In terms of the implementation of single window, Asian LLDCs perform very well due to the fact that most of them are CAREC countries. It proves the importance of participating to such a regional initiative that has a joint customs controls programme. Most African LLDCs still face challenges in developing single windows. One of them is the high broadband prices in the region. Application of ICT in border management, such as ASYCUDA, SINTIA, and ACI, that increases efficiency in border operations, is also progressing in many LLDCs. Adequate physical ICT infrastructure is critical to ensure the project's success. Again, funding limitation hinders the implementation of ICT applications in LLDCs to improve and harmonize customs administrations and border crossing procedures in order to enhance trade facilitation.
- Most LLDCs that are members of the WTO have ratified the WTO TFA, however many LLDCs are yet to ratify international conventions and agreements that facilitate trade and border crossing, such as the TIR convention. This convention is a global customs transit system, which plays an important role in cutting trade and transport costs significantly. Yet, only 30% of LLDCs have ratified this convention.
- Promoting regional integration is also important for LLDCs to promote partnerships with transit countries. Supporting regional initiatives allows LLDCs to take benefits of investment, research and development, and sharing of experiences. All LLDCs participate to at least one regional transit and trade agreement.

7. Preparedness of LLDCs to Handle the Impact of Pandemic and Other Emergency Situations

The COVID-19 outbreak has a major impact on the health system of almost all countries in the world. According to the WHO Coronavirus Disease Dashboard, as of 23 February 2021, LLDCs had confirmed nearly 2.3 million cases (compared to 955 on 24 March 2020 and 1.3 million on 17 November 2020) and 46,242 deaths (compared to 9 on 24 March 2020 and 26,967 on 17 November 2020). These account for 2.06% and 1.87% of the world's total respectively.

The outbreak also causes disruptions on supply chain operations and trade among countries. Figure 7-1 gives an impression of the far-reaching implications of supply chain disruptions due to the COVID-19 pandemic and the measures taken by many governments to contain the virus.

Figure 7-1: Supply chain disruptions have far-reaching effects

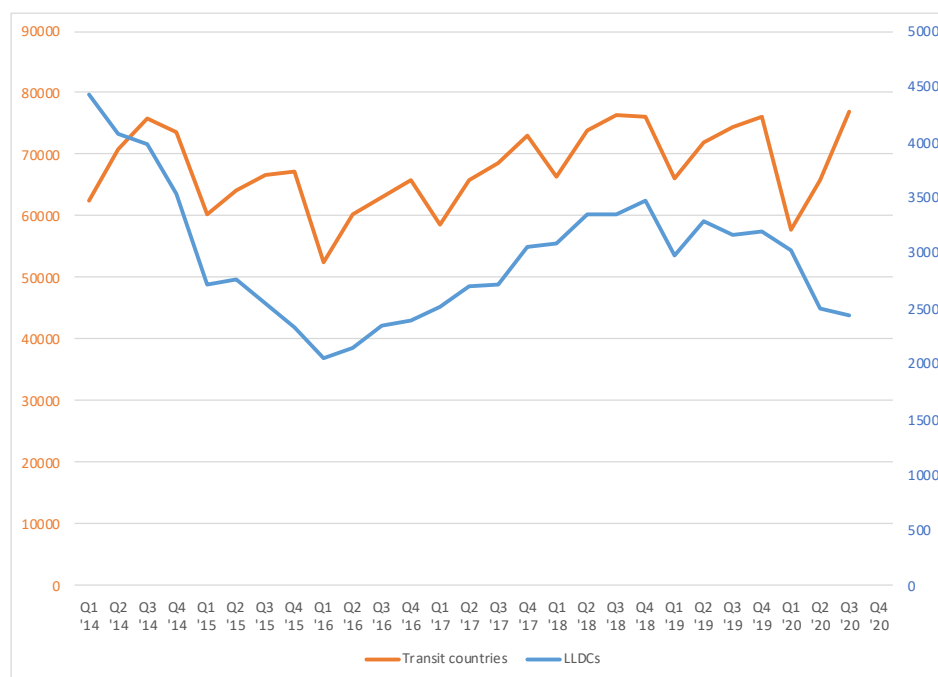


Source: International Economics Consulting (https://www.tradeconomics.com/iec_publication/impact-covid19-transport-logistics/). Accessed on 29 March 2021.

Such disruptions have severely hit LLDCs with the impacts ranging from job loss, increased poverty, reduced revenue from tourism, to declines in economic growth and private investment. In the beginning of the outbreak, nearly all countries closed their land, air and sea borders mainly for non-essential traffic. Along with additional inspections and reduced operational hours, this has driven an increase in transport costs. These immediate measures taken by governments in LLDCs and transit countries have negatively affected the movement of goods and services from and to LLDCs that already face higher transit costs and time during normal circumstances due to their geographical locations and challenge to access the international market. Figure 7-2 below presents the average total merchandise exports in LLDCs and transit countries, which shows the exports of LLDCs dropped in 2020, while those of transit countries increased.

The impact of COVID-19 has been putting pressure on LLDCs and their achievement of the SDGs and the implementation of the VPoA as countries have to reprioritize their budget and investment.

