



The impact of COVID-19 on transport and logistics connectivity in the landlocked countries of South America

Alejandra Rivera



**COVID-19
RESPONSE**

Thank you for your interest in this ECLAC publication



Please register if you would like to receive information on our editorial products and activities. When you register, you may specify your particular areas of interest and you will gain access to our products in other formats.



www.cepal.org/en/publications



www.cepal.org/apps

The impact of COVID-19 on transport and logistics connectivity in the landlocked countries of South America

Alejandra Rivera



COVID-19
RESPONSE

This document has been prepared by Alejandra Rivera, consultant with the Economic Commission for Latin America and the Caribbean (ECLAC), under the supervision of Gabriel Pérez, Economic Affairs Officer with the Infrastructure Services Unit of the International Trade and Integration Division of ECLAC. This research was conducted as part of the regular programme of work of ECLAC and within the activities of the United Nations Development Account project, "Transport and trade connectivity in the age of pandemics: Contactless, seamless and collaborative United Nations solutions".

The views expressed in this document, which has been reproduced without formal editing, are those of the author and do not necessarily reflect the views of the Organization.

United Nations publication
LC/TS.2020/155
Distribution: L
Copyright © United Nations, 2020
All rights reserved
Printed at United Nations, Santiago
S.20-00768

This publication should be cited as: A. Rivera: "The impact of COVID-19 on transport and logistics connectivity in the landlocked countries of South America", *Project Documents* (LC/TS.2020/155), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2020.

Applications for authorization to reproduce this work in whole or in part should be sent to the Economic Commission for Latin America and the Caribbean (ECLAC), Documents and Publications Division, publicaciones.cepal@un.org. Member States and their governmental institutions may reproduce this work without prior authorization, but are requested to mention the source and to inform ECLAC of such reproduction.

Contents

List of Abbreviations	5
Abstract	9
I. Infrastructure and Logistics Country Profiles	11
A. Infrastructure and Logistics in Bolivia (Plurinational State of).....	12
1. Road and Railway Transport.....	12
2. Fluvial and Maritime Transport.....	13
3. Air Transport	14
B. Infrastructure and Logistics in Paraguay.....	14
1. Road Transport.....	15
2. Fluvial and Maritime Transport.....	16
3. Air Transport	16
C. Joint Infrastructure and Logistics for LLDCs	17
D. A comparative view on Logistics Performance	18
II. Measures and initial reactions	21
A. Measures and Reactions in Bolivia (Plurinational State of)	22
B. Measures and Reactions in Paraguay.....	22
C. Restrictions of Transit Countries	23
III. Impact on International Connectivity in Bolivia (Plurinational State of) and Paraguay	25
A. Air Connectivity.....	25
B. Maritime (indirect) Connectivity of LLDCs: Bolivia (Plurinational State of) and Paraguay	29
C. Inland Connectivity of LLDCs: Bolivia (Plurinational State of) and Paraguay	32
D. ICT Connectivity	35

IV. Conclusions and Contribution	39
A. Impact on International Connectivity of Bolivia (Plurinational State of) and Paraguay	39
B. Implications for Transport and Trade	40
C. Policy Recommendation to improve international inland transport.....	42
1. Extension of customs' border-crossing hours.....	42
2. Promote a regional integration.....	42
3. Expedite region-wide implementation of common vehicle license plates	43
4. Regional Observatory of Border-crossing Transit	44
D. Recommendations to Improve ICT Connectivity	46
1. Tethering (phone-as-modem) System.....	46
2. Standardization and Export Facilitation.....	47
3. Revision and update of National ICT Development Plans.....	47
4. Promote Public Private Partnerships	47
5. Join forces among LLDCs countries	48
Bibliography	49

Tables

Table 1	Bolivia's Investment in Transport Infrastructure and Telecommunications	12
Table 2	Bolivian fluvial infrastructure by system, 2019 (sq.mts)	13
Table 3	Annual aircraft departures and transport volumes per Bolivian airline	14
Table 4	Paraguay's Investment in Transport Infrastructure	15
Table 5	Progression of registered vehicles in Paraguay	15
Table 6	Annual aircraft departures and transport volumes per Paraguayan airline	17
Table 7	Bolivian passengers by road and rail, and freight by rail, 2020	33
Table 8	Year-on-year percentage change in Paraguay's customs operations	34
Table 9	Percentage of access and usage of ICTs in LLDCs, 2018.....	36
Table 10	Prices for two ICT services in LLDCs based on ITU's ICT Price Basket for 2019	36

Figures

Figure 1	Conceptual layers of the environment for commerce	11
Figure 2	WB Logistics Performance Index	18
Figure 3	Components of Bolivia's LPI score	19
Figure 4	Components of Paraguay's LPI score	19
Figure 5	Percentage of Central and South American ports with hinterland transport delays ...	24
Figure 6	YTD Daily flight departures for Bolivia.....	27
Figure 7	YTD Daily flight departures for Paraguay	27
Figure 8	Total freight moved in Bolivia and Paraguay.....	28
Figure 9	Total air passengers in Bolivia and Paraguay	29
Figure 10	Port LSCI for Pacific and Atlantic ports Bolivia and Paraguay use	30
Figure 11	Country-LSCI for LLDCs Transit Countries.....	31
Figure 12	Bolivia's Telecommunication Quantity Index.....	37

List of Abbreviations

ABC	:	Administración Boliviana de Carreteras (Bolivian Road Administration)
ACI	:	Airport Council International
ACI	:	Air Connectivity Index
ALADI	:	Asociación Latinoamericana de Integración (Latinamerican Association for Integration)
ANNP	:	Administración Nacional de Navegación y Puertos (National Administration of Navigation and Ports of Paraguay)
ASOCIATRIN	:	Asociación de Transporte Pesado Internacional y Nacional (Bolivian International and National Transport Association)
ATIP	:	Asociación de Transportistas del Interior del Paraguay (Association of domestic road carriers of Paraguay)
ATIT	:	Acuerdo sobre Transporte Internacional Terrestre (Agreement on International Ground Transport)
ATT	:	Autoridad de Regulación y Fiscalización de Telecomunicaciones y Transportes (Telecommunications and Transport Regulatory and Inspection Authority of Bolivia)
BoA	:	Boliviana de Aviación (Bolivian Airline)
CAPATIT	:	Cámara Paraguaya de Transporte Internacional Terrestre (Paraguayan Chamber of International Road Transport)
CFB	:	Camara Forestal de Bolivia (Bolivian Forest Chamber)
CIH	:	Comité Intergubernamental de la Hidrovía (Intergovernmental Committee of the Waterway)
CONDESUR	:	Consejo Empresarial del Transporte de Cargas por Carretera del Mercosur, Bolivia y Chile (Business Council of Freight Transportation by Road of Mercosur, Bolivia and Chile)
COVID-19	:	Corona Virus 2019
CTK	:	Cargo Tonne-Kilometres
DGEEC	:	Dirección General de Estadística, Encuestas y Censos (National Directorate of Statistics, Surveys and Census of Paraguay)
DINAC	:	Dirección Nacional de Aviación Civil (National Directorate of Civil Aviation of Paraguay)
DINATRAN	:	Dirección Nacional de Transporte (National Directorate of Transport of Paraguay)
DNA	:	Dirección Nacional de Aduanas (National Directorate of Customs of Paraguay)
DNRA	:	Dirección del Registro de Automotores (Directorate of the Registry of Motor Vehicles)
EU	:	European Union
FEDECAP	:	Federación de Camioneros del Paraguay (Paraguayan Federation of Truck Drivers)
FEPAMA	:	Federación Paraguaya de Madereros (Paraguayan Federation of Wood Exporters)
GDP	:	Gross Domestic Product
GNI	:	Gross National Income
GSMA	:	Global System for Mobile Communications
IADB	:	Inter-American Development Bank

IAPH	:	International Association of Ports and Harbors
IATA	:	International Air Transport Association
ICAO	:	International Civil Aviation Organization
ICT	:	Information and Communication Technology
ICT4Dev	:	Information and Communication Technologies for Development
IMO	:	International Maritime Organization
INE	:	Instituto Nacional de Estadística (National Statistics Institute of Bolivia)
IOSA	:	IATA Operational Safety Audit
IPB	:	ICT Price Basket
ITU	:	International Telecommunications Union
LAC	:	Latin America and the Caribbean
LLDC	:	Land-locked Developing Countries
LPI	:	Logistics Performance Index
LSCI	:	Liner Shipping Connectivity Index
Mercosur	:	Mercado Común del Sur (Southern Common Market)
MIC	:	Ministerio de Industria y Comercio (Ministry of Industry and Commerce of Paraguay)
MOPSV	:	Ministerio de Obras Públicas, Servicios, y Vivienda (Bolivian Ministry of Public Works, Services and Housing)
MSPBS	:	Ministerio de Salud Pública y Bienestar Social (Ministry of Public Health and Social Welfare of Paraguay)
NGO	:	Non-Governmental Organization
NTFC	:	National Trade Facilitation Committees
PDI	:	Policía de Investigaciones de Chile (Investigations Police of Chile)
PLF	:	Passenger Load Factor
PPP	:	Public-Private Partnership
PPW	:	Paraguay-Paraná Waterway
PSCG	:	WCO Private Sector Consultative Group
Q	:	Quarter (Q1, Q2, etc)
SAG	:	Servicio de Agrícola y Ganadero (Agricultural and Livestock Service)
SEGIB	:	Secretaría General Iberoamericana (Iberoamerican General Secretary)
SGT	:	Sub-Grupo de Trabajo (work sub-group within Mercosur)
SPIDER	:	Swedish Program for ICT in Developing Regions
TAM	:	Transportes Aéreos del Mercosur (Mercosur Air Transport Carriers)
TEU	:	Twenty-foot Equivalent Unit (20' container)
TFAF	:	Trade Facilitation Agreement Facility
UN	:	United Nations
UN-ECLAC	:	Economic Commission for Latin America and the Caribbean
UN-OHRLLS	:	United Nations' Office of the high representative for the least developed countries, landlocked developing countries and small island developing states
UNCTAD	:	United Nations' Conference on Trade and Development
VAT	:	Value Added Tax
VPoA	:	Vienna Programme of Action
VUE	:	Ventanilla Única de Exportación (Single-Window System)
WB	:	World Bank
WCO	:	World Customs Organization
WEF	:	World Economic Forum

WHO : World Health Organization
WPSP : World Port Sustainability Program
WTO : World Trade Organization

YOY : Year-on-year
YTD : Year-to-date

Abstract

For an effective and truly equitable sustainable development there is a need to place special attention to LLDCs, countries that face challenges due to their remoteness, lack of direct access to the sea and significant distance from world markets, as recognized by the UN High Representative for the Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States.

The Vienna Programme of Action (VPoA) for Landlocked Developing Countries 2014-2024 seeks to address the challenges faced by LLDCs in six priority areas: (1) fundamental transit policy issues, (2) development and maintenance of transport, energy, and ICT infrastructure, (3) international trade and trade facilitation, (4) regional integration and cooperation, (5) structural economic transformation, and (6) means of implementation (Perez and Sanchez, 2019).

LLDCs typically experience various barriers to trade such as high export times and costs, and uncertainty of total transit time. Also, their economies are mostly based on raw materials with low value added. Furthermore, LLDCs' performance lags behind in development and use of ICTs with marked urban/rural disparities and e-commerce is incipient. Within this context, the COVID-19 has doubly impacted these countries increasing their difficulties to connect to global markets. The pandemic has forced governments to take simultaneous and radical measures to protect the physical health of their populations by temporarily cutting channels of potential virus transmissions. This, however, entails important repercussions for LLDCs' connectivity and logistics facilitation. Foreseeing the undesirable economic and social effects of movement restrictions, international organizations have issued calls to actions to maintain free flow of essential medical supplies and all merchandise, while also protecting the population from virus transmission. Six UN agencies, including UN-ECLAC, in a joint call, underline that LLDCs are more vulnerable to cross-border restrictions and closures. They call for transport facilitation across borders to allow responses to short-term urgent demands, and the long-term economic recovery post-COVID-19 of LLDCs (UN-ECLAC, Informative Note).

In the long term, additional needs arise and will also require attention, like the diversification of financing channels and attraction of investments in physical and digital infrastructure. This is especially important to secure investments in infrastructure that improve inland water transport and co-modality

(Pérez, Sánchez and Cipoletta, 2010). The coordination with transit countries is essential to ensure facilitation of transit of goods, which would also increase domestic flows for transit countries, as well as solve operational inefficiencies that increase costs and transit times even in their own hinterland (Perez and Sanchez, 2019).

In such framework, the purpose of this study is to review the specific needs and differentiated impact of COVID-19 in the two landlocked countries of South America: Bolivia (Plurinational State of) and Paraguay, and propose practical policy recommendation for governments and relevant actors in transport and logistics of LLDCs and their neighbors and transit countries, in order to improve the connectivity, smooth transport flows and sustainable logistics with a regional perspective.

The methodology employed is case-study research focusing on the cases of Bolivia and Paraguay. This multinational comparison carries the aim to contrast the differentiated impact in terms of international connectivity and its implications for both LLDCs in the LAC region. This methodology is accomplished using quantitative and qualitative research methods that account for measures and responses to the COVID-19 pandemic by governments, as well as, connectivity indicators that quantify and visualize their impact.

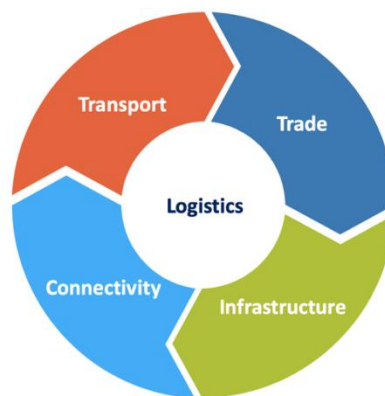
The report develops following a three-stage analytical framework. First, Chapter I reviews the existent infrastructure and logistics country profiles covering road, railway, fluvial, and air transport means. Then, Chapter II summarizes the reactions to COVID-19 by compiling the measures taken regarding border-closures, customs, airports and relevant transit countries. Then, Chapter III analyzes the impact of the COVID-19 pandemic and these measures on international connectivity. This is accomplished by examining the effects on air transport, inland transport to neighbor maritime gateways and their connectivity, and ICT connectivity as well. Lastly, Chapter IV states the conclusions and contributions of this report.

I. Infrastructure and Logistics Country Profiles

Within the recent context of the COVID-19 pandemic, the importance of infrastructure and logistics is more evident than ever. The continuation of logistics services helps guarantee the provision of food stock, medical supplies, and all consumption items. It is therefore, necessary to examine in detail the special needs of LLDCs which rely on access to transport gateways in neighboring countries, thus lacking autonomy and control over the connectivity network (inland, fluvial or maritime ports in foreign territories). A pivotal point to ease this burden is the development of strong domestic and cross-border infrastructure, and logistics services that can provide the much-needed connections to external markets, especially in times of crisis.

This report focuses on the impact of COVID-19 on transport connectivity and its implications for transport and trade. To facilitate the understanding of the interconnectedness of these concepts, their relationship can be summarized in figure 1:

Figure 1
Conceptual layers of the environment for commerce



Source: Own elaboration.

These concepts could be thought as interconnected and dependent gears that constitute the environment for commerce. At the base, and most important, is infrastructure, the construction anew or adaptation of the built environment to configure the physical existence of nodes (hubs), vectors (transport lines), and mediums (modes of transport). It makes connectivity possible, the creation of strong and constant linkages between nodes (hubs), allowing access and communication between internal with external infrastructure networks. Then, with the movement between nodes along the vectors is possible to structure transport flows that facilitate the carriage of goods along its segments, or the material flow. Lastly, the monetization of these flows can be seen in the trade value of goods, as well as in freight charges.