Figure 7-2: Average total merchandise exports 2014-2020 (million \$US)



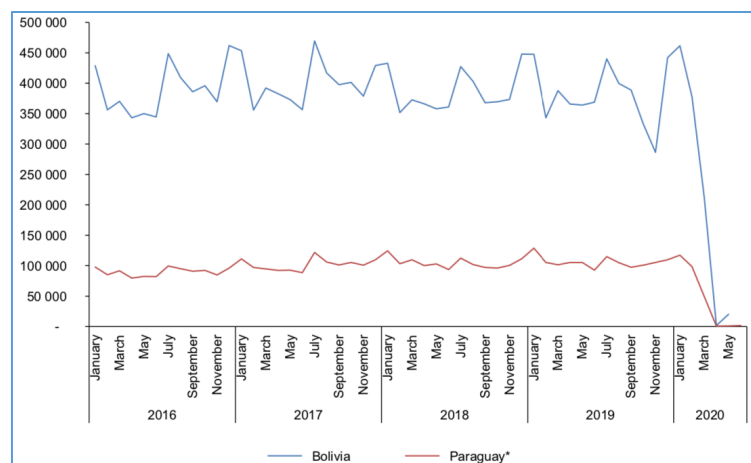
Source: WTO. Available at <https://data.wto.org/>. Accessed on 30 March 2021

Note: Data available for LLDCs (Armenia, Bolivia, Kazakhstan, Kyrgyz Republic, Moldova, North Macedonia and Paraguay) and transit countries (Algeria, Argentina, Bangladesh, Brazil, Chile, China, India, Iran, Kenya, Nigeria, Pakistan and Peru).

7.1. COVID-19 impacts on transport system

The supply chain disruptions discussed in the previous section are caused by disruptions in the transport system as transport is the crucial part of supply chain. That being said, the transport system is the first to be affected by the impact of the COVID-19 pandemic. Nearly all countries suspended regular flights leading to the collapse of passenger airline services and a dramatic capacity reduction of air freight, as shown by Figure 7-3. Air transport has been the hardest hit transport mode while it has a vital role in LLDCs as it is not subjected to borders and other impediments as in the case of surface transport modes.

Figure 7-3: Total air passengers in Latin American LLDCs



Source: ECLAC (2020)

Although to a lesser extent, transport over water has also experienced sharp decline especially in the beginning of the pandemic as cargo ships were denied entry to ports causing sharp increase of freight prices.

Border closures also resulted in tens of thousands of trucks being stuck at land border crossing points, affecting the delivery of essential goods, such as foods, pharmaceuticals, medical supplies and fuels. The impact is significantly felt by economically vulnerable countries that often rely heavily on imports to cover their basic needs.

On the other hand, rail freight has been proven to be resilient as the COVID-19 pandemic gave rise to a shift from road to rail mainly because international rail transport uses less manpower over long distance, hence less frequent human interactions and lower potential of spreading the virus during transport process. Despite reduced economic activities as a result of international lockdowns, the rail freight sector between China and Europe covered by the Belt and Road Initiative grew in the first quarter of 2020³⁷. In Europe, international freight trains have been deployed to transport medical supplies and equipment since the beginning of the outbreak. Several European countries have reduced or waived track access charges for rail freight undertakings during the pandemic, making rail freight more competitive in terms of cost and transit time and ultimately to advance the modal shift³⁸.

For LLDCs, where the transport disruptions caused by the pandemic have been severe, international railway transport would have been effective to minimize the disruptions impacts. Unfortunately, rail freight has the lowest share in LLDCs (as shown in Figure 2-8) due to the low density of railway infrastructure in most countries. While the COVID-19 pandemic could be considered as a momentum to raise the awareness of LLDCs to turn this crisis into an opportunity to increase the comparative advantages of railway transport as a sustainable mode, at the same time international private sector investment in SDGs related sectors in developing economies (to which LLDCs belong) fell sharply in 2020. According to UNCTAD (2020), infrastructure greenfield investment and project finance (that includes transportation infrastructure, non-renewable power generation and distribution, and telecommunications) fell by 62% in 2020, making the pandemic impact more pronounced in countries that were already vulnerable even before the COVID-19 outbreak.

7.2. Measures to facilitate cross border activities during pandemic

As discussed in chapter 6, facilitation of trade is as important, or even more important, than infrastructure provision. **Error! Reference source not found.** shows some good examples of measures taken by LLDCs to facilitate cross border activities during the Covid-19 pandemic, such as setting up priority lanes for essential goods, extending opening hours of border crossing points and temporary extension and/or exemption of duties and taxes. A full list of measures taken by Governments is available on the [UNECE Observatory on Border Crossing Status due to COVID-19](#)³⁹.

³⁷ <https://www.chinadaily.com.cn/a/202007/14/WS5f0ca3b4a310834817259220.htm>

³⁸ <https://www.railfreight.com/railfreight/2021/03/15/belgium-reduces-track-access-charges-until-end-of-june-2021/>

³⁹ <https://wiki.unece.org/display/CTRBSBC>

Table 7.1: Measures taken by LLDCs to facilitate cross border activities during pandemic

Country	Measures
Bhutan	Ensuring uninterrupted supply chain by extending working hours, simplifying the import clearance procedure, implementing fast track clearance of essential cargo related to Covid-19, and deferring custom duties and taxes payment.
Nepal	Nepal Customs formed a Quick Response Team to ensure essential goods are cleared within two hours. ⁴⁰
Central African Republic	<ul style="list-style-type: none"> - Fast track procedures for medical supplies - Immediate release of goods and direct collection - No value-added tax (VAT) levied on medicinal products.
Rwanda	<ul style="list-style-type: none"> - Established a dry port near the border that operates 24/7 and extended all customs services to facilitate faster clearance of essential and relief goods at the first point of entry. - Enforced the use of online services available in the Rwanda Electronic Single Window System among which is online payment.
Armenia	The State Revenue Committee has ensured 24/7 operation of certain functional units of the Customs Service, including particular divisions of IT Department
Paraguay	The delivery services of food, medicine, hygiene products, cleaning products and other basic necessity supplies are exempted from the new health emergency measure, as well as logistics services (ports, river ships, maritime lines, transport land freight), customs services for loading and unloading of goods.
Bolivia	Expedite the clearance of goods by determining the maximum length of clearance time for the customs administration.