In the same manner, the concept of logistics refers to all the interconnected operations and activities needed to distribute goods in global commodity chains, thus its central location in the gear diagram. Then, to examine connectivity, a first examination is necessary to the underlying structure or physical configuration of the transport network, and the operations occurring within it. The sections below review the infrastructure and logistics profile of the Plurinational State of Bolivia and Paraguay, the only two LLDCs in Latin America.

A. Infrastructure and Logistics in Bolivia (Plurinational State of)

Bolivia's total investment in infrastructure has fluctuated between 3.79% and 5.12% of its GDP for the years between 2014 and 2017 (Infralatam, 2020). The highest area of investment is notoriously road transport averaging 90% of the total infrastructure investment for these years. Investments, to a much lower extent, in rail have been constant at around USD 50 million per year and airports constant as well at a lower amount between USD 25-30 million for the last years. Amounts dedicated to fluvial and maritime infrastructure are very small, and in 2017 none. Another important aspect of connectivity is the investment in telecommunications, which has increased both in absolute numbers and as percentage of GDP in 2016 and 2017.

Table 1
Bolivia's Investment in Transport Infrastructure and Telecommunications

Subsector	2014		2015		2016		2017	
	USD (millions)	Percentage of GDP	USD (millions)	Percentage of GDP	USD (millions)	Percentage of GDP	USD (millions)	Percentage of GDP
Air	43.84	0.13	29.73	0.09	24.73	0.07	26.91	0.07
Road	1 118.16	3.39	1 339.38	4.06	1 573.96	4.64	1 410.71	3.76
Rail	51.52	0.16	49.08	0.15	57.50	0.17	57.85	0.15
Fluvial and maritime	1.53	0.01	2.48	0.01	0.31	0.00	0.00	0.00
Telecommunications	34.22	0.10	19.57	0.06	82.15	0.24	98.06	0.26
Total subsectors	1 249.27	3.79	1 440.24	4.36	1 738.65	5.12	1 593.53	4.25

Source: Own elaboration based on data from Infralatam "Investment in Transport" www.infralatam.info (2020).

1. Road and Railway Transport

Correlated to the investment patterns, Bolivia's main mode of transport is by road. The road length has grown consistently from 56 530 km in 2000 to 89 397 km in 2016. Furthermore, in 2017 the road network had an 70% increase in its extension, which occurred by the most part at the municipal level, and another

25% increase in 2018 reaching 191 545 km, doubling the extension of the network from only two years before¹ (INE). From this total, 18% of the road network is paved and 73% are rural unpaved roads (Perez 2020). At the same time, the number of registered vehicles in the country has increased constantly at an average rate of 100 000 vehicles per year, reaching 2 013 400 by 2019 (INE).

Quality of road infrastructure is one important element to facilitate inland connectivity. Bolivia scored 41.3/100 in quality of road infrastructure and 56.7/100 on road connectivity according to the WEF's Global Competitiveness Report (2019). While both indexes are not ideal, it can be said that Bolivia's quality of road infrastructure is better than the density of its road network.

There are two railway companies that serve two networks that are not connected to each other. One is Ferrovial Oriental S.A. servicing the Eastern Network in an inverted "L" shape from Puerto Suarez in the most eastern side of the country to Yacuiba in the southern end. The other railway company is Empresa Ferrovial Andina S.A. connecting some of the main south-western cities in the Andean Network.

2. Fluvial and Maritime Transport

Besides the Titicaca Lake, there are two fluvial navigable systems in Bolivia: The Amazon river basin (5 728 km) to the northwest and the Plata River Basin (65 km) in the southeast which is integrated to the Paraguay-Paraná Waterway (PPW) making it the most important fluvial access in Bolivia. This is also reflected in the area of docks and infrastructure built of this system in comparison with others. In the PPW, there are two main gateways to Bolivia: Busch Port in the southeastern corner of the country between Brazil and Paraguay, and Tamengo Canal located 120 km north. Other important ports in Bolivia are the Aguirre port complex transporting hydrocarbons, general containerized cargo, and bulk carriers and oils; Jennefer port, and the Gravelal port. They all can be accessed by road or the eastern rail to further connect to the PPW (UN-ECLAC, Fluvial Infrastructure).

Table 2
Bolivian fluvial infrastructure by system, 2019 (sq.mts)

Description	2019	
	Dock	Infrastructure
Amazon Basin	80	0
Plata River Basin	1 071	34 978
Titicaca Lake	895	6 000
Total	2 046	40 978

Source: National Statistics Institute (INE).

Bolivia's location in the center of South America allows the utilization of ports in neighboring countries in both Atlantic and Pacific coasts. In the Pacific side, there are four main corridors leading to Peruvian ports Matarani and Ilo, and Chilean ports Arica, Iquique, and Antofagasta. These are reached by ground transport either by road or rail. In the Atlantic side, there are two main corridors that use the eastern rail to Puerto Suarez to connect with the Paraguay-Paraná Waterway to the ports of Buenos Aires and Rosario (Argentina), and Montevideo and Nueva Palmira (Uruguay). Journeys using the southern rail connection at Yacuiba can continue by road either to the west (Mendoza and Chilean ports) or east (Rosario, Argentina) via Salta.

¹ Source of information for the Municipal Network until 2016 was ABC (Bolivian Road Administration), and as of 2017 the Autonomous Municipal Governments, therefore the significant differences in municipal road extension might be due to reporting differences.

3. Air Transport

Bolivia counts with five main international airports: La Paz, Cochabamba, Viru Viru, Tarija, Yacuiba, and 24 smaller airports for general aviation (MOPSV, 2019). As of 2019, there were 131 978 square meters of airport terminal surface and 460 768 square meters of platforms in the country (INE). There are two observable concentrations of airport infrastructure. First in the Department of Beni, with 63 km of total length of runways, which has 11 general aviation airports, and the Department of Santa Cruz with a total of 91 km of runways, which includes Viru Viru, the largest airport (INE). There is currently a project for land access modernization for El Alto International Airport (La Paz), and at Viru Viru International Airport (Santa Cruz) there are plans for the construction of a second runway, a 50 000 sq. meters terminal building and a 70,000 sq. meters for cargo (Planzer and Perez, 2019).

Regarding aviation services, the only IATA Operational Safety Audit (IOSA) registered airline for Bolivia is "Boliviana de Aviación (BoA)" (ICAO API Data Service). Other Bolivian airlines are Amazonas and Ecojet, and the foreign Aerolineas Argentinas, AirEuropa, American Airlines, and Azul (SABSA). Table 3 below shows the aircraft departures and transport volumes, for scheduled international flights, for Amazonas and BoA. BoA is notoriously the airline with the most departures and volumes for both passengers and freight, and also the highest PLF. The average monthly departures for Amazonas are 116.4, while BoA double them (240.3). However, the passengers carried by BoA are more than 9 times those carried by Amazonas (ICAO Data Solutions Air Carrier Traffic, 2020).

Table 3
Annual aircraft departures and transport volumes per Bolivian airline

Air carrier	Year	Aircraft departures	Passengers carried	Passenger load factor (PLF) (%)	Freight tonnes carried
Amazonas	2017	1 517	59 917	79.0	0
Amazonas	2018	1 214	33 794	55.7	0
Amazonas	2019	1 459	39 283	50.4	14
BoA - Boliviana de Aviacion	2017	2 856	405 680	79.4	2 092
BoA - Boliviana de Aviacion	2018	2 863	417 774	77.9	3 088
BoA - Boliviana de Aviacion	2019	2 932	419 862	75.3	4 116

Source: ICAO Data Solutions Air Carrier Traffic. https://data.icao.int/newDataPlus/Dataplus/App_AirCarrierTraffic.

B. Infrastructure and Logistics in Paraguay

Paraguay's investment in transport infrastructure is destined to roads by far. Investment in roads has been sustained and even increasing 0.22% of GDP (US 73.56 million) from 2014 to 2017. It was followed by airport infrastructure in the years 2014 and 2015, but it has been surpassed in recent years by significant increased investment in the fluvial and maritime sector. It went from only over half a million USD in 2015, to 13.5 million just one year later, and doubled the following year. There is no railway operating network and no investments have been made in that subsector these years.

Table 4
Paraguay's Investment in Transport Infrastructure

Subsector	2014		2015		2016		2017	
	USD (millions)	Percentage of GDP	USD (millions)	Percentage of GDP	USD (millions)	Percentage of GDP	USD (millions)	Percentage of GDP
Air	10.07	0.03	11.59	0.03	9.36	0.03	8.93	0.02
Road	407.96	1.01	404.79	1.12	423.16	1.17	481.52	1.23
Rail	0.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Fluvial and maritime	1.89	0.01	0.56	0.01	13.54	0.04	25.83	0.07
Total subsectors	420.72	1.04	416.94	1.15	446.06	1.24	516.28	1.31

Source: Own elaboration based on data from Infralatam "Investment in Transport" www.infralatam.info (2020).

1. Road Transport

Higher urbanization in the east and south parts of the country has led to a denser road network surrounding and servicing Asunción, when compared to the northern more desolated areas. The total road network is 80 127 kms, out of which 9% is paved and 76.3% are rural unpaved roads (Perez, 2020). In Paraguay, 42% of people live within 2 km of a year-round transitable road (Rural Access Index 2003 in Perez, 2020). However, there are marked differences in local accessibility between departments. Densely urbanized areas report much higher percentages, e.g. Asunción (88%), Central (96%), Alto Paraná (72%), while peripheral departments have radically lower accessibility levels like in the Chaco region: Presidente Hayes (28%), Boquerón (13%), and Alto Paraguay (1.6%) (Perez 2020).

In terms of quality, Paraguay scored only 26.7/100 in quality of road infrastructure but 76/100 on road connectivity according to the WEF's Global Competitiveness Report (2019). This indicates that investment has been dedicated primarily to extend the road network, responding to vehicular pressures which have increased an average of 9.5% from 2018 to 2020. Departments with the highest number of vehicles are Asunción, Caaguazú, Itapúa, Alto Paraná, and Central, are all located southeast (). It is also worth noting that departments with lower vehicular demands in 2018 such as San Pedro, Guairá, Presidente Hayes, and Alto Paraguay, most of them located in the north, also show the highest percentage increases. This speaks of increasing urbanization rates to the north, and therefore higher transport connectivity demands.

Table 5
Progression of registered vehicles in Paraguay

Department	Registered Vehicles 2018	Registered Vehicles 2020	Absolute change	Percentage change
Asunción	418 296	447 456	29 160	7.0
Concepción	37 342	40 942	3 600	9.6
San Pedro	53 473	60 596	7 123	13.3
Cordillera	57 009	63 680	6 671	11.7
Guairá	53 319	59 808	6 489	12.2
Caaguazú	120 492	134 444	13 952	11.6
Caazapá	24 777	27 737	2 960	11.9
Itapúa	200 096	213 677	13 581	6.8
Misiones	27 854	30 750	2 896	10.4
Paraguarí	44 847	49 781	4 934	11.0

Department	Registered Vehicles 2018	Registered Vehicles 2020	Absolute change	Percentage change
Alto Paraná	377 160	411 877	34 717	9.2
Central	647 899	718 447	70 548	10.9
Ñeembucú	22 677	24 025	1 348	5.9
Amambay	55 015	61 154	6 139	11.2
Canindeyú	45 214	50 150	4 936	10.9
Presidente Hayes	20 124	22 801	2 677	13.3
Boquerón	43 739	47 929	4 190	9.6
Alto Paraguay	913	1 059	146	16.0
(Not reported)	2 855	1 691	-1 164	-40.8
Total	2 253.101	2 468 004	214 903	9.5

Source: Own elaboration based on data from Statistics Annal (DGEEC) for 2018 and National Directorate of the Registry of Motor Vehicles (DNRA) for 2020.

2. Fluvial and Maritime Transport

According to ANNP, in 2018 only 1.86% of imports entered the country through fluvial means, while 98.14% did so by land. (ANNP in Anuario Estadístico 2018, DGEEC). Most fluvial imports utilize the ports of Asunción and Villeta on the Paraguay River, and exports make use of Encarnación and Ciudad del Este on the Paraná River. The Paraguay-Paraná Waterway (PPW) extends to a total of 2110 kms of waterways with Paraguayan coast (for draft 8 feet or more), with 850 kms on the Paraná River and 1 260 kms on Paraguay River, making the PPW the country's main fluvial vector to the Atlantic ports (UN-ECLAC, Fluvial Infrastructure).

Asunción port (PYASU) is located in the Paraguay River more than 1 300 km from open seas, the closest river mouth the Plata River Basin. The international vessel traffic registered at PYASU in 2018 was 15 vessels entering with an average gross tonnage of 509 tons, and 7 vessels exiting at an average gross tonnage of 3 578 tons (ANNP in Anuario Estadístico 2018, DGEEC). There are also 51 private ports and terminals along the Paraguay and Paraná rivers that mobilize the majority of soy exports. However, there is a large variation in infrastructure and capacity of fluvial ports. The main ports by exported volume in 2018 were Caacupe-mí, Terport and Puerto Seguro Fluvial. The larger ones have up to 4 docks/cranes to operate up to 4 simultaneous ships (Fénix port). Since there is no railway network in the country, access to all Paraguayan ports is limited to road only (UN-ECLAC, Fluvial Infrastructure).

3. Air Transport

There are two international airports: "Silvio Pettrossi" in Asunción and "Guaraní" in Ciudad del Este. Also, there are 9 national airports. The IATA Operational Safety Audit (IOSA) registered airlines for Paraguay are "Transportes Aereos del Mercosur S.A" (LATAM Airlines Paraguay) and "Compañía de Aviación Paraguaya S.A.- Paranaair" (ICAO API Data Service). Foreign airlines that also serve the country are Aerolineas Argentinas, Air Europa, Amazonas, Avianca Taca, Copa Airlines, Flybondi, and VRG/Gol (Anuario Estadístico 2018, DGEEC).

Table 6 below shows the aircraft departures and transport volumes for scheduled international flights, for TAM Mercosur (LATAM Airlines Paraguay) and Paranaair. The figures show the clear dominance of TAM Mercosur in terms of departures, passengers and freight. Paranaair is a small airline with four fixed destinations and three additional ones for summer, while its counterpart is one of the largest multinational airlines in LAC with subsidiaries in various other countries. Considering this difference, Paranaair departures in 2018 are remarkable (4 745) surpassing those of TAM Mercosur (4 215); however, the passengers mobilized and PLF were considerably low, pointing to smaller and emptier flights than TAM Mercosur (ICAO Data Solutions Air Carrier Traffic, 2020).

Table 6
Annual aircraft departures and transport volumes per Paraguayan airline

Air carrier	Year	Aircraft departures	Passengers carried	Passenger load factor (percentage)	Freight tonnes carried
TAM Mercosur	2017	3 454	454 276	76.5	1 272
TAM Mercosur	2018	4 215	560 631	78.6	1 358
TAM Mercosur	2019	4 044	521 242	77.1	1 185
Paranair	2017	2 423	76 049	64.2	0
Paranair	2018	4 745	117 000	49.8	0
Paranair	2019*	1 562	42 742	27.3	0

Source: ICAO Data Solutions Air Carrier Traffic. https://data.icao.int/newDataPlus/Dataplus/App_AirCarrierTraffic.

*Data reported only for 6 months (January-June 2019).

C. Joint Infrastructure and Logistics for LLDCs

The Bi-Oceanic Railway Corridor is an international cooperation project between Peru, Bolivia, Paraguay, and Brazil to connect the Pacific and Atlantic coasts of the continent and improve transport connectivity and efficiency in the region. Thus, it would be especially beneficial for Paraguay and Bolivia. Costs are estimated between 10-14 billion dollars implying construction of 3 700 km for the desired linkages from Ilo, Peru to Santos, Brazil (Pérez and Sánchez, 2019). The dimensions for such a project pose a challenge, demanding high degree of commitment and coordination among all regional countries and potential foreign investors like China (Ibid.). Progress is being made with construction of small segments. For example, Paraguay's Ministry of Public Works announced that by the end of July 2020 would finish the road construction of 104 km in some segments on its territory (Portal Portuario). The project has great potential, but financing and coordination needs to be achieved to move forward.

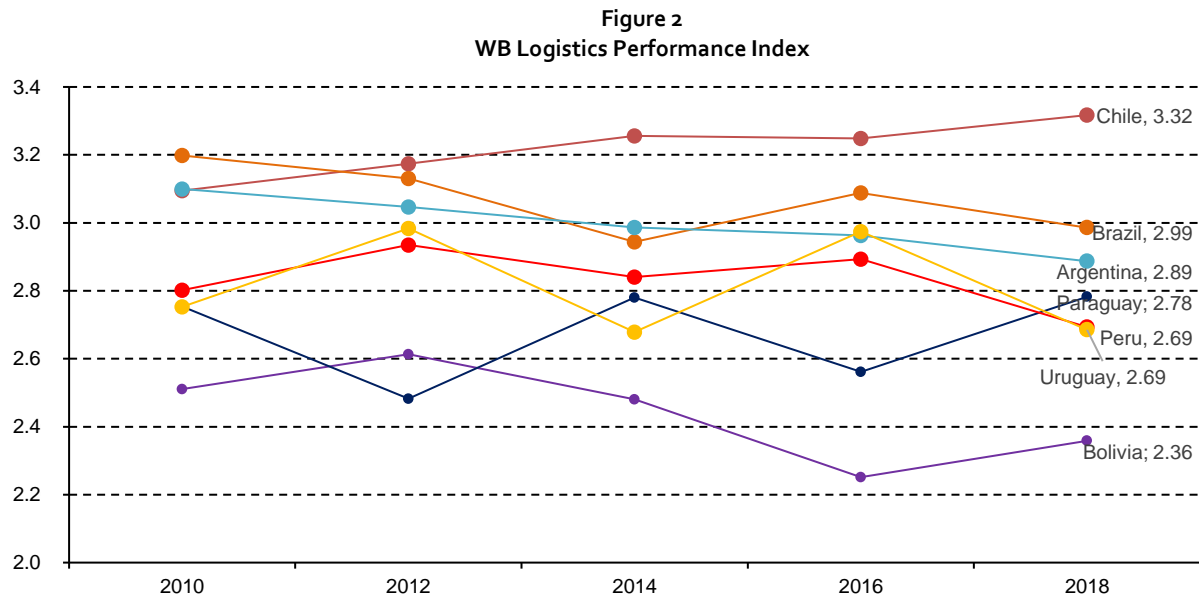
The Paraná-Paraguay Waterway (PPW) is a fluvial transit route with a total extension of 3 442 km using the two rivers that give its name. It starts in Puerto Cáceres, Brazil, in a short segment passes by the southeastern corner of Bolivia with gateways at Tamengo Canal and Busch Port, then crosses through the middle of Paraguay from Bahia Negra, Concepcion, Asuncion, to reach the Argentinian cities Corrientes, Santa Fe, Rosario, and ultimately the Plata River and open seas. There, the fluvial traffic connects to maritime inter-continental traffic from Buenos Aires and Montevideo ports. Bolivia does not count with a barge merchant fleet, so fluvial transport services are offered by Brazil and Paraguay companies that cover their own and also Bolivia's transport demands. Nonetheless, there are some navigability issues due to drought of the Paraguay River during 4 months/year which increase costs and time (Suarez, 2018).

Some important regional regulation frameworks for fluvial transport are the "Acuerdo de Transporte Fluvial de la Hidrovía" signed on March 9, 2018 in Asunción by Argentina, Bolivia, Brazil, Paraguay, and Uruguay. Its objective is to coordinate inland water transport through the agreement on free navigation and transit for signatories, equal treatment, exclusivity in cargo transport, and facilitation of transport and commerce in the PPW (CIH).

For land transport, the "Acuerdo sobre Transporte Internacional Terrestre" (ATIT), in the framework of the Latin-American Association for Integration (ALADI), was signed in 1990 by Argentina, Brazil, Bolivia, Chile, Paraguay, Perú and Uruguay. It is a comprehensive text of 64 articles outlining specific and "unique legal norms" to be applied to international road traffic and transport of goods by rail (ALADI).

D. A comparative view on Logistics Performance

World Bank's Logistics Performance Index (LPI) is a score from 1-5, "created to help countries identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve it" (WB LPI, 2020). The international LPI evaluates performance on six dimensions of trade: customs, infrastructure, ease of arranging shipments, quality of logistics services, tracking and tracing, and timeliness. Figure 2 shows the latest available scores (2018) for Bolivia, Paraguay, and their transit countries.



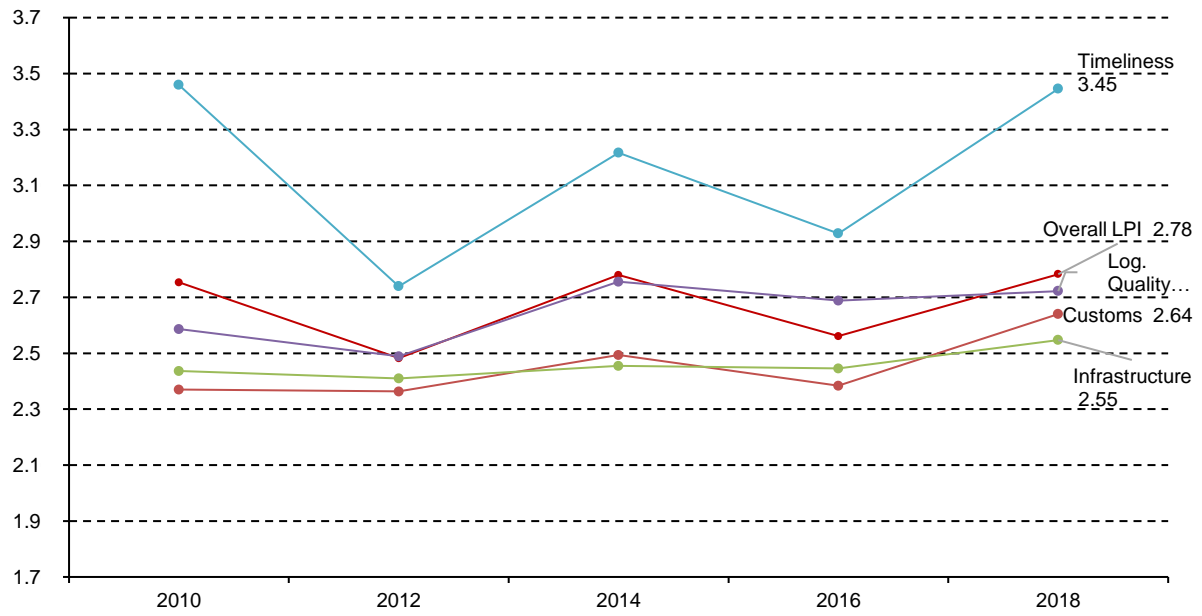
Source: Own elaboration based on data from World Banks' LPI, 2018 country score card

When logistics performance of LLDCs is compared to that of their neighbors from 2010 to 2018, Paraguay and Bolivia show the lowest indexes. Bolivia's LPI scores (purple) are the lowest during almost all the years observed, and have an overall downward trend that has resulted in its current (2018) score 2.36 being lower than in 2010. Paraguay's performance (dark blue) while along the range of Bolivia's in early years, since 2014 it has shown modest improvements to recently surpass Peru and Uruguay, whose performances, in turn, have slightly decreased. Brazil and Argentina were top performers of the group in 2010, however, both have experienced continuous decreases on LPI scores through the years. Chile, conversely, has constantly increased its LPI from an already relatively high starting position, yielding the only score of this group over 3,0 (WB LPI, 2018).

Figures 3 and 4 offer a closer look at the components of the LPI revealing some important deficiencies in LLDCs. For example, throughout the years, Bolivia's performance in Timeliness has been much higher than aspects such as Customs, Logistics Quality and Infrastructure, which weight the score down, especially in its lowest levels in 2016. Paraguay also scores constantly higher in Timeliness (3.45) but poorer in Customs processes (2.64) and Infrastructure (2.55). While some progress has been made from 2010 to 2018 in these aspects, those are still the two lowest performance indicators.

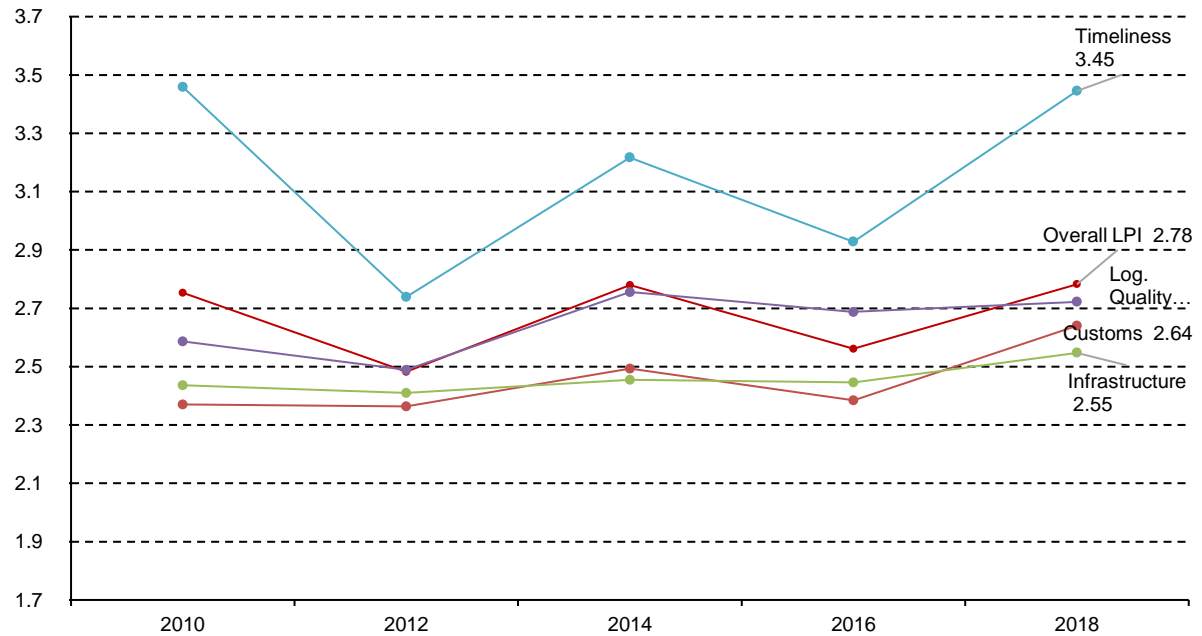
Both Bolivia and Paraguay high scores of Timeliness indicate that relative to the existent infrastructure, customs regulations, and logistics quality, they are still able to serve the industry in a competent manner. Nonetheless, improvements need to be made in the lowest performing components to increase the overall LPI score, and increase even more the Timeliness component. This would also lead to costs savings and higher levels of efficiency in the overall logistics process.

Figure 3
Components of Bolivia's LPI score



Source: Own elaboration based on data from World Bank's LPI 2018 country score card.

Figure 4
Components of Paraguay's LPI score



Source: Own elaboration based on data from World Bank's LPI 2018 country score card.

II. Measures and initial reactions

Facing the COVID-19 pandemic, international organizations have diligently issued recommendations and directives for countries, regarding health measures (WHO), customs (WCO) and trade (WTO), to try to contain the health, social and economic impact of the pandemic. In the “Updated recommendations for international traffic in relation to COVID-19 outbreak”, the WHO advises against travel or trade restrictions because those measures are usually ineffective and very costly in social and economic terms. Nonetheless, restrictions on movement of people may be useful on certain settings with few international connections and limited response capacities (WHO). Also, on April 15, the IMO/WCO issued a joint statement on the integrity of the global supply chain. It called customs administrations and governments to facilitate border movement of humanitarian aid, medical supplies, and all goods in general, to mitigate the social and economic impact of the pandemic (IMO/WCO)

Following these declarations, Latin American countries took early measures restricting movement of people (cruises and commercial flights), intensified epidemiological surveillance at border-crossing points, and took customs measures to stimulate free flow of essential goods. While restrictive national directives virtually stopped the cruise industry, ports remained open for cargo operations, but with delays due to indirect effects e.g. new protocols and availability of personnel. Cargo ships can berth and operate with health controls varying in strictness depending on national directives. Digitalization and electronic processes have been key to keep ports operating and vessels sailing (Trade News, 2020a), even though with drastic decreases in volumes.

The following sections go into more detail of the measures taken in Bolivia (Plurinational State of) and Paraguay in matters of borders and customs, and the consecutive measures adopted by airports, land transport and seaports in these countries.

A. Measures and Reactions in Bolivia (Plurinational State of)

The first registered case of COVID-19 in Bolivia was on March 11 (ECLAC COVID-19 Observatory). March 17, Supreme Decree 4196 was issued with the purpose to declare national sanitary emergency and quarantine in all the national territory. Among many dispositions, the decree declared closing of borders from March 20 to March 31. This aimed at transit of foreigners and it did not apply to repatriation cases, diplomatic missions or international organizations, and neither to international transport of freight. In the same manner, time restrictions on operations of public and private transport did not apply to transport of freight of any kind at any geographic scale, "with the aim to supply products and supplies to all the country" (Bolivia Segura).

The same decree also suspended international commercial flights, and all passenger land, fluvial and lacustrine transport at interdepartmental, interprovincial and international scales, as of March 21. Law No. 1293 of April 1 was issued through Supreme Decree 4205 "for the Prevention, Containment and Treatment of Coronavirus Infection (COVID-19)". It established general guidelines and actions from the National Government such as border and airport controls for early detection of cases, calling the deployment of armed forces to border posts and coordination with Bolivian Police and the General Directorate of Migration to enforce controls (Bolivia Segura). A few days later, an additional decree (4 206) guaranteed the provision of basic services during the state of emergency, including information and communication technology services, by prohibiting operators and providers to suspend them (Bolivia Segura).

Regarding, Bolivian Airport regulations and operations, IATA's COVID-19 Dashboard on State & Airport Restrictions reported data on restrictions for the three main airports of the country: Jorge Wilstermann International Airport in Cochabamba (ICAO code: SLCB), El Alto International Airport in La Paz (ICAO code: SLLP), and Viru Viru International Airport in Santa Cruz de la Sierra (ICAO code: SLVR). As of July 31, all airports are still closed to international flights. This restriction does not affect aircrafts in state of emergency, cargo flights, technical landings, humanitarian flights or carrying medical supplies, ambulances, repatriation flights, nor United Nations flights. Passengers on overflights are not allowed to disembark, except the crew with strict sanitary controls (IATA's COVID-19 Dashboard on State & Airport Restrictions, ICAO Global COVID-19 Airport Status).

Regarding customs, "Instructive AN-GEGPC-IN ° 009/2020" issued on March 17, the same day of the state of the emergency, sought to expedite customs processing times for medical supplies and equipment, medicines, and other related goods. Regarding relief shipments destined to the national emergency, declaration of goods will not be necessary and Customs will issue an "Administrative Resolution" to authorize its temporary entry to the country for as long as it is necessary (Aduana Nacional). On April 8, Supreme Decree 4 211, eliminated the tariffs on wheat imports for two years. Twenty days later, through Supreme Decree 4 227, the Council of Ministers did the same to tariffs on imports of certain medical supplies in an indefinite manner, and required customs release within 24 hours (Bolivia Segura).