Source: UNECE Observatory on Border Crossing Status due to COVID-19 (<https://wiki.unece.org/display/CTRBSBC>).

These measures are however focusing on domestic efforts, while international coordination is undoubtedly a crucial element of trade facilitation and its importance has become even clearer during the COVID-19 pandemic in order to ensure a seamless and efficient transport and logistic system. Imposing different measures by governments in different countries at different periods of time indicates the absence of an agreed protocol to be implemented during pandemics and possibly in other emergency situations.

This brought to light the vital role of the relevant conventions and agreements at different levels – international, regional, sub-regional and bi-lateral – between LLDCs and transit countries to facilitate collaboration, cooperation and management of transit issues. The most relevant one may be the UNECE-administered **TIR Convention** (see section 6.2.1). As the only global customs transit system, it simplifies and harmonizes the administrative formalities of international road transport (can also be in combination with other transport modes) and establishes an international customs transit system with maximum facility to move goods by guarantying that goods compartments are sealed from the departure country until the destination country. The COVID-19 pandemic has been creating difficulties in the distribution of TIR carnets and in obtaining new approval certificates for vehicle fleets. To address these challenges, UNECE sent a letter to all TIR Contracting Parties offering the temporary extension of the validity of the vehicle approval certificates for 6 months and the provision

⁴⁰ <https://blogs.worldbank.org/endpovertyinsouthasia/covid-19-highlights-need-digitizing-and-automating-trade-south-asia>

of print@home TIR carnets. Unfortunately, only 11 LLDCs (seven in Asia and four in Europe) are contracting parties of this convention.

This example shows that UN entities and other relevant institutions could use the momentum of the COVID-19 pandemic to raise the LLDCs' awareness of the benefits of ratifying conventions and agreements facilitating border crossing.

7.3. Important role of digitalization

Digitalization plays an important role in ensuring the continuation of cross border activities and flow of goods during the pandemic through electronic documentation which not only expedites movement of goods but also to reduce physical contacts at border crossing points. This includes electronic cargo tracking systems, electronic exchange of information, paperless solutions and the use of mobile banking and payment systems. These require fast and stable broadband technologies that are currently somewhat costly in many LLDCs as a result of insufficient digital infrastructure. As a result, LLDCs were left behind when the pandemic accelerated the rise of e-commerce.

However, positive endeavors have been undertaken by several LLDCs in Asia and Africa (Table 7.2) to quickly respond to the need to digitize their trade and transit procedure in order to ease both bilateral and transit freight transport movement across borders during the pandemic, especially for relief and essential supplies.

Table 7.2: COVID-19 digital solutions as policy responses of LLDCs

Country	Digital solutions
Botswana	- On line processing of declarations and e-payment
Kazakhstan	- Road transport carriers do not need to carry paper permits as of 15 April 2020. Verification will be carried out using the information and analytical system of the transport database. - All railways-related processes are carried out remotely in electronic form. The system allows customers to pay fees, fines without leaving home.
Uzbekistan	- Uzbekistan Railways has developed a software for processing and providing preliminary electronic information to customs authorities for goods transported by rail.
Lesotho	- Programmed ASYCUDA risk management to route Relief Supplies to green lane
Zambia	- Mandatory pre-registration and electronic payment options

Source: ESCAP (2020); UNECE Observatory on Border Crossing Status due to COVID-19 (<https://wiki.unece.org/display/CTRBSBC>), accessed on 30 March 2021.

As discussed in section 6.1.2, nearly all LLDCs have automated their customs system although the implementation level varies. This should be standard practice, especially in African LLDCs that have been severely impacted economically by the international lockdowns (see **Error! Reference source not found.**). If all African countries implement harmonized electronic customs systems and more comprehensive single window solutions (Table 6.1 shows that only 25% of African LLDCs are implementing single window), the multiplier effects, not only for intra-Africa trade but also for trade with the rest of the world, would be significant⁴¹.

⁴¹ <https://www.tralac.org/blog/article/14702-digitalise-transport-and-trade-procedures-to-ease-the-supply-of-essential-goods-during-covid-19-and-beyond.html>

Improved digitalization is also a powerful catalyst to recover the LLDC's economy as the rise of e-commerce amidst the COVID-19 pandemic will stay beyond it.

Summary

Disruptions on transport system caused by the COVID-19 pandemic impacts have led to disruptions of supply chains and trade flows. These have been obvious in LLDCs that are already vulnerable in normal circumstances. On the other hand, the COVID-19 virus has also brought to light the vital role of the efficient functioning of corridors and active participation in relevant conventions and agreements to promote coordinated actions, harmonized procedures along the corridors, the resilience of rail freight, and the importance of digitalization and modernization of custom systems.

LLDCs has been taking various measures to facilitate cross border activities during pandemic such as setting up fast track clearance of essential goods.