B. Measures and Reactions in Paraguay

The first case of COVID-19 in Paraguay was reported on March 7 (ECLAC COVID-19 Observatory). On March 16, Decree 3456 declared the state of emergency in the country and called for "general preventive isolation measures" or quarantine at night (Ministry of Public Health, MSPBS). Also, decrees 3 458 and 3 465 of March 16 and 17 respectively "dispose[d] the partial and temporary closure of migratory control posts at the border", only allowing border crossing of diplomatic missions, international organizations with authorizations and nationals and residents. It also did not apply to border trade (Ministry of the Interior).

On May 1, the president announced reinforcement of military presence at the Brazilian border stating the vulnerability of contagiousness via the border (National Government Press). On that day, Paraguay had 249 confirmed cases and 9 deaths, while its giant neighbor counted 78 162 cases and 5 466 deaths (WHO). Later that month, the full closure of borders was announced from March 24-29 by the General Directorate of Migrations, and commercial and private flights were suspended from March 24-April 12. This measure was directed to the traffic of passengers, not applying to cargo aircraft, specially importing medical supplies. Also, exceptions were made for the repatriation of foreign nationals. (ECLAC COVID-19 Observatory)

Regarding airports regulations, IATA reported data for the two main airports: Silvio Pettirossi International Airport in Asuncion (ICAO airport code: SGAS), and the Guaraní International Airport in Ciudad del Este (ICAO airport code: SGES). As of July 31, all operations of commercial and general aviation flights from foreign countries are still prohibited; foreign flights for repatriation purposes, cargo and emergency flights, and inspection flights are authorized. Technical stops for refueling are allowed but “must be requested by email specifying: operator, type of aircraft, route, number of passengers and their nationality. Authorizations will be granted exclusively for the purposes of refueling, and the airplane must continue its planned route as soon as possible” (IATA’s COVID-19 Dashboard on State & Airport Restrictions, ICAO Global COVID-19 Airport Status).

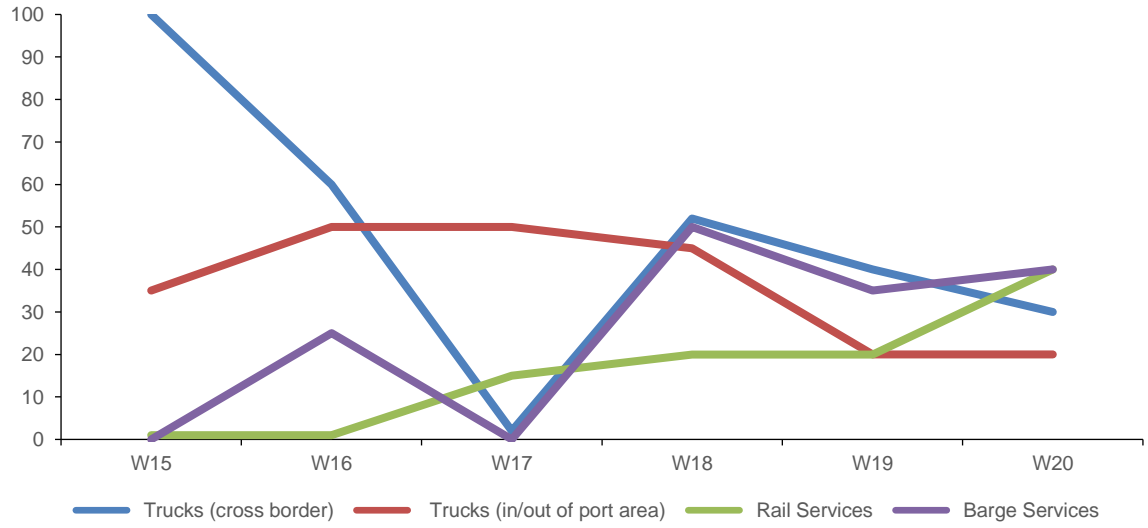
Regarding customs, there have been several decrees between March and May aiming to facilitate international trade of medical supplies, both to incentivize imports and to disincentivize exports. On one hand, there is a temporary reduction, and in some cases, temporary total suspension, of value added taxes (VAT) on certain imported personal protective equipment and pharmaceutical products. On the other hand, licenses are required to export facemasks and ethyl alcohol (WTO).

C. Restrictions of Transit Countries

Land-locked countries are additionally affected by border-crossing and port restrictions adopted by their neighboring countries. Restrictions have affected both the traffic of people and cargo. Transit countries have prohibited entrance by land of nationals of other countries in the region, including Bolivia and Paraguay. Also, the transport of cargo was allowed but only through authorized ports, airports and border points, which has delayed the entire logistics process.

Besides these restrictions, there has been a significant reduction of calls for container, Ro-Ro and break-bulk cargo vessels. When compared to global trends, “Latin American ports [are] more impacted by hinterland delays, dockworker shortages, and truck driver availability”, than any other region. There was a 33% increase in reported delays on trucks crossing borders and 20% increase in the trucks in/out of ports; however, the highest increases in reported delays were 40% in both rail and inland barge services (Figure 5, WPSP-IAPH Week 20 Report). All these inland transport issues in addition to ports’ restrictions at transit countries, had drastically reduced the connectivity, efficiency, and timeliness of LLDCs commerce during COVID-19 .

Figure 5
Percentage of Central and South American ports with hinterland transport delays



Source: WPSP-IAPH Port Economic Impact Barometer Report Week 20 (Notteboom and Pallis, 2020).

III. Impact on International Connectivity in Bolivia (Plurinational State of) and Paraguay

Transport and trade logistics have been impacted drastically by COVID-19, and at the same time, it is necessary keep these networks working to overcome the crisis (Hoffmann 2020). An assessment of impact on connectivity, the backbone of transport, trade, and logistics, is therefore fundamental to identify challenges and opportunities for LLDCs for the post-Covid era.

COVID-19 impact is multi-dimensional and can be evidenced in all modes of transportation: air, sea, land, and even in digital connectivity. Impact varies by region, country, and condition. LLDCs differentiated impact is not so evident in air transport as they enjoy sovereignty on their airports. That is not the case for maritime transport. LLDCs depend on cross-border regulations of transit countries to reach and use foreign seaports, and be able to commerce with the rest of the world. As LLDCs said themselves: "dependency on transit neighbors, transport and digital connectivity, transit and cross-border trade facilitation [among others], will have a significant impact on our socio-economic development" (UN-OHRLLS, 2020)

During the COVID-19, the international community has reminded that "it is crucial to keep ships moving, ports open and cross-border and transit trade flowing" (UNCTAD), but it is easier said than done, especially for LLDCs. The following sections examine the particular challenges that LLDCs have faced due the COVID-19 's measures, and their impact on air, maritime, inland transport, and digital connectivity of Bolivia and Paraguay.

A. Air Connectivity

The impact of COVID-19 on air connectivity is unquestionably dramatic, affecting both domestic and international markets. Global passenger traffic declined -94.4% year-over-year in April, and while the COVID-19 measures were aimed to restrict movement of people and not cargo, due to indirect measures, global air freight volumes also declined by -22.6%. In LAC, the decrease in passenger traffic

was -95.8%, slightly higher than the world's average, and -44.5% in freight (-37.6% international and -61.4% domestic), substantially higher than the world's average² (ACI).

In general terms in the region, while governments adopted mobility restrictive measures in mid-March, the shocking declines were experienced in April, and a slight increase was seen in May. While passenger load factors (PLF) reached record lows for most world regions, "Asia Pacific and Latin America were the only regions to deliver a PLF above 60% in May". Also, in terms of freight, Airlines registered in LAC experienced a 22.1% decline in CTKs (cargo tonne-kilometres) in May, an improvement from the 40.7% decline in April (IATA Air Passenger and Freight Monthly Analyses, May 2020).

A starting point to evaluate the impact on air connectivity specifically in Paraguay and Bolivia is their starting positions in the global air transport network before COVID-19, which were very low. The Air Connectivity Index (ACI) from the World Bank, was created in 2011 with 2007 data. It weighted value on the number of distant connections (out of a possible 210 countries and territories), not only regional ones, and the subsequent available connections at each destination node. Bolivia ranked 185th and Paraguay 157th (Arvis and Shepherd).

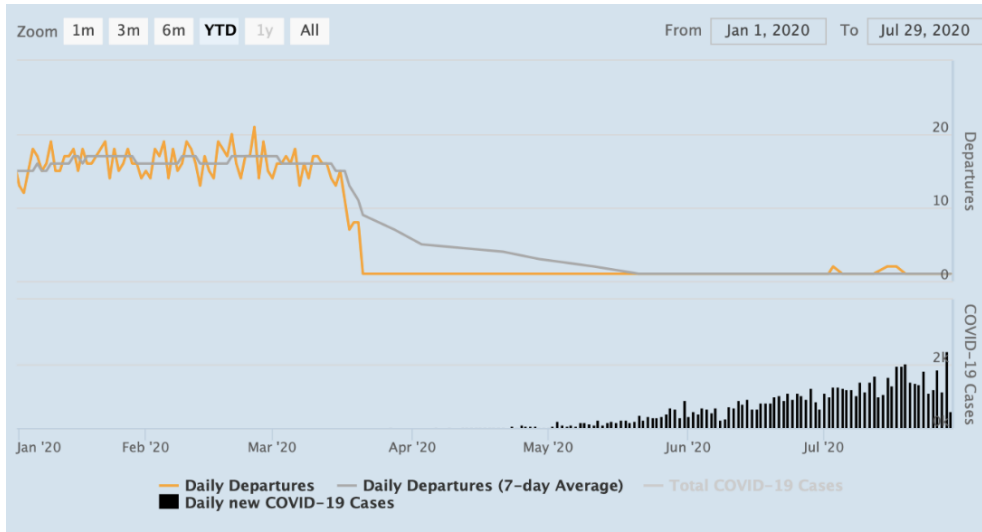
The more recent Airport Connectivity Index from the World Economic Forum (2019) shows their situation has improved, but not substantially. The index is based on available seats and the size of destination airports; therefore, it is not relative to the country's size, but calculates the score as an absolute number to compare performance at the global arena. United States is ranked 1st with a score of 100, Bolivia is ranked 105th with a score of 30, and Paraguay falls just behind ranked 119th, scoring 24.7 (WEF Global Competitiveness Report 2019).

Figures 6 and 7 below show the YTD daily number of departures in relation to the daily new COVID-19 cases in Bolivia and Paraguay. In Bolivia, the effect of COVID-19 on air transport is evident as of March 16 when the first flight cancellations took place. The International Civil Aviation Organization (ICAO) reports information for four Bolivian airports. The airport with the highest daily activity (3-4 flights) is La Paz, followed by Santa Cruz and Cochabamba with only one, and Tarija airport, in the south, reports no flights at all.

In Paraguay, commercial flights have been cancelled since March 19. The country's main airport at Asunción (Silvio Pettrossi) went from an average of 8 daily flights to only 1 in the last week of March, and none at Guaraní airport. The very few flights reported correspond to the similar exceptions that both countries have made for repatriations, cargo flights, humanitarian aid, and technical and emergency landings (ICAO). Air transport restrictions and border closures will remain in place for Bolivia until July 31, and for Paraguay measures are active without a definite end-date yet (SEGIB).

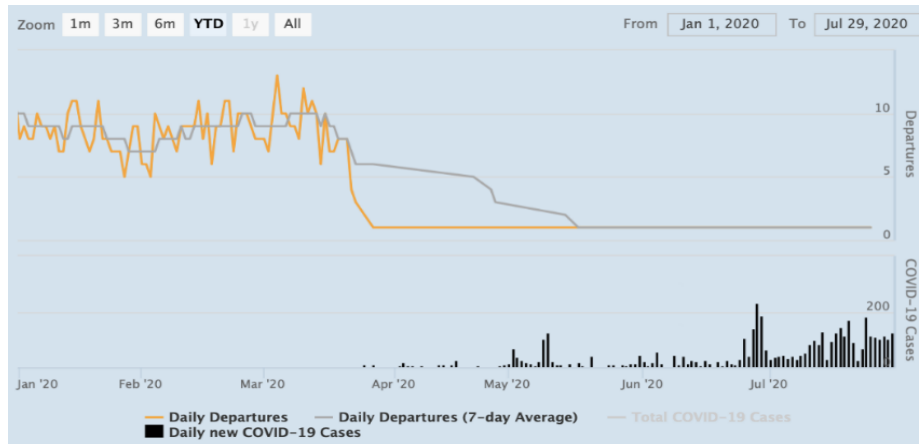
² The world average decrease in freight (-22.6%) is weighted down by the North America region, which was not as severely affected as the other world regions. North America showed a -16% international and -3.3% domestic freight, resulting in only 4.5% total decrease in freight volumes, when the rest of regions ranged between a -26% and -47% decreases (ACI).

Figure 6
YTD Daily flight departures for Bolivia



Source: ICAO Global COVID-19 Airport Status Dashboard. Updated July 31, 2020.

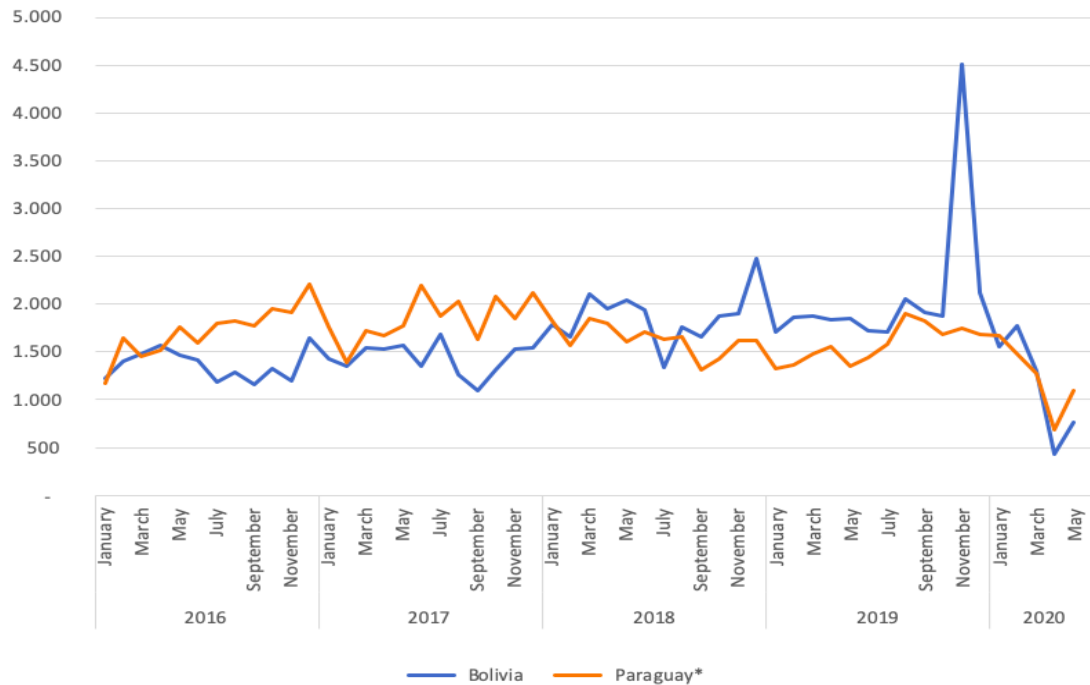
Figure 7
YTD Daily flight departures for Paraguay



Source: ICAO Global COVID-19 Airport Status Dashboard. Updated July 31, 2020.