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8. Policy Recommendations

This section provides recommendations on policies and strategies to strengthen the capacity of LLDCs and their transit neighbours to design and implement policies that promote transport connectivity and to build resilient transport infrastructure. It also provides suggestions on the best role that multilateral agencies can play. Without contemporizing and realigning policy, regional connectivity cannot be improved and socio-economic objectives will not be attained.

8.1. Improving capacity on closing transport infrastructure gaps

The transport policy recommendations outlined in this section will be elaborated for each type of transport infrastructure. However, it is important to consider all modes of transport as parts of one seamless logistics chain when planning and improving the movement of goods. It is also important to consider transport from the perspective of the customer not only the supplier. Transport is invariably supply side driven because most of the transport network is owned by the State. Yet, the customer or shipper in the case of trade in goods is not concerned about the specific mode of transport or section of network but the overall services that meets his needs, door to door and just in time. Understanding planning logistics chains that maximize value added should be understood by LLDCs because their economy depends very significantly on their performance.

Infrastructure projects naturally involve very high investments and substantial efforts to prepare and execute over the span of many years which requires robust long-term policies. To improve the performance of LLDCs in undertaking transport infrastructure projects effectively and efficiently in all project phases, their capacity in the following areas need to be strengthened: project planning, projects restructuring to include all regional and international initiatives, project implementation, and project monitoring. These are essential to ensure an efficient use of resources that are already scarce and to raise more finance. Inadequate design, delays in project implementation and underinvestment, which are characterized by infrastructure project management in LLDCs, need to be addressed properly. For this, various UN-entities and development banks have been providing technical assistance, as shown in a non-exhaustive list in appendix 2.

Subsector Transport Policy recommendations for each type of transport infrastructure are elaborated in the next sub-sections.

Road infrastructure

Arising from the situation analysis, road sub-sector policy recommendations for the LLDCs should be focused on improving the way roads are planned, developed and maintained and integrating the development of roads with other modes of transport.

Some key features of roads infrastructure policy recommendations for LLDCs are:

- Increasing the capability of road agencies to monitor road condition
Increasing the road infrastructure adequacy in terms of quantity is one thing. Building the infrastructure with adequate levels of service is another thing. As road infrastructure serves trade routes, the provision must take a high proportion of heavy good vehicles into consideration. For this purpose, IRI should be one of the KPIs in the design standard. As an international standard, applying the IRI will ensure consistency in the way road roughness data is collected, compiled and analyzed, as such ensure standardization of data and transferability throughout the world. It is important that this is done regularly (at least every five years), to ensure continuous monitoring to view the roughness changes over time. The continuous data collection can also give early warnings of changes and damages.
- Raising awareness of the importance of road maintenance

It is important to raise awareness of LLDCs that the deterioration of transport infrastructure is a result of lack of maintenance. UN-OHRLLS can assist in this matter by developing evidence-based cost-benefit analyses that prove that deferring costs of maintenance will cost more in repairs and much more in rehabilitation or replacement.

- **Establishing road fund**
LLDCs that have not yet done so, are encouraged to establish a Road Fund that oversees the building and maintenance of road network and to enforce necessary regulations such as axle-load regulations.
- **Ensuring technical standards are harmonized**
Mechanisms and procedures that create harmonized and seamless logistics should be established to translate the agreements to benefit LLDCs on the ground. Monitoring the level of harmonization in road provision maintenance and operations would be necessary. Further work should be done to implement prioritized actions such as standardizing vehicle loading, pavements design, signage and regulations.

Support LLDCs to have sufficient capacity to develop a pipeline of bankable road infrastructure projects.

Rail infrastructure

Some key features of rail infrastructure policy recommendations for LLDCs are:

- **Increasing and upgrading rail network**
LLDCs are encouraged to undertake efforts to mobilize investment for increasing the network and for rehabilitating and upgrading existing infrastructure, an effective use of investment to ensure the highest benefits is vital. This can be achieved by harmonizing regional initiatives with national transport/infrastructure plans to ensure interoperability, to provide seamless logistics chains and to maximize value addition. This will apply to design and construction standards such as track gauge and loading gauge (which should adhere to the regional/global technical standards), and railway signaling systems. It is important that LLDCs explore all forms of partnerships to maximize resource mobilization.
- **Becoming member of international railway organization**
To achieve the above, being member of international railway organizations (OSJD and/or OTIF) is highly recommended to encourage and help LLDCs to comprehensively address the legal issues of international rail transport.
- **Increasing market share and competition**
LLDCs, if applicable in their countries, should increase rail market share, by creating better rail-freight services, leveling the playing field, and creating competition in rail sector. Opening up of the sector to competition can be encouraged by establishing ownership, restructuring railways, removing the restrictions, regionalization of railways, and developing a supporting railway industry.

Air connectivity

Some key features of policy recommendations for LLDCs in the air transport sector are:

- **Liberalization of air services**
LLDCs need to increase their air connectivity by pursuing bilateral agreements or MoUs to liberalize air service by including fifth freedom, intermediate or beyond, especially in regions and country-pairs that lacked strong local carriers. African LLDCs that haven't been parties to SAATM

are encouraged to do so. Those who have but have not fully implemented the directed measures are encourage to progress the implementation by:

- simplifying the procedures at the national level to sign the Memorandum of Implementation of the Yamoussoukro Declaration
 - establishing national implementation committees for the Yamoussoukro Decision
 - harmonizing the Yamoussoukro Decision with the national laws.
- Increasing focus on aviation in national infrastructure development plans
LLDCs need to give more priority to the aviation sector in their national infrastructure development plans. The following indicative aviation policy objectives could be considered:
 - Increasing Market Share, by stimulating passenger demand, supporting tourism and trade, serving remote areas (through the development of smaller airports), and improving air cargo services.
 - Improving Airport Planning and Infrastructure.
 - Engaging Contemporary Management.