Figure 8 below shows the monthly freight (in tons) shipped including domestic moves, imports and exports for Bolivia and Paraguay. The countries show congruent volumes oscillating in a narrow range between 1.100 – 2.400 monthly tons, due to the typical cyclical variations. Bolivia had an extraordinarily high peak in November 2019 due to higher than normal domestic freight. The following months, freight volumes suffered a negative percentage change YOY of -14% (Jan), -8% (Jan), -4% (Feb). What seemed on track to a recovery was truncated by COVID-19, and volumes decreased further to -76% YOY in April. Paraguay actually showed YOY grow rates in the first two months, to then decrease by -55% in April. Nonetheless, according to the latest data from May, volumes have recovered to 'only' show a decrease of -19%. Bolivia has shown a slight recovery, as well, going from the -76% YOY decrease in April to -55% in May.

Figure 8
Total freight moved in Bolivia and Paraguay
(Tons)



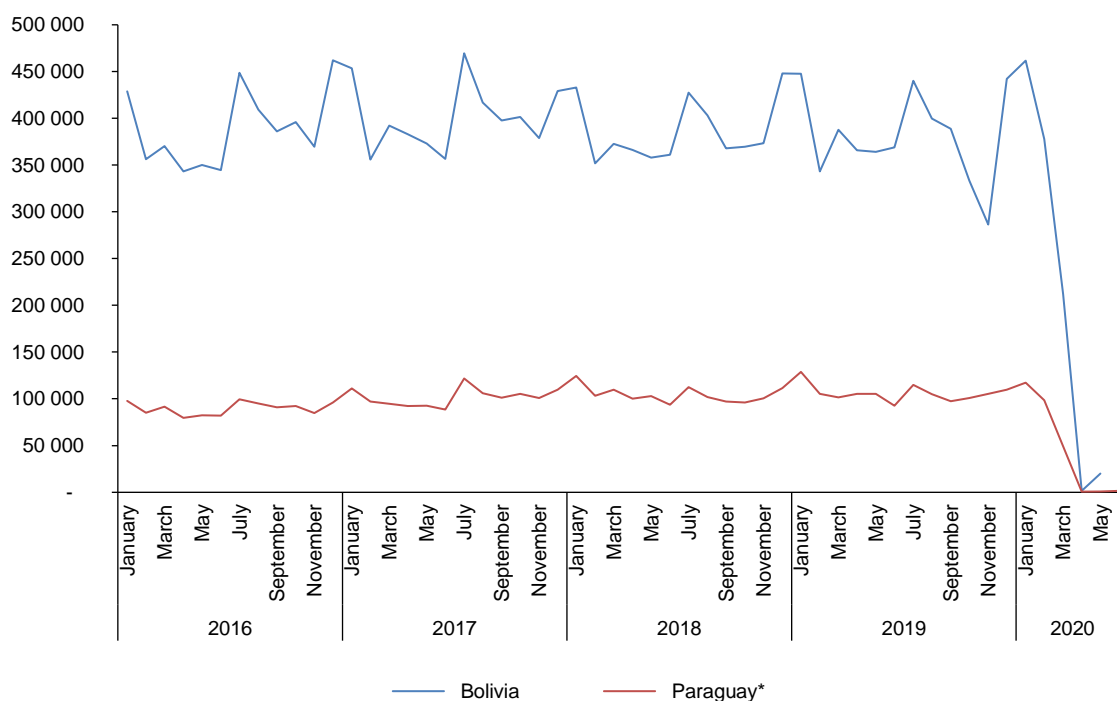
Source: Own elaborations based on data from INE (Bolivia) and DINAC and DGEEC 2018 (Paraguay).

Figure 9 below shows the monthly number of passengers (domestic and international) for both Bolivia and Paraguay from January 2016 to June 2020, the latest data available³. From 2016 to 2019, there is an evident trend of passenger peaks during holiday seasons: June-August and November-January, which is more pronounced for Bolivia, than Paraguay. The impact of COVID-19 restrictive measures during mid-March is evident. Bolivia goes from a monthly average of 389 021 passengers to 211 880 (-45.6% YOY) in March, and to 1 552 passengers (-99.6% YOY) in April. Paraguay follows a similar trend going from a monthly average of 100 477 passengers to 4 137 (-51.6% YOY) in March, and then to only 699 passengers (-99.-% YOY) in April.

For passengers, likewise freight, there is a slight sign of recovery in May. The latest data available for Paraguay shows passenger volumes increased to 871 in May and to 1 727 in June. For Bolivia, the latest data available is for May, which already showed a significant increase in passenger volume from 1 552 in April to 20 173 in May. However, 18 280 of this total traffic occurred in domestic flights while only 1 893 passengers flew in an international route. This indicates air connectivity might be reactivating for commercial flights as well, but very slowly, and domestically at a first stage.

³ Due to lack of available data, figures for Paraguay reflect volumes only at the two main airports (Silvio Pettirossi and Guarani), while Bolivian figures are for all Bolivian airports.

Figure 9
Total air passengers in Bolivia and Paraguay



Source: Own elaborations based on data from INE (Bolivia) and DINAC and DGEEC Anuario Estadístico 2018 (Paraguay).

B. Maritime (indirect) Connectivity of LLDCs: Bolivia (Plurinational State of) and Paraguay

The impact of COVID-19 is tangible at seaports. The WPSP-IAPH Port Economic Impact Barometer reports sharp decreases in cargo volumes around the world and blank sailings to reduce capacity accordingly (May 22 Report). That, followed by high volume vessel calls from accumulated cargo, put pressure on port operations and cargo flow planning (July 6 Report). Delays are reported due to several reasons. For example, road congestion for ports within city limits, especially in South America, there are strict restrictions on vessels crew changes (ibid). There are also delays due to new procedures on vessels arrivals: such as sanitary inspections, working with social distancing, special schedules, and reduction in port workers (Sabatino).

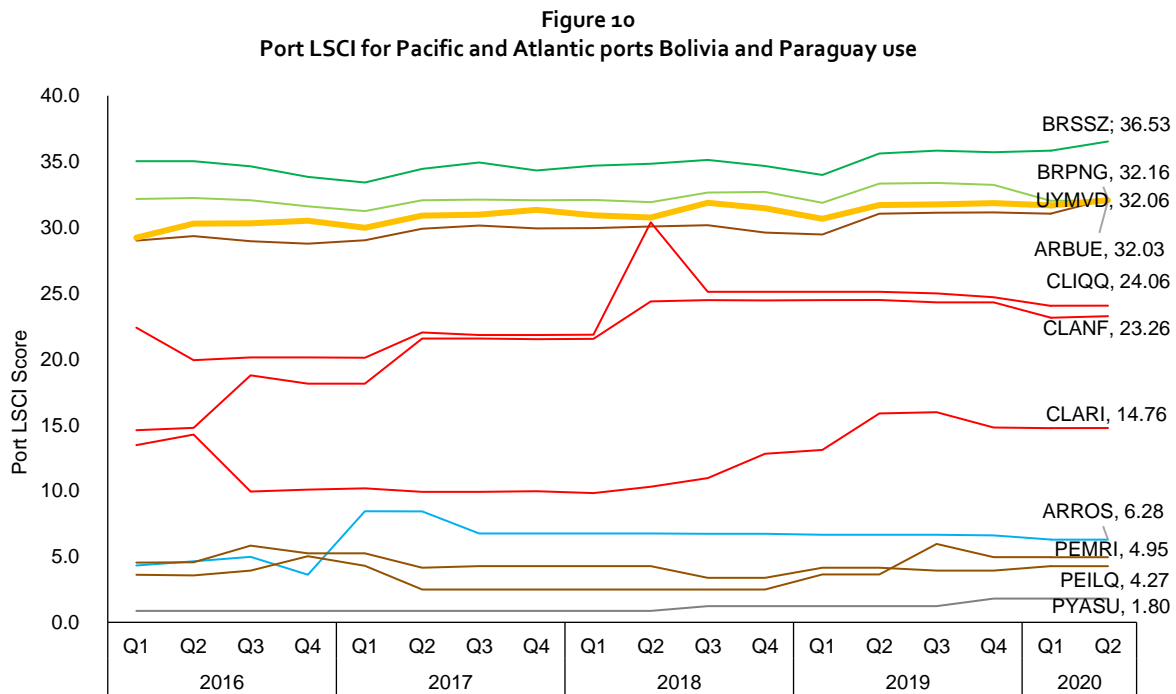
While the effects of the pandemic on ports are widely reported, it is less obvious how the impact is translated to countries without ports on their sovereign territory, but that constantly trade through ports on neighboring countries. Bolivia and Paraguay must rely on the connectivity that Peru, Chile, Argentina, Uruguay, and Brazil have developed and their internal regulations during COVID-19. To examine the impact of COVID-19 measures on maritime connectivity on these foreign ports, the Liner Shipping Connectivity Index (LSCI) is reviewed for the period before and after the start of the pandemic.

The LSCI is calculated in a quarterly basis by UNCTAD. "[It] can be jointly considered as a measure of connectivity to [the] maritime shipping [network] and as a measure of trade facilitation" (Notteboom et. al. 2020). The LSCI components are: containership deployment per capita (number of ships) calling, TEU carrying capacity per capita, number of shipping companies, liner services and vessels per company, and the average and maximum vessels' size. The score is relative to the highest performer,

China in 2004 (LSCI = 100). Some of the most connected countries are China, Singapore, and United States. The index is calculated for country and port scales.

Therefore, the port-specific LSCI is useful to distinguish the maritime connectivity of non-capital peripheral ports, from the unified country score. This is the case of southern ports in Peru and northern ports in Chile that Bolivia uses to commerce. This index also allows to examine the specific maritime connectivity of Atlantic ports that are utilized by both Paraguay and Bolivia, such as Santos and Paranaguá in Brazil, Montevideo, Buenos Aires, and Rosario. Then, the LSCIs at country level for transit countries are examined for a comparative perspective.

Figure 10 displays the port-LSCI scores for the 10 foreign ports that Bolivia and Paraguay use in Brazil (green), Uruguay (yellow), Argentina (blue), Chile (red), and Peru (brown), as well as the information for Paraguay's own port: Asuncion (grey). Data comprehends the time period between 2016 Q1 and 2020 Q2, which contains the latest information available on fleet deployment. There is a general trend towards increasing maritime connectivity for all ports, but the LSCI tends to be rather stable through time, save particular changes in port calls, trade line rotations, or changes in vessel assignment that are manifested in sharp peaks or deepes in the graph.



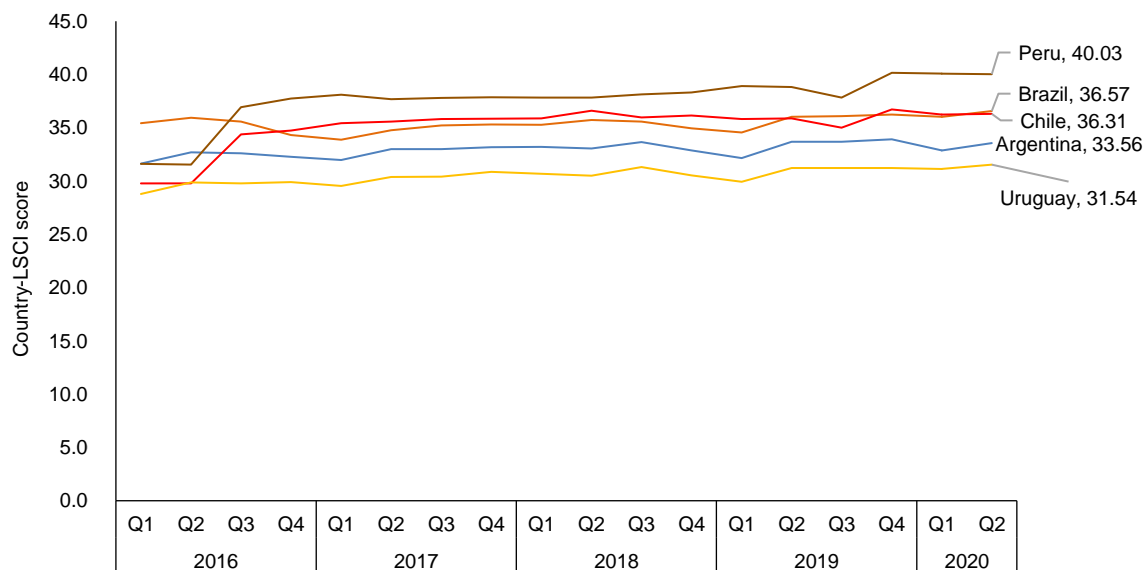
Source: Own elaboration based on data from UNCTAD Stat.

It is observed that Atlantic ports (BR, AR, UY) that are reached by the PPW and inland routes to Brazil, have higher global connectivity than Pacific ports (CL and PE). The exception is Rosario, which scores comparatively low 6.28, which might be due to the preference of large services for ARBUE instead. Northern Chilean ports: IQQ, ANF, and ARI are better connected to the rest of the world than southern Peruvian ports are (MRI and ILQ), but still much lower than the Atlantic options. The port of Asuncion (PYASU) on the Paraguay River has a port-LSCI score of 1.80 due to its regular services of containerized transport. There is not a noticeable change from the scores in 2019 compared to the first

two quarters of 2020. Scores for most seaports remained the same during the COVID-19 months, with only slight fluctuations of 1 point or less.

For comparison, Figure 11 shows the LSCI at country level to examine the evolution of global connectivity of transit countries. The graph keeps the same scale as Figure 10, to help visualize the marked difference of the global connectivity of transit countries as a whole (including other ports in their territories), vs. the connectivity of specific ports that Bolivia and Paraguay utilize.

Figure 11
Country-LSCI for LLDCs Transit Countries



Source: Own elaboration based on data from UNCTAD Stat.

As shown in Figure 11, all transit countries: Peru, Chile, Brazil, Argentina, and Uruguay have relatively high LSCI scores ranging between 30-40. It is notable how Pacific coast countries were able to increase their connectivity from the bottom-end positions to the top of the group from 2016 to 2020.

Comparing figures 10 and 11, could be observed that transit countries have an overall higher connectivity than the individual (peripheral) ports that are accessible to Bolivia and Paraguay. However, for the Atlantic coast, the differences between country and port level are not so substantial. Buenos Aires and Montevideo are capital city ports which do count with high connectivity relative to their respective countries, also Santos and Paranaguá in Brazil, count with the urban gravity of São Paulo and Curitiba respectively to position themselves in the same 30s range as Brazil's overall country score.

The most striking differences are overserved in the Pacific Coast. Peru is the country with the highest connectivity index (40.03), but the southern ports of Matarani and Ilo do not surpass an index of 5. This points out to Peruvian internal polarization concentrating most of the activity, transport, and connectivity in the port of Callao. The situation is similar in Chile. The country scores 36.31, but the northern ports of Arica, Iquique and Antofagasta range between 14-24, while the most connected ports are San Antonio and Valparaíso in the central region. Such differences in connectivity between country and peripheral ports reveal an additional disadvantage for LLDCs: i.e. besides a long inland journey to reach sea access, Bolivian exports arrive to peripheral ports with lower global connectivity than the rest of Peru or Chile.

Based on the analysis of the LSCI change (or lack thereof) during the COVID-19 months, it seems the LSCI measures “long-term connectivity” of countries and ports. This is influenced by the country’s commercial profile, but ultimately determined by shipping companies through the establishment of trade lines and rotations, and the infrastructure dedicated to service them. COVID-19 shock was sudden, drastic, but also temporary. It has interrupted the continuity of weekly vessel calls due to blank sailings and temporary changes in port calls scheduling, but it has not dismantled entire trade services nor rotations, because cargo flow must continue, even with large fluctuations and decreases in volumes.