Inland water transport

It is important to increase the mode share of inland water transport.

- Establishing legal framework and cooperation
LLDCs with inland waterways are encouraged to pursue bilateral agreements with transit countries with connecting waterways, in line with regional and international legal instruments.
- Mapping of national inland water transport capacity
LLDCs should start developing inventories of current and potential capacity of inland waterways in their countries, including but not limited to the following elements:
 - sections that do not comply with the requirements of regional or international waterways
 - sections that meet the requirements of regional and international waterways but further work is needed to improve the capacity and performance
 - an inventory of missing links (necessary sections to complete the network)
- Prioritization of inland water transport projects
Based on the inventories, a prioritization of projects can be made to be proposed and integrated into the national infrastructure plans and regional integration projects.

Dry ports to facilitate multimodal logistics

Dry Ports provide a particularly useful role in the logistics chains for LLDCs. Policy recommendations related to dry port developments include:

- Ratification of international agreements
LLDCs that have not been parties to intergovernmental agreements on dry ports or have not ratified them, such as the ESCAP Intergovernmental Agreement on Dry Ports, are encouraged to do so. Being part of regional and international agreements on dry ports can create greater awareness of policy makers about the benefits and opportunities of the development of dry ports through a knowledge-sharing forum.
- Supporting dry port development and operations

More dry ports/ICDs need to be built along the corridors as necessary. Strategies to promote larger and more developed aggregation hubs close to production areas could increase the critical mass for more efficient transport and facilitate value addition.

In order to address the challenge of high initial costs and skilled manpower shortage to operate the facilities, a BOT principle can be adopted. This mechanism will guarantee initial capital and ensure the availability of high skills from the private sector.

Incentives to private operators need to be provided, including low-cost land and tax breaks.

Finally, management and technical capabilities of port officials also need to be improved.

- **Establishing dry port authority**

LLDCs that have not done so are encouraged to establish a dry port authority to oversee and coordinate all activities related to the operation and management of dry ports including ensuring policy coherence. The capacity of this authority and related institutions to develop bankable dry port projects needs to be developed, in order to secure funding from development partners and the private sector. LLDCs can also individually, jointly or through multilateral bodies commit public financial resources to inland terminals that are critical to increase the region's competitiveness.

Sea ports

For LLDCs, sea ports provide the gateways for trade with the rest of the world. Investment by LLDCs in maritime country sea ports help provide LLDCs with added trade security. There is nothing stopping LLDCs taking a material interest in sea-port development and even in shipping lines and the following policy recommendations apply to LLDCs to invest in sea ports:

- **Include sea port infrastructure in national planning**

LLDCs should be encouraged to include Sea Port Infrastructure in their national transport policies and planning.

- **Sea port development and investment**

To move forward with seaport policy, LLDCs' actions will need to include the following:

- Take steps to own, lease or have a share in a sea port. LLDCs with sufficient financial means are encouraged to cooperate with their transit countries in joint development of sea ports to derive significant benefits.
- In case of 100% state-owned sea ports, LLDCs through political relations should encourage the host country to privatize the ports to allow LLDCs to have a share and take a material interest in sea ports.
- Enact laws for the operation of maritime transport to enable LLDCs to own and operate merchant shipping.
- Acquire long leases from the maritime neighboring country for land to build land port facilities.
- Provide funds for port infrastructure using PPP models.
- Ensure the connectivity of other modes to maritime transport.

Last but not least, LLDCs must strive for greater cooperation with transit countries to increase their access to seaports. This can be done through corridor management arrangements and formal agreements.

Transport corridor infrastructure development

Transport corridors foster opportunities for LLDCs to participate in regional and global trade. The following policy recommendations are suggested for LLDCs:

- **Incorporating corridor development in national transport planning**
It is important that LLDCs and transit countries incorporate integrated and harmonized planning from regional policies into their national plans. This may start with transport corridor planning then cascade to other parts of the connected transport network. Furthermore, the national transport planning also needs to incorporate likely impacts of pandemic and other emergencies related situations to ensure the continuation of cross border activities, facilitating evacuation, emergency services, relief supplies, and flow of goods.
- **Improving capacity and efficiency of corridors**
Policies should also concentrate on improving capacity (road, rail and waterways) and efficiency on transport corridors within the country, rather than only on the national transport networks, because they will provide the trade route for most of the LLDCs economies and their development will have different policy drivers, design standards and levels of service.
- **Establishing corridor management agreements and mechanisms**
LLDCs are encouraged to enter into agreements with neighboring countries regarding corridor development and management.
- **Enhancing capacity of corridor management staff**
It is important for LLDCs to cooperate with their neighboring countries to build the capacity of the corridor management institutions and their staff in the areas of coordinating the roles of the participating countries and other stakeholders, providing training for stakeholders in trade and transit, assisting participating countries to domesticate corridor policies, and measuring corridor performance.