Therefore, the LSCI does not seem to be reactive to strong, short shocks, impacting “short-term connectivity” as has been the COVID-19. This explains the long-term stability of the index and lack of visible short-term impact during the first two quarters of 2020. Nonetheless, for LLDCs during COVID-19, the main challenge was not so much a decrease in the global connectivity of seaports in neighboring countries, which seems to have been maintained, but rather on international inland transport flow. The following section places attention on such challenges.

C. Inland Connectivity of LLDCs: Bolivia (Plurinational State of) and Paraguay

LLDCs such as Bolivia and Paraguay not only rely on the maritime connectivity of ports on neighboring countries, but have the additional challenge of time, cost, and distance to reach them across international borders. The journey from inland cities to port of loadings (or vice versa) confronts physical, operational, logistical, and diplomatic barriers that have been exacerbated by the COVID-19 border closures. Even though these measures were aimed to prevent movement of people and stop the spread of the virus, there are also several negative side effects on the transport and trade flows of LLDCs that must be acknowledged.

Border closures have affected the economic and social well-being of cities and towns at border limits. In Paraguay, for example, the Ministry of Industry and Commerce (MIC) seeks to attend these localized socio-economic effects by extending social benefits to border citizens (Revista Logística del Paraguay, 2020a). The objective is to recover as many jobs as possible, promote e-commerce and provide financial aid in the form of tax assistance, extension of the Tekoporã program⁴, and help local business (ibid). However, while financial aid might mitigate short-term economic hardship, the long-term sustainability of local border economies remains based on international commercial activities.

In Bolivia, the rail sector has been severely affected as evidenced by plunges in traffic volumes. Rail transport including the Andina and Eastern networks averaged 10 829 monthly passengers in 2019. January usually experiences higher than normal passenger traffic due to holidays, however, by March there were already less than half of the usual passengers, before coming to a complete halt in April. Regarding freight, volumes for January were already lower than last years’ average and remained low for the first quarter. This cannot be said is a result of COVID-19 restrictive measures, however, the month of April, does show a decrease of -60,68% in which the situation was indeed exacerbated (INE).

⁴ The Tekoporã Program is “a social program by the ministry of Social Development for the protection and assistance to families in situation of poverty and vulnerability” (Ministry of Social Development of Paraguay).

Table 7
Bolivian passengers by road and rail, and freight by rail, 2020

Time period	Passengers by ROAD	Percentage change*	Passengers by RAIL	Percentage change*	Freight (tons) by RAIL	Percentage change*
Monthly avg. (2019)	9 115 858		10 829		262 343	
Jan-20	11 002 721	20.70	18 531	71.13	190 083	-27.54
Feb-20	10 773 181	18.18	7 210	-33.42	182 019	-30.62
Mar-20	8 626 715	-5.37	4 271	-60.56	217 141	-17.23
Apr-20	128 228	-98.59	0	-100.00	103 151	-60.68

Source: Own elaboration based on data from National Statistics Institute (INE).

Note: *Percentage change is versus monthly average (2019)

As seen in the statistics of table 7, there was a total suspension of passengers and partially of freight, keeping only the necessary personnel to serve traffic flows of national interest and strategic for the region. The international traffic for modal exchange (land and fluvial) was interrupted, and there were limitations in inter-operability with rail networks in neighboring countries, customs and phytosanitary clearance at border-crossing points. Among other effects on domestic operations, there was an increase of workers' absences, financial struggle given the additional costs, and postponement of planned investments and regional development projects (Revollo J.C., Ferroviaria Oriental 2020).

Table 7 also shows Bolivia's road transport flow of passengers. There was an average of 9 115 858 passengers/month (2019) including main and secondary roads, exits and entrances. Since 2014, the first three months of the year report traffic 20% higher than the other months. For 2020, that is the case for January and February, but March already decreases under the monthly average since movement restrictions were applied as of mid-March. April saw a drastic reduction of -98.59% from what would have been a regular month.

International road transport has been significantly affected by COVID-19 measures in neighboring countries, specially Argentina and Uruguay. For example, in early June, Gerardo Morales, governor of Jujuy Province (Argentina) asked the national government to close the border-crossing point at "La Quiaca" from Villazón, Bolivia, and "Jama" from Chile, due to increasing COVID-19 cases in both countries. The anxiety was fueled by cases of Covid-positive drivers from Peru and Brazil. The governor activated the emergency alert in Jujuy, and intensified military presence at the borders to control illegal crossing of foreigners (Infobae, 2020).

Also, in Uruguay the fear of contagion has taken the presidency to adopt stricter prevention measures through the new decree 195/2020 published on July 15, 2020 which sets new requirements for any person entering Uruguay, national or foreigner, by any means of transport, for any reason. The requisites include a sworn declaration of not having been in contact with confirmed or suspected cases, also a negative COVID-19 test result, health insurance coverage in Uruguay, and 7 days quarantine (depending on length of stay), in addition to the traditional biosafety instructions (Impo, 2020).

The Business Council of Freight Transportation by Road of Mercosur, Bolivia and Chile (CONDESUR), including several road transport federations of member states, issued a statement on July 24, rejecting the new Uruguayan decree. They responded that "some measures established will be impossible to fulfill or will make the normal continuity of the provision of international ground transportation services unfeasible, jeopardizing market supply⁵" (Condesur in Trade News, 2020b).

⁵ Translated by the author from original in Spanish.

In Bolivia, there are also domestic inefficiencies and inconsistencies that further impede the fluidity of international road transport. It was reported in June 4 that between 300-350 trucks with export cargo were parked in line at the border-crossing point of Tambo Quemado due to slowness in the Bolivian customs clearing processes (La Razon, 2020). ASOCIATRIN, the Bolivian International and National Transport Association, and the Bolivian Chamber of Transport complained these delays create huge inconveniences to reach deadlines with shipping companies in Chilean and Peruvian seaports. The transport associations argue further that the negligence is affecting, not only transport flow but also, the working conditions of truck drivers, who have to wait for hours and even days to cross the border under the cold [-3°C] temperatures (La Razon 2020, CFB 2020).

The reason for delays, these associations state, is the new reduced attention hours of Bolivian Customs under the COVID-19 emergency. "Before the quarantine, [customs] controls and procedures worked 12 hours per day, from 08:30 to 20:30, with the arrival of the virus it was adjusted from 08:30 to 15:00 and now it has been extended by one hour, from 08:30 at 16:00" (La Razon 2020). Bolivian National Customs "assures that is making an effort to expedite international transport in the border with Chile" (CFB 2020). Bolivian Customs respond that the accumulation of trucks with export cargo is due to the strict biosecurity and sanitation measures by Chilean agencies such as the Investigations Police of Chile (PDI) and the Agricultural and Livestock Service (SAG) (ibid). This shows there is an inconsistency in the exposed reasons for the delays, signifying an additional hindrance in itself to get them resolved.

The inland transport challenges of Paraguay are very similar. Commercial passenger transit is paralyzed generating massive losses for transportation companies. Even assuming a restart of services in September, losses are calculated around USD 20 million for the missed transit of approximately 370 000 passengers that usually travel between March and August. Such financial stress puts at risk the continuity of some transport companies and many jobs in the sector (Contacto News, 2020). Consequently, on July 25, the Chamber of International Road Transport (CAPATIT) and the Association of Road Carriers (ATIP) asked the national government for a plan and special fiscal considerations for the sector, placing emphasis on the passenger transport companies (ABC Noticias, 2020b).

Regarding customs, it is possible to perceive the impact of COVID-19 on customs operations. Table 8 shows the percentage change YOY for export and import customs operations during the COVID-19 months. It is visible how in April, and May to a lesser extent, exports decrease significantly, but recover in June (DNA, 2020). A national analysis attributes the perceivable recovery to the "Smart Quarantine" instituted as of May 4th that has allowed a partial reactivation of the Paraguayan exports (Revista Logística del Paraguay, 2020b). However, imports seem less reactive, as they also rely on the international panorama, and for now remain in negative figures.

Table 8
Year-on-year percentage change in Paraguay's customs operations

2020 Month	Export % change YOY	Import % change YOY
February	11.57	-5.07
March	1.33	-14.31
April	-27.76	-45.66
May	-4.82	-35.33
June	13.19	-8.01

Source: Own elaboration based on monthly statistics reports from the National Directorate of Customs, Paraguay (DNA) www.aduana.gov.py.

Regarding freight transit, the National Directorate of Transport (DINATRAN) and CAPATIT manifested their concerns about the transport restrictions encountered at border-crossing points. They state that additional costs and delays are seriously affecting the free transit of trade, especially when crossing Argentina and Uruguay (ABC TV Paraguay 2020, Dinatran 2020). For example, at the border-crossing point of Puerto Falcón with Argentina, there are extra charges such as express COVID-19 tests for drivers, and the “bromatological fee” (tasa bromatologica), which entails a superficial sanitation of freight trucks. It is contended who is responsible for the extra costs, if drivers, trucking companies, brokers, or ultimately the buyers and/or sellers. Either way, the financial burden falls on the side of the LLDC, Paraguay (Dinatran, 2020).

According to Paraguayan road transport authorities, there is also traffic congestion at border-crossing points due to reduction on truck-crossing times. “There are delays on the route to Chile via Salta”, which is considered to be a “political issue, because the [Argentine] provinces take radical positions [stricter measures] independently of directives from the [Argentine] central government” (Dinatran, 2020). Considering travel times to seaports are already extremely long, these kinds of unnecessary delays are significant for the competitiveness of Paraguayan exports in international markets.

From the Paraguayan side, truck drivers are afraid of the risk of contracting the virus in neighboring countries since they have no guarantees of protection (ABC TV Paraguay, 2020). In fact, on March 21, the Paraguayan Federation of Truck Drivers (FEDECAP), in coordination with other federations and unions called a strike for eight days arguing they are a group at risk of contagion and transmission of the virus due to their constant traveling. The association guaranteed the transport of necessities goods and fuels, but not of other commodities “that can wait, such as fertilizers and grains” (ABC Noticias, 2020a). The justification of such measure is debated, but it certainly disrupts the transit flow of commodities even more.

Notwithstanding, the fear of catching the virus originates in both sides of the border. At the Argentinian side, rejection of foreign truck drivers has even instigated discrimination. It is reported and complained by both CAPATIT and DINATRAN that “many drivers are discriminated in their work because service stations located on their routes do not allow them to load fuels, much less use toilets” (La Union 2020, Dinatran, 2020).

This points out to the growing tensions between LLDCs and transit countries during the COVID-19 pandemic. On one hand, there is the fear of contagion from foreigners or by crossing to a foreign territory, and on the other hand, there is the unquestionable need for LLDCs to keep the flow of transport and trade as fluid as possible to ensure provision of goods to their land-locked population. The key question lies on how to overcome this apparent trade-off. Trans-border transit should ensure the safety and protection of trans-border workers, and also ensure a high level of fluidity in transport flow between seaports and LLDCs.

D. ICT Connectivity

Equal access to Information and Communications Technology (ICT) is essential for the educational, commercial, and cultural development of any country. Therefore, inequalities in ICT connectivity exacerbate already existing divides. COVID-19 has clearly shown the need to bridge such gaps to protect vulnerable populations from the harshest impacts of the pandemic. A popular social media message during COVID-19 captured the importance of understanding and bridging such gaps: “we are not all in the same boat, we are in the same storm, with different boats”. The following sections seek to give an idea of the situation of each country, or of the available ‘boats’ they have to withstand the COVID-19 ‘storm’.

LLDCs face special challenges in ICT connectivity since their geographical position does not allow direct access to submarine internet cables. This handicap increases costs of internet access, both for

peering and transport, making it more difficult and costlier to deploy ICT infrastructure to serve the population, especially in remote areas.

As table 9 shows, the proportion of households that have access to internet at home is very low for both countries. In Paraguay, internet access at home is under one fourth of the total households, and in Bolivia it is under one fifth. Regarding usage, both countries reveal a predominant use of mobile phones over PCs. Also, individual usage of internet is 44.3% in Bolivia and 65% in Paraguay, considerable higher than their respective proportions of households with internet access. This points out to an important segment of the population employing public facilities such as libraries and tele-centers, or their mobile phones for internet access.

Table 9
Percentage of access and usage of ICTs in LLDCs, 2018

Country	Households with Internet access at home	Individuals usage		
		PC	Internet	Mobile
Bolivia	16.2	29.7	44.3	69.7
Paraguay	24.4	23.4	65.0	84.3

Source: Core Household Indicators. ITU World Telecommunication/ICT Indicators Database.

Another important indicator of connectivity is affordability. The ICT Price basket (IPB) is ideal to compare the affordability of mobile-voice services, mobile data and fixed broadband across countries. Table 10 shows two out of five service baskets of the index, Fixed-broadband basket of 5GB and a mobile voice and data basket. Bolivia and Paraguay have similar absolute prices for both services. In terms of their prices relative to national income per capita, Paraguay is lower by 2.6% for fixed-broadband, and by 2.7% for the mobile voice and data basket, meaning these services are generally more affordable for Paraguayans than Bolivians.

Table 10
Prices for two ICT services in LLDCs based on ITU's ICT Price Basket for 2019

Country	Fixed-broadband basket 5GB		Mobile voice and data basket*	
	USD	% of GNI p.c.	USD	% of GNI p.c.
Bolivia	21.27	7.58	15.63	5.57
Paraguay	23.55	4.98	13.61	2.87

Source: Own elaboration based on ICT Price Basket (IPB 2019) from ITU statistics.

*Mobile (low usage) voice and data basket for 70 min + 20 SMS + 500 MB

Bolivia, in particular has a limited deployment of fixed access networks, but mobile carriers have tried to expand mobile network infrastructure to different areas of the country (ITU, 2018 Bolivia Report). This is also reflected by the higher number of mobile users than PC users. Nonetheless, the services and quality provided are not uniform in all departments. The territorial unbalance does not only occur in fixed access networks, there are also urban/rural inequalities in all ICT connectivity indicators. For example, between the three departments of La Paz, Santa Cruz, and Cochabamba, they report 75.49% of the total mobile lines registered, 75.05% of internet connections, and 82.08% of fixed lines (ATT, 2019), but they host 71.5% of the national population (INE, 2019).

The Bolivian government has plans to deploy more tele-centers to the most remote areas of the country to address these unbalances. The ITU applauds and supports the plan, adding that it is necessary

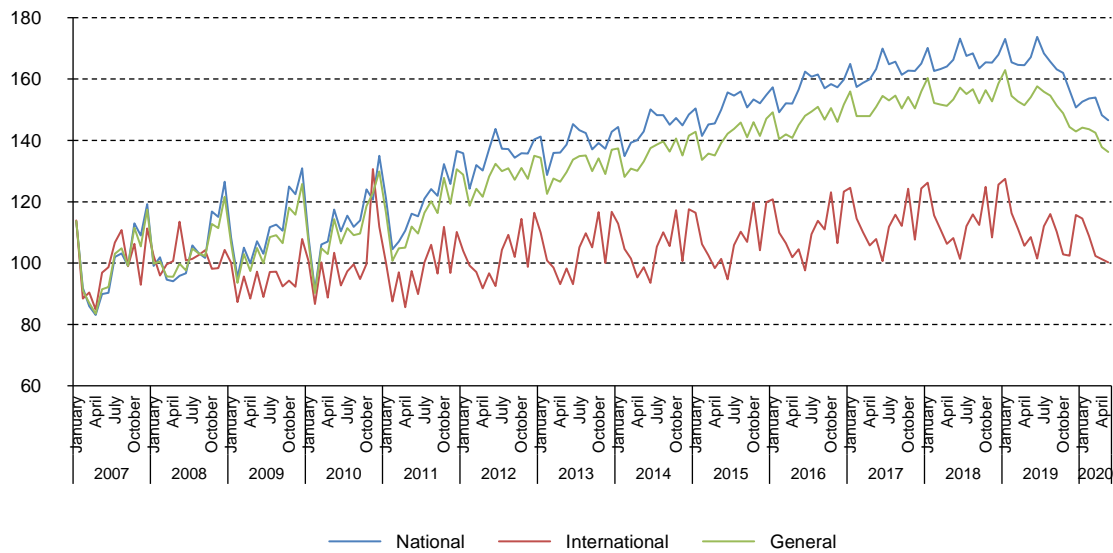
they are sustainable. For this end, the ITU suggests to “turn them into the point of distribution of all digital services, including all public and social services, like e-learning, e-health, e-government, disaster prevention, etc. and services related to the area’s economy, like agriculture and fishing” (ITU, 2018 Bolivia Report).

Paraguay shares many of Bolivia’s ICT accessibility and connectivity challenges. In addition, there is a gap in access to communication between new and old technologies. According to the 2019 DGEEC Household Permanent Survey⁶, 96.7% of households had a mobile phone, 90% a television, 73.7% radio, and 51.9% TV cable. Nonetheless, access to new technologies (for both urban and rural households), was much lower: 28.3% had access to internet, 25.1% access to a PC, and only 5.9% a tablet or similar device.

Paraguay also experiences a territorial unbalance in accessibility to ICT services. The percentage of total population that used internet in urban areas increased from 61.4% in 2015 to 77.6% in 2019, while in rural areas it went from 30.7% to 52.7% in the same period (DGEEC Household Permanent Survey, 2019). “The development of ICTs in rural and remote areas need to be an integrated part of the definition of the development of the country, with proper planning and budgeting, for them to succeed” (ITU, 2017 Paraguay Report). The ITU also points out to the institutional and regulation complexity in the governance of ICTs in Paraguay, recommending simplification where possible, and coordination between the different actors (ibid).

Given that there is more ICT data available for Bolivia for recent years and the 2020 COVID-19 months, it is possible to perform a more in-depth analysis of the case of Bolivia. The National Statistics Institute reports the “Telecommunications Quantity Index” which observes the international and national quantity of telecommunications in the country. It takes as base year 2007 (=100) to provide a comparative perspective by year and month. The graph below visualizes this quantification.

Figure 12
Bolivia's Telecommunication Quantity Index



Source: Own elaboration based on Telecommunication Quantity Index data from the National Statistics Institute (INE).

⁶ DGEEC Encuesta Permanente de Hogares (Spanish). Official survey by the Statistics branch of national government, the sample for 2019 was 1.863.684 households.

Since 2007, there is a general trend of telecommunications to increase both national and international. While both national and international had similar volumes from 2007 to 2010, there is a clear divergence in augmented national telecommunication volumes (blue) than international (red), as of 2011. The divergence continues until mid-2019, to then lower substantially in the last semester of the year. It seems COVID-19 continued this trend, and national as well as international telecommunications decreased in March, April, and May, months of quarantine restrictions.

A decrease in telecommunications quantity during quarantine months might be explained recalling that only 16.2% of households have internet access at home, but 44.3% of individuals report to use it (2018). The difference might be due to customary use of public facilities, libraries, or mobile phones to go online; possibilities of internet access that during quarantine, were not possible. This is an important difference on how quarantine is lived and perceived in Bolivia. With the impossibility to leave home to access the internet, people find themselves locked and with fewer tools and possibilities to learn, work, or be entertained than in western developed countries, with much higher rates of internet access at home.

IV. Conclusions and Contribution

A. Impact on International Connectivity of Bolivia (Plurinational State of) and Paraguay

The COVID-19 impact on international connectivity is multi-dimensional. This report examined the effect on air, sea, land, and digital connectivity of LLDCs. To start, air connectivity in the LAC region has been affected more than global averages, especially in freight (ACI). In Bolivia and Paraguay, air connectivity is deemed very low by international comparative indexes, to begin with. The external shock of COVID-19 made national governments of both countries take restrictive measures in mid-March to try to contain the spread of the virus. The effects of these measures on air connectivity can be perceived by the significant decrease in number of flight departures, and volumes of passengers and freight during the affected months.

According to ICAO, daily departures plunged on March 16 for Bolivia and on March 19 for Paraguay to only a daily flight the following months. Consequently, numbers of passengers decreased in March to about half the regular volumes, and in April almost came to a complete stop. Freight volumes were also affected significantly, -76% in Bolivia and -55% in Paraguay, for April YOY. Commercial flight restrictions continue until today, with all commercial airports virtually stopped.

Evaluating the impact of COVID-19 on international connectivity of LLDCs is more complex without (direct) maritime connectivity indicators. The task requires the evaluation of the access LLDCs have to seaports on neighboring countries and the inland road, rail, and fluvial transport networks they have to reach those ports. This study examined the Port Liner Shipping Connectivity Index (P-LSCI) for seaports that Bolivia and Paraguay use in southern Peru, northern Chile, Argentina, Uruguay and Brazil, as well as, the inland transport challenges LLDCs face to access these ports.

Results from the P-LSCI analysis showed connectivity polarization among the 11 ports under study. The Atlantic ports of Santos, Paranaguá, Montevideo, and Buenos Aires have considerably higher connectivity to the global transport network than the Pacific ports examined. Furthermore, southern Peruvian ports (Matarani and Ilo) scored substantially lower than the northern Chilean ports (Iquique,

Antofagasta, and Arica). Port-specific connectivity was also compared to country-level connectivity of transit countries. Results showed that LLDCs face an additional disadvantage, especially in the Pacific, where they reach Chilean and Peruvian peripheral, non-capital ports with considerably lower global connectivity than the rest of Chile and Peru, and lower than Atlantic capital ports. During COVID-19, the long-term connectivity, expressed in port and country level LSCIs, for these ports remained mostly stable.

Nonetheless, for Bolivia and Paraguay during COVID-19, the main challenge was not so much a decrease in the global connectivity of seaports in neighboring countries, but rather on access to them. International inland connectivity was hindered in both countries due to additional costs and time at border-crossings points, delays with customs and phytosanitary clearances, and limitations on inter-operability with road and rail networks of neighboring countries, specially Argentina and Uruguay. In Bolivia, there are also perceived domestic inefficiencies and incoherencies that exacerbate delays in customs clearance processes and add traffic congestion. There is a general fear of contagion on both sides of all borders resulting on truck drivers strikes, additional and stricter biosafety measures, and even discrimination against foreign truckers crossing transit countries. All these are serious impairments to the international connectivity of LLDCs, and their possibilities of efficient transport and trade.

LLDCs also confront difficulties to gain good-quality and affordable ICT connectivity. Due to their mediterranean condition, they lack direct access to submarine internet cables. Therefore, same as with maritime connectivity, LLDCs depend on neighboring countries for their ICT access and connectivity. Bolivia and Paraguay also face the challenge of distributing equally such connectivity within their territories. Spatial inequalities are perceived by up to a 20% difference in internet usage between urban and rural areas. Both countries also have relatively low PC usage when compared to internet and mobile phones usage.

The impact of COVID-19 in ICT connectivity of LLDCs is exemplified by the case of Bolivia. It was found that during March and April, months of quarantine, the number of telecommunications decreased. A possible explanation might be the limitations on use of public facilities or libraries to go online. This would imply that during confinement months, population without internet access at home nor at public facilities, would rely only on television or radio. This also speaks of limitations on productivity. Without internet access, households are limited in their production of information, stagnating academic and business outputs.

B. Implications for Transport and Trade

The COVID-19 pandemic has sparked a series of global, simultaneous and radical measures to prevent the spread of the virus by drastically reducing movement of people. International organizations such as WTO, UNCTAD, UN-OHRLS and UN-ECLAC have underlined the importance of international cargo flow and trade facilitation to ensure the continuity of global supply of food, medicines, and essential goods during these critical times. For LLDCs such importance cannot be emphasized enough given their reliance on transit countries for international connectivity.

This report has investigated the effect of COVID-19 measures on the international connectivity of Bolivia and Paraguay. The results show that despite recommendations from the international community on trade facilitation, these LLDCs have suffered differentiated impacts leading to just opposite: significant disruptions in their international connectivity, with important implications for their transport and trade environments. This study has researched and evaluated several dimensions of connectivity corresponding to different means of transport. It included airport connectivity, maritime (indirect) connectivity through the seaports in neighboring countries, inland transport from LLDCs to transit countries, as well as ICT connectivity, an increasing mode of digital transport of information, goods, and services.

As seen in the conclusions, all these dimensions have been affected, although air and maritime connectivity to a lesser extent. As part of a global trend, air transport volumes of passengers plunged and cargo was affected as well. Airlines struggle financially and will require new strategies in upcoming months to regain customer trust and return to pre-Covid volumes. International connectivity of Bolivia and Paraguay through seaports in neighboring countries was examined through the port and country LSCIs. While the COVID-19 shock entailed omissions of vessels calls, blank sailings, and put pressure on port operations, the instability was short-term, and it did not dismantle already established liner shipping services. Global connectivity of transit countries and the ports LLDCs utilize seems to be entrenched. Therefore, the underlying long-term air and maritime (indirect) connectivity of LLDCs seems resilient, counting that both passenger and cargo volumes are reestablished.

Unfortunately, the same cannot be said of the COVID-19 effects on inland transport and digital connectivity of LLDCs. There are several issues reported in inland transport connectivity of both Bolivia and Paraguay. While LLDCs already have a challenge of border-crossing and transit through neighbor countries to reach sea access, these challenges were intensified by the COVID-19 measures. Transport associations from both countries report they encounter higher than 'normal' obstacles for road international transport. This includes additional border restrictions e.g. additional time and cost for inland exporters, making their products more expensive in global markets. Also, trans-border workers are subject to discrimination and uncertainty of their personal safety under unguaranteed working conditions, implicating a social problematic as well.

In terms of ICT connectivity, Bolivia and Paraguay already have a low level of internet access at home with marked rural/urban inequalities. This divide was accentuated during the COVID-19 quarantine, which further isolated people in their homes without internet access. This problematic has repercussions in multiple aspects from domestic life to the national economy. Digital exclusion accompanied by financial distress creates a downward spiral of precariousness; it denies academic and capacity building possibilities and imposes limitations on productivity.

Bolivia and Paraguay have a starting position of relative isolation due to their mediterranean condition. Additional obstacles in inland transport and ICT connectivity during COVID-19, have further limited their physical and digital connection with the rest of the world. Such limitations create a chain of obstacles in the interconnected and dependent environment of commerce.

Starting at a disadvantage and armed with a weak transport and ICT infrastructure to confront the COVID-19 pandemic, makes it much more difficult to sustain connectivity during the crisis. This, in turn, has direct implications on the free transport of goods and digital services to and from LLDCs. Obstacles in connectivity and transport, in addition to hindrances in competitiveness in international markets, obstruct the monetization of these flows hurting their local economies.

In sum, the impact of COVID-19 on the international connectivity of Bolivia and Paraguay has been overwhelming but variable in its distinct dimensions. Air and maritime connectivity show higher elasticity to the COVID-19 shock than inland transport and ICT connectivity. This is particularly important because it indicates these are the issues that must be attended in the post-COVID period: first to mitigate and recover from the social and economic impacts, and then, to transcend to a more efficient environment of commerce in the months and years to come.

The post-COVID period is an opportunity to attend these specific issues and ensure they do not solidify as a new status quo. This will avoid widening, and potentially narrowing, existent social and economic inequalities in LLDCs. The following section outlines some policy recommendations with focus on the most affected dimensions of connectivity: international inland transport, ICT connectivity and overall trade facilitation.

C. Policy Recommendation to improve international inland transport

The economist Paul Romer said that “a crisis is a terrible thing to waste” (2004), a popular phrase that gains relevance for the post-Covid times. The whole world trying to endure and surpass the devastating impacts of the pandemic, is inevitably thinking of the future. This investigation on the impact on international connectivity of LLDCs in its different dimensions have yielded multiple observations which are hardly condensable in a few pages. These are hoped to be helpful to improve transport connectivity and therefore the quality of life of the populations in Bolivia, Paraguay, and the immediate region in the upcoming post-Covid period.

To be able to learn lessons from this arduous period, the first step is to recognize that COVID-19 movement restriction measures have also raised barriers to transport flow, with side effects like additional delays and costs at border-crossing points. In the post-Covid era health protection measures are likely to be sustained, at least to some degree, which could also extend some of the issues affecting transport and trade of LLDCs. Therefore, it is imperative to reach a regional consensus on the need of LLDCs to regain normal transport flow and timely access to world gateways. Based on the consensus of this need then it is possible to unravel possibilities for action.

1. Extension of customs' border-crossing hours

The WCO Private Sector Consultative Group (PSCG) have made a series of recommendations for the WCO and its members to consider during COVID-19. They state: “carriers of all modes of transport provide essential and lifesaving services... we propose that governments recognize as ‘essential services’ carriers... staff and crews... [to ensure the continuity of] critical supply chains” (WCO PSCG, 2020). Therefore, it is recommended that the governments of Paraguay, Bolivia and their transit countries, recognize the service of cargo transportation by road or rail, an “essential service” and the speed up of international cargo transit is treated as a priority under the COVID-19 restrictions.

It is therefore specifically recommended that Customs and other National Offices returns promptly to normal operating hours , as border-crossing operations, and their personnel, should be deemed essential for national stability. Biosafety protocols, social distancing, and acceptance of electronic procedures can be adopted to ensure the safety of personnel while maintaining at least the regular schedule and avoiding delays.

It is further encouraged to evaluate in the mid-termT, the possibility of extending the work shift for border-crossing operations up to 24 hours/day, 7 days/week, so there is a truly constant and uninterrupted cargo flow. The decision should objectively weight the additional labor costs for functionaries and the safety protocols to be adopted versus the gain in trade facilitation, profits for exporters, and international competitiveness for the country. The same recommendation is made for Customs agencies of transit countries, at least for the border-crossing points with LLDCs. Inspections by Customs and other government agencies on both sides should be done in coordination and, if possible, at the same time (WCO Secretariat Note).

2. Promote a regional integration

A pandemic is such an imminent threat against national and personal health, that is natural to respond with the social distancing measures taken. Cleaning and biosecurity protocols recommended by WHO and governments must be followed to avoid the further spread of the virus. But as it is responsibility of governments to guard public health and safety, it is also their responsibility to contain the spread of massive fear and anxiety that could bring detrimental effects to society.

The document exposed some fears that could hindering the essential activities of transport and trade, and discriminating against national and foreigners truckers. Paraguayan cross-border cargo truck

drivers claimed to have experienced discrimination by local businesses in Argentinian soil, due to extreme social distancing measures that prevented them to fulfill basic needs. Therefore, a gap seems to exist between the principles of collaboration and solidarity displayed by the Argentinian government at international tables, and the radical attitudes of rejection encountered at border provinces and bordering local businesses.

It is important to be reminded that “transportation workers must cross international and local borders, [therefore] national and local entities, industry and unions, health agencies and other stakeholders must provide support without regard to their nationality or state of origin” (Rodrigue 2020), these words gain more importance under the extenuating circumstances that all countries and people at all levels are experiencing. It is therefore recommended that Argentinian public authorities from national down to municipal level:

- 1) Strengthen communication to remind the population, especially in bordering provinces, not only of safety protocols, but also of the essential activities that need to keep functioning and the special solidary treatment that is expected with the personnel that carry them out.
- 2) Use their local presence at border provinces, while to help restrict the illegal crossing of people, also to facilitate the legal crossing of cargo, and to guarantee and enforce the dignified treatment of cross-border workers.
- 3) These micro international transit issues have an inherent multilateral nature, and should not be left to the will of local businesses or local authorities. Border towns and provinces are where international relations are physically actualized, and their (human) relations should be granted the status of diplomatic matters.

Compliance could be enforced by setting a local Non-Discrimination Policy that sets reporting mechanisms that offer direct communication between cross-border workers and municipal governments in the main border towns of Paraguay and Argentina, avoiding complains being lost on high ministerial affairs. Local reports of incidents should be attended directly by local authorities following national directives and standard operating procedures. A way to prevent future discrimination issues would be to impose fines for the perpetrators.

In the same way, these recommendations should be examined by public authorities of Bolivia, Paraguay, and all other transit countries, not only Argentina, to prevent the same issue on their territories.

3. Expedite region-wide implementation of common vehicle license plates

Bolivia’s complete accession to MERCOSUR will facilitate transport and trade in the region. Significant progress has been made already by MERCOSUR member states with standardization processes such as the common vehicle license plates for vehicles circulating in the Mercosur zone. It is already utilized in Argentina, Brazil, Uruguay, and Paraguay (Mercosur, 2019). For the post-Covid period, it is therefore necessary for Mercosur national governments to:

- 1) Expedite the process of Bolivia’s accession into Mercosur
- 2) During the initial stage of integration, give priority to transport regional integration, for example by ensuring that the common license plates is one of the first policies Bolivia adopts. A strong foundation on transport facilitation and integration will subsequently facilitate trade integration (Figure 1)
- 3) National multi-level coordination is also needed within each member state to ensure municipal authorities and border provinces know, recognize and have standard operating procedures in place to expedite the crossing of Mercosur common license plates

- 4) During the post-Covid period, a series of commonly-agreed and reasonable health standards and biosafety protocols can be linked to the issuance of common plates, finding middle ground between the apparent trade-off between safety strictness and transport fluidity. Coordination and cost should be distributed between national transport authorities to avoid the burden of cost and extra procedures to be borne by they already affected small transport companies or drivers themselves.
- 5) If the adoption of common license plates is correctly communicated and implemented to police and customs agencies on the field, meaning the plates are easily recognized and prioritized at border-crossing points, it could be a significant step towards procedures standardizations to facilitate transport flow while ensuring biosafety and security for the drivers and local populations.

4. Regional Observatory of Border-crossing Transit

This study encountered various hindrances to cross-border transit of cargo and trade that have originated as side-effects of COVID-19 restrictions on movement. These issues and concerns are raised by the afflicted organizations as public memorandums and statements. Claims are often left unattended and issues unresolved amidst pointing fingers. It is therefore recommended to establish a Regional Observatory of Border-crossing Transit of goods between LLDCs and transit countries, with the idea to be a space for centralization of issues, concerns, proposals, requests, alternatives, and ideas to improve cross-border processes and operations during and after the COVID-19 period.

The Observatory should work as an open and organized platform to allow a balanced participation of all public and private relevant actors, which can raise concerns regarding border-crossing procedures, and request solutions with regional visibility. This initiative could be powered and coordinated by the Council of Transport for Trade Facilitation, a subsidiary body of ALADI, with support of other regional organizations working on physical and economic integration.

The Observatory could be an easily implemented online platform of public access that could serve as a single, centralized place to expose and seek to resolve current trans-border issues. Its nature would be (1) multilateral, with representation of LLDCs and transit countries, (2) multilevel, with entities from municipal to national level, and (3) inter-sectorial, counting with public and private actors as active participants, and one academic institution from each country to provide evidence-based recommendations and solutions.

A fruitful collaboration under the Observatory, would ideally include the following active participants from the public sector: representatives of Ministries of Transport, Commerce, and/or Foreign Affairs, border provincial and municipal governments, Customs, and national coordinators of Mercosur work sub-group (SGT) 5 on Transport. From the private sector, its desired to count with the presence of the Business Council for Road Freight Transport of Mercosur, Bolivia and Chile (Condesur), related chambers of exporters and commerce, associations of cargo transport companies, and transport unions. Lastly, the Observatory would be enriched by counting with observers from the member states' National Trade Facilitation Committees (NTFC).

COVID-19 have brought multi-directional pressures affecting all transport actors, some with seemingly conflicting interests. An Observatory on border-crossing of cargo in the region, would act as a platform for mediation and negotiation to improve trade logistics. The ideal process would be for an entity to raise a concern in a single platform that is visible to all other active participants in the region, and is of public access to ensure transparency and accountability. The submission of claims or concerns should include a specific proposed solution, request a timeframe, and a call to action. The relevant entity(ies) should then respond and resolve the issue in the deemed timely manner.

The aim is to centralize voices in one source with full visibility of current domestic and international road blocks and monitor their status. The Observatory would also promote clear, fast, and direct communication between all international transport actors encouraging efficiency and

effectiveness through mutual checks under regional exposure. Thanks to its multi-level nature, the Observatory could also help seek coherence between national-level agreements and implementation in the field at border-crossing points.

For the long term, after the COVID-19 emergency, the Observatory can evolve to acquire agency as a “Cargo Border-Crossing Facilitation” sub-work group, adopted under the existing “Trade Facilitation” work group of ALADI. This will allow the Observatory to transcend from a platform of centralization and visibility, to be integrated into an agency that can dedicate work, effort and resources towards reaching objectives specifically on improving border-crossing indicators.

ALADI already has a commitment to the “participation of the relatively less economically developed countries in the integration process”, therefore the adoption of the Observatory into a sub-work group is aligned with ALADI's commitment:

To support the regional and sub-regional projects and initiatives on physical integration that favor the relatively less economically developed countries, *especially the ones related to transport that allow Bolivia and Paraguay*, given their condition of inland countries, *to access the markets of the region in competitive conditions*. In that sense, the improvement of the current mechanisms within the region or the development of new transport agreements directed to *facilitate the free traffic* shall prevail, as well as actions and agreements on telecommunications and energy, and the deepening of the same. (ALADI Resolution 61 (XIII) from October 18, 2004 of the Council of Ministers, emphasis added)

With the power of agency, the “Cargo Border-Crossing Facilitation” sub-work group could be independent, objective, and transparent with oversight on border-crossing operations, ideally with deployment of field observers to oversight the correct and adequate implementation of diplomatic agreements at border-crossing points.

This sub-work group could be dedicated to improve trade facilitation indicators, based on border-crossing efficiency such as the Logistics Performance Index and the “Trading Across Borders” component of the “Doing Business Score” Index, for countries in the region, especially of LLDCs. This would imply concentrating on reducing time, cost and paperwork of import-export logistics. The sub-work group could also help other international and regional organizations promote inter-operability between systems, and observe working conditions of cross-border workers.

Then, this recommendation is envisioned as a two-stage solution to respond to short and long term needs of international transport. The long-term goal is the evolution of the Observatory into a sub-work group within an agency, which can be dedicated exclusively to improve cargo border-crossing operations with a regional strategy.

These multilateral regional efforts could gain support from the larger international community. For instance, the EU's regular Trade-Related Assistance to developing countries (Trade Facilitation Agreement Facility, TFAF) covers matters such as improving working methods in customs operations by reducing, simplifying and standardizing documentation, among other areas of trade facilitation (EU, 2020). EU support for trade facilitation is channeled through regional programs which during the 11th European Development Fund (2014-2020) dedicated €220m to South America, the second largest amount per region that period (EU, 2017). Therefore, there is a large potential for advancement and international collaboration in this area.

These recommendations are certainly aligned and in addition to recommendations already in place to advance the priorities of the Vienna Programme of Action in regards to international transport and connectivity. The 2019 report on the status of implementation of the VPoA, reminds that efforts still need to be made on the persistent bureaucratic structures and red tape that keep costs and processing times high for trade logistics (Perez and Sanchez, 2019). Regarding customs procedures, the Mercosur Customs Code

(Decision CMC 27/2010) that harmonizes customs rules is under congressional approvals in Paraguay and Uruguay (ibid). It is further recommended that, upon successful accession, this Customs code is treated as priority by the new Bolivian administration following the upcoming October 2020 general elections.

D. Recommendations to Improve ICT Connectivity

COVID-19 has highlighted existing differences between “haves” and “have nots” in the world in social, economic, and technological respects. It is estimated that only slightly over half (53%) of the global population is connected to the internet (O'Halloran, 2020). The other half lacks access to basic information and opportunities, which are precisely so critical during the COVID-19 pandemic and its aftermath.

The World Bank, ITU, GSMA and World Economic Forum have identified priority areas to help maintain and increase internet access beyond the COVID-19 crisis (O'Halloran, 2020). Some insights from their recommendations could be useful for Bolivia and Paraguay:

- Support digital industry supply chain by facilitating customs and logistical process, e.g. classifying network equipment as essential infrastructure.
- Ensure access to and affordability of digital services. For example, Chile’s “solidarity plan” developed from a partnership with private sector to provide affordable internet access. Other countries like Egypt have offered free SIM cards to students, and Thailand public assistance granted up to 10GB data for free to mobile users.
- From the management side, the ICT and Telecommunication Ministers should develop emergency action plans, as well as long-term strategies to increase fixed broadband access to disconnected areas

In addition to these general recommendations from the international community, the below five recommendations offer some pointers for Bolivia and Paraguay to improve ICT connectivity during and after the post-Covid times.

1. Tethering (phone-as-modem) System

As seen in table 11, both Bolivia and Paraguay have very low rates of households with internet access at home 16.2% and 24.4% respectively. However, the use of mobile phones is much higher reaching 69.7% in Bolivia and 84.3% in Paraguay (ITU, 2018). With this on mind, the option of tethering (phone-as-modem) system could be an option for households without connectivity. It is the process of sharing a mobile phone’s internet connection with a computer using a USB cable. The downfalls of this option are that data limits are usually low and the internet connection in the PC could become unstable. However, it could resolve immediate needs of households unprovided of fixed-broadband connections.

To massify this alternative, it is necessary that Ministries of Communication as well as regional and municipal public authorities negotiate with the private sector, and find the needed support. Authorities could offer public contracts in exchange of data mobile plans per household that offer special affordable rates and a decent capacity to support massive use of tethering. For these negotiations, governments can include temporary subsidies, for the subscription plans, as part of their respective packages of COVID-19 relief measures. Successful agreements have the potential to offer provision of ICT connectivity during the months impacted by COVID-19 and up to a year depending on national funds and conditions of the operators. However, as this would be a temporary measure, it would also be necessary to extend negotiations to include lowering cost and increasing coverage in the long term. To increase internet usage, the ITU also recommends to expand the quantity and quality of tele-centers, and incorporate social services and the local economy in their sustainability mechanisms (ITU 2017, 2018).

2. Standardization and Export Facilitation

For Customs, it is important to have simplified and secure procedures, not only to facilitate the trade of medical goods during a pandemic, but it should be adopted as customary practice to facilitate trade in general. The IADB highlights the importance of “Resilience and transformation of Customs during COVID-19” for example with standardization and facilitation platforms such as the Single-Window System for Trade (Corcuera-Santamaria and García Sanjinés, 2020).

Paraguay already counts with a Single-Window System or VUE “Ventanilla Unica de Exportación” to consolidate and simplify the export process. Bolivia, has not implemented its own system yet, but has had plans to do so with the “VUCE Project” during the last years (Mundo Marítimo, 2020). Then it is recommended that the Vice Ministry of Internal Trade and Exports makes the effort to give priority to this project and expedite the creation of the “VUCE” for the post-Covid period. It is important to avoid further delays and resolve current inefficiencies. This will make export processes easier, save time and help exporters be more competitive in international markets to recover from the COVID-19 impact faster.

3. Revision and update of National ICT Development Plans

Bolivia’s National Broadband Plan was formulated in February 2017 for a 4-year period. This creates the opportunity for the next plan to account for the increased connectivity needs of the post-Covid period. Bolivia’s current National Broadband Plan is well-designed and oriented, specifically for the public sector (ITU, 2018). The 2021-2024 plan would demand to focus on alliances with the private sector, and detail strategies for expansion of both infrastructure and services to reach its objectives.

It is the same case for the Paraguay’s 2016-2020 National Telecommunication Plan (ITU, 2017). The plan for the next four years should seek to attract private investments in ICT infrastructure deployment and maintenance, finding the right balance between concessions to the private sector, keeping revenues within the country and ensuring affordability of services.

It is important to acknowledge that the COVID-19 has drained financial resources for all countries, and Bolivia and Paraguay have been hit even more. The extenuating circumstances of COVID-19 will certainly deviate resources from the “transition from National Broadband Plan to Digital Societies” plans that ITU had suggested (ITU 2017, 2018). While it is the ultimate objective, the unforeseen shock and impact of COVID-19 precludes such transition in the upcoming years. Therefore, it is recommended to both countries to focus on renewing and strengthening their National Broadband Plans, and on reaching first their objectives of infrastructure deployment and coverage. This will allow a substantive basis to construct a digital society in subsequent years.

4. Promote Public Private Partnerships

The post-Covid times will demand ingenuity, flexibility, and unconventional partnerships to be able to do more with less. Alliances with the private sector have proven beneficial in many contexts helping government reach necessary investment levels and also allowing the companies to gain more market share. It will be important to nurture such alliances and look to build and keep new links with the private sector. It is also recommended for the governments of Bolivia and Paraguay to look for recovery and development resources beyond the traditional PPPs.

In this sense, the third sector has great potential with NGOs in the field of information and communication technologies for development, often abbreviated ICT4Dev. Some examples include the Swedish Program for ICT in Developing Regions (SPIDER), or Computer Aid International which has worked in Bolivia and Paraguay before, but not to its full potential. The respective Ministries of Communication could evaluate opening an area of work with full time personnel dedicated to explore new types of alliances through programs and projects in ICT4Dev either at provincial or national scale.

5. Join forces among LLDCs countries

Because Bolivia and Paraguay share many challenges, they could also share potential solutions. For example, it could serve to form a bigger market to reduce cost and improve efficiency and competitiveness (ITU 2017, 2018). This will require not only joint efforts of national governments but also of the private sector from each country to work together.

Progress has been made on the establishment of national Internet Exchange Points (PIT Bolivia and IX Paraguay). It is recommended to consider the possibility and advantages to join these IXPs for greater traffic and consolidation of operations. It would also be necessary to involve more operators to enlarge the market and reduce transmission costs (ITU 2017, 2018). ITU recommended in 2018 to “share broadband transport infrastructures throughout the territory” for greater reach in faster time (ITU, 2018). This recommendation could be expanded to sharing infrastructures throughout both countries, even thinking in the long-term possibility to create joint infrastructures for broadband transport guaranteeing good connectivity with submarine cables in both Pacific and Atlantic coasts. Bolivia and Paraguay could tap into the opportunity to improve international communications for both, given the right coordination and political will.

Bibliography

- ABC Noticias, 2020a. "Asociación de Camioneros llaman al paro para evitar propagación del COVID-19". National News ABC Color. March 21, 2020. Accessed July 27, 2020. <https://www.abc.com.py/nacionales/2020/03/21/asociacion-de-camioneros-llaman-al-paro-para-evitar-propagacion-del-COVID-19/>.
- _____. (2020b) "Transporte internacional pide un plan". National News ABC Color. July 25, 2020. Accessed July 27, 2020. <https://www.abc.com.py/nacionales/2020/07/26/transporte-internacional-pide-un-plan/>.
- ABC TV