8.2. Improving capacity to address energy and ICT infrastructure gaps

- **Expanding affordable and sustainable energy**
LLDCs are encouraged to continue to expand sustainable sources of energy, and include this in their national energy policies. Short-term, medium-term, and long-term energy production plans need to be formulated in order to produce affordable energy to fulfill the country's demand for electricity.
- **Increasing ICT affordability**
In terms of ICT infrastructure, it is of utmost importance to increase broadband affordability. As discussed before, pricing of broadband service and devices is one of the critical barriers to achieving high penetration. As it has been considerably researched, the development of competition is one of the major tools for affecting a reduction in telecommunications service pricing.
- **National and regional broadband and ICT policies**
LLDCs that have not yet done so, are encouraged to formulate national broadband policy to improve access to international high-capacity fiber-optic cables and high bandwidth networks. Greater cooperation between the LLDCs and transit countries in this regard.

Those who already have, need to review their national broadband policies to ensure that the policies provide enabling environment to attract investment.

Although several regional initiatives have been developed to increase ICT cross-border networks, LLDCs need to ensure the harmonization of policy and regulatory frameworks at the regional level

with the national regulatory framework. This is essential to ensure consistent and higher pace of implementation. This recommendation is also relevant to other LLDCs that still need to make broadband services more affordable.

- Enhance use of ICT in customs management

Finally, more use of ICT at all borders must be promoted to improve the efficiency of Customs and border management, including for enhancing of customs process, implementation of customs automation and advance electronic cargo information tools.

To avoid the risk that each country developing its own set of data, such that it raises incompatibility barriers between countries, WCO and UN-entities like UNCTAD, ECE, ECA and ECLAC can provide trainings for LLDCs that aim to promote standardized international customs data. The training can address issues like types of trade data that should be collected, the format that should be used, data coding, and data exchange. In order to ensure the leverage in the participating countries, the train-the-trainer concept can be adopted.

8.3. Enabling legal environment for trade facilitation

- Ratification of legal conventions and agreements

LLDCs that are yet to ratify conventions and agreements facilitating border crossing, should be encouraged to do so. UN entities have been taking the lead in this matter through some of the following endeavors and their continuation should be maintained and enhanced:

- Raising the awareness of the LLDCs about the potential benefits from ratification by providing best practices and evidence-based advantages that have been experienced by other LLDCs who have ratified the considered agreements. It can also be stressed that lack of ratification could be considered a commercial risk by investors.
- Providing technical assistance to develop cost and benefit analyses of ratifying conventions and agreements.
- Providing technical assistance to interpret the conventions and agreements to practical language. Agreements and conventions need to be reflected in domestic legislation in order to deliver predictability to the trade community and government agencies. The degree to which domestic legislation fits the international trade legal environment has a dramatic impact on trading potential.
- Providing technical assistance to LLDCs to harmonize their national laws and legislations with the conventions and agreements.
- Providing guidelines for the implementation of each convention and agreement to assist the LLDCs that have ratified it.
- In terms of the implementation of WTO TFA, technical assistance should be provided to LLDCs mainly in the areas of *Information Available through Internet* (article 1.2), *Enquiry Points* (article 1.3), *Test Procedures* (article 5.3), *Risk Management* (article 7.4), *Trade Facilitation Measures for Authorized Operators* (article 7.7), and *Border Agency Cooperation* (article 8). Furthermore, attention also needs to be given by international entities to transit countries that need technical assistance, especially those that notified most or all measures of *Freedom of Transit* (Article 11) under category C.

- Implementation of legal conventions and agreements

Ratifying conventions and agreements that facilitate trade is important, but implementing them effectively is also critical. In order to ensure successful implementation, cooperation between government and the private sector as well as between government entities is essential. For LLDCs cooperation with their transit neighbors is also essential including regional approach to implementation of relevant conventions and Agreements. This can facilitate harmonization and

standardization of rules and documentation at bilateral and regional level and can reduce the cost of implementation and facilitate data sharing. Policy measures that are developed should ensure sustained political support by the government and incorporate the interest of the private sector. Enhanced technical and financial support are fundamental for effective implementation. Sharing of experience is important and as such south-south cooperation should be enhanced. Support should also be provided to domesticate the relevant conventions and agreements.

8.4. Strengthening capacity to develop climate-resilient infrastructure

- **Creating awareness of benefits of developing climate-resilient infrastructure**
It is of importance to create awareness among LLDCs that investments in resilient infrastructure will be cost-effective in the long run.
- **Planning and development of climate-resilient infrastructure**
The capacity of LLDCs needs to be enhanced to:
 - develop cost-benefit analyses for every infrastructure investment that include assessment of the lifetime costs of infrastructure, integrating climate change scenarios to the analyses and quantification of climate-related costs.
 - The capacity of LLDCs needs to be enhanced to integrate climate change scenarios into the planning and design of infrastructure, including spatial planning frameworks to redirect development away from high-risk areas
 - require strategic environmental assessments and environmental impact assessments during the project planning phase.
 - effectively monitor asset condition over time to identify the most vulnerable infrastructure elements and prioritize investments.
- **Need for technical assistance**
Technical assistance from international organizations is needed to support the building of the above-specified capacities of LLDCs to develop policies and strategies on creating sustainable and resilient transport infrastructure.
- **Coalition for Disaster Resilient Infrastructure (CDRI)⁴²**
It is strongly recommended that LLDCs become members of the Coalition for Disaster Resilient Infrastructure (CDRI)⁴³, a new multi-country and multi-stakeholder Coalition that aims to promote knowledge exchange and provide technical support to countries on implementing disaster and climate resilient infrastructure. The key thematic pillars under CDRI are: 1) Risk assessment; 2) Standards and regulations; 3) Financial mechanisms for managing risks; and 4) Recovery and reconstruction (IWDRI, 2019). As this is a new cooperation body, being members will give opportunities to LLDCs to co-create the form of the coalition and play a key role in setting its substantive agenda, and finally leverage change in their home countries.

8.5. Enabling environment to increase infrastructure funding and technical assistance

- **Mobilizing domestic resources**
Enhancement of capacity of LLDCs to mobilize domestic resources for transport infrastructure development through taxation and an efficient use of these resources.

⁴² <https://resilientinfra.org>

⁴³ <https://resilientinfra.org>

- Attracting funding and financing

To attract other funding sources, such as ODA and pensions funds and insurance reserves, it is important that LLDCs have sufficient capacity to develop a pipeline of bankable infrastructure projects to meet the investors' requirements. For this, the following ground works need to be done:

 - LLDCs need to have a long-term national transport infrastructure plan, which is necessary to secure project pipelines.
 - Increase the capacity to develop feasibility studies of the proposed projects as the groundwork for sustainable investments and to meet market risk-adjusted return requirements.
 - Multilateral and regional development banks and financial institutions and other relevant international organizations are requested to provide assistance to LLDCs in developing financially viable transport infrastructure projects.
 - LLDCs should create an enabling environment for investment by ensuring economic, political and social stability and by extending fiscal and non-fiscal incentives. A corruption-free environment, liberalized open market and transparent public procurement procedures need to be promoted.
 - LLDCs that have not yet done so, are encouraged to develop PPP laws, involving the creation of a common regulatory framework to ensure that the legal environment is attractive for investors. Such a framework will also deliver confidence to government officials to adopt PPPs. The framework should highlight the government's commitments and the mechanisms of risk transfer.
 - To utilize modern sources of funding, like South-south and triangular cooperation, LLDCs should enhance cooperation with developed adjoining or partner countries to attract investment from them.
- Support for attracting climate finance

In terms of funding for climate resilient infrastructure, as this is new terrain for many LLDCs, trainings are needed to increase the capacity of LLDCs to design project proposals for this specific purpose to be submitted to relevant donors that provide climate funds. These donors are encouraged to provide such trainings.

Furthermore, regional organizations (such as UN ECA, UN ECLAC, AfDB, and ADB) and transport corridor secretariats (such as CAREC and NCTTCA) can follow the initiative of UNECE that is creating a GIS database system for Euro-Asian Transport Links that allows users to locate bottlenecks (such as sections with high landslide risks) along the international routes. Such information sources could help LLDCs with the first step of identifying possible climate resilient projects to be funded.

8.6. Strengthening the preparedness of LLDCs to handle (future) pandemic and emergency situations

- LLDCs, that have not yet done so, are advised to take the following actions:
 - Develop protocols to deal with future pandemic and other emergency situations in order to expedite movement of goods at border crossing points. The protocols should include, amongst others, a list of essential goods, set up of fast-track treatment for vehicles carrying essential goods, extension of the operational hours of border crossing points, temporary extension of the validity of certificates and temporary exemption from several procedures (such as weight control). National Trade Facilitation Committees could play an important role in this endeavor.

- Furthermore, a crisis team should be set up to coordinate concerned government agencies and private stakeholders in order to maintain the overall performance of customs tasks and to improve the efficiency of border crossing activities.
- The COVID-19 crisis could be considered by UN-entities and other development partners as a momentum to raise the awareness of LLDCs on:
 - The urgency of strengthening transport corridors to support sustainable recovery and to be more prepared for likely future pandemic and potential disruptions, as such borders can stay open and functional whilst remain safe.
 - The importance of regional and sub-regional cooperation and adopting the relevant conventions and agreements on trade facilitation to enjoy the benefits of coordinated actions needed to maintain transport connectivity and smooth cross-border movement.
 - The fact that countries with less bureaucracy and cost at the border have been able to benefit ahead during the pandemic.
 - Taking bolder actions to digitize and automate transport and trade procedures, not only to provide contactless solutions and expedite movement of goods across borders but also to reduce corruption. United Nations instruments, such as TIR Convention and its eTIR system, as well as the CMR Convention and its e-CMR Protocol, provide the legal framework for a harmonized digital transition in trade and transport, complementing other digital tools used at the national level.

The role of international organizations is crucial in supporting LLDCs to undertake these efforts, which will lead to long-term sustainable practices to build back better.

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Appendix 1

List of UNECE International Transport Agreements and Conventions

1. Transport Infrastructures

- 1975 European Agreement on Main International Traffic Arteries (AGR), entered into force on 15 March 1983.
- 1985 European Agreement on Main International Railway Lines (AGC), entered into force on 27 April 1989.
- 1991 European Agreement on Important International Combined Transport Lines and Related Installations (AGTC), entered into force on 25 June 1998.
- 1999 European Agreement on Main Inland Waterways of International Importance (AGN), entered into force on 26 July 1999.

2. Border Crossing Facilitation

- 1975 Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention), entered into force on 20 March 1978.
- 1982 International Convention on the Harmonization of Frontier Controls of Goods, entered into force on 15 October 1985.
- 1972 Customs Convention on Containers, entered into force on 6 December 1975.
- 1954 Customs Convention on the Temporary Importation of Private Road Vehicles, entered into force on 15 December 1957.
- 1956 Customs Convention on the Temporary Importation of Commercial Road Vehicles, entered into force on 8 April 1959.
- 2006 Convention on International Customs Transit Procedures for the Carriage of Goods by Rail under Cover of SMGS Consignment Notes, not yet in force.

3. Other Legal Instruments related to Road Transport

- 1970 European Agreement concerning the Work of Crews of Vehicles engaged in International Road Transport (AETR), entered into force on 5 January 1976.
- 1956 Convention on the Contract for the International Carriage of Goods by Road (CMR), entered into force on 2 July 1961, along with the 1978 Protocol to the CMR and the 2008 Additional Protocol to the CMR concerning the electronic consignment note (e-CMR).

4. Transport of Dangerous Goods

- 1957 European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), entered into force on 29 January 1968.
- 2000 European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterway (ADN), entered into force on 28 February 2008.

5. Transport of Perishable Foodstuffs

- 1970 Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for such Carriage (ATP), entered into force on 21 November 1976.
- Road Traffic and Road Signs and Signals
- 1968 Convention on Road Traffic, entered into force on 21 May 1977.
- 1968 Convention on Road Signs and Signals, entered into force on 6 June 1978.

6. Road Vehicles

- 1958 Agreement concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and /or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Prescriptions, entered into force on 20 June 1959.
- 1997 Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections, entered into force on 27 January 2001.
- 1998 Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and/or be used on Wheeled Vehicles, entered into force on 25 August 2000.

7. Inland Water Transport

- 1960 Convention relating to the Unification of Certain Rules concerning Collisions in Inland Navigation, entered into force on 13 September 1966.
- 1965 Convention on the Registration of Inland Navigation Vessels, entered into force on 24 June 1982.
- 1966 Convention on the Measurement of Inland Navigation Vessels, entered into force on 19 April 1975.
- 2000 Budapest Convention on the Contract for the Carriage of Goods by Inland Waterway (CMNI), entered into force on 1 April 2005.

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Appendix 2. Technical assistance provided by UN-entities and development banks on transport connectivity

- United Nations Office for Project Services (UNOPS)
Within the context of improving the quality of transport projects, UNOPS have developed a series of tools to helping governments assess and improve their capacity to plan, deliver and manage infrastructure systems. LLDCs are encouraged to reach out to UNOPS to get assistance to apply these tools. These are the Capacity Assessment (CAT-I), Database for Evidence Based Infrastructure (DEBI), FieldSight, and the National Infrastructure Systems Model (NISMOD)(UNOPS, 2019).
- United Nations Conference on Trade and Development (UNCTAD)
UNCTAD has developed a toolkit that assists transit corridor stakeholders in improving the corridor performance. The toolkit provides two methodologies: the Cluster Development (CD) Methodology and Time/Cost-Distance (TCD) Methodology. The CD methodology offers a governance methodology to improve strategic decision making at control points on a corridor, while the TCD methodology is a performance measurement tool to assess and monitor the performance of transit transport operations. (UNCTAD et al., 2012)
- United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)
ESCAP has developed regional strategic frameworks for both road and rail transport to support the efficient and smooth movement of goods, passengers and vehicles through the promotion of transport facilitation measures that help ESCAP members and development partners in formulating transport facilitation policies, agreements, programmes and projects in a coordinated and consistent way⁴⁴.
- United Nations Economic Commission for Europe (UNECE)
UNECE provides Regional Advisers in its six priority areas to participate in national capacity-building activities and the implementation of technical cooperation projects. In the field of transport, UNECE technical assistance aims to improve national capacity to accede to and implement of ECE legal instruments, norms and standards as well as in promoting cooperation among countries in planning and developing coherent road, rail, inland waterway and combined transport infrastructure⁴⁵.
- United Nations Economic Commission for Latin America and the Caribbean (ECLAC)
Through the Regular Programme of Technical Cooperation⁴⁶, ECLAC provides support and technical assistance to develop the capacities of Governments to formulate and implement policies for sustainable economic and social development, in which International Trade and Integration is one of the working areas.
- The World Bank
The World Bank has developed toolkits for trade and transport facilitation and to assess logistic competencies and skills, such as Trade and Transport Facilitation Audit (TTFA), Trade and

⁴⁴ <https://www.unescap.org/our-work/transport/transport-facilitation-and-connecting-subregional-transport-networks/about>

⁴⁵ <https://www.unece.org/operactoper-welcome/our-expertise/operactoperaregional/regional-advisor-transport.html>

⁴⁶ <https://www.cepal.org/en/cooperacion/regular-programme-technical-cooperation>

Corridor Management Toolkit, and Logistic Competencies, Skills and Training Assessment Toolkit⁴⁷.

- African Development Bank (AfDB)
Through the NEPAD Infrastructure Project preparation Facility (IPPF), the AfDB has been assisting African countries, RECs and institutions to prepare high quality and viable regional/continental infrastructure projects that would be ready to solicit public and private financing, and to support targeted capacity building initiatives to enhance the sustainability of existing and planned infrastructure developed in the continent (Cisse, 2012).
- Asian Development Bank (ADB)
Through its Technical Assistance Special Fund, the ADB provides technical assistance grants to improve the capabilities of ADB's developing member countries to formulate, design, implement, and operate development projects and sector lending⁴⁸.

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⁴⁷ <https://www.worldbank.org/en/topic/trade-facilitation-and-logistics>

⁴⁸ <https://www.adb.org/site/funds/funds/technical-assistance-special-fund>

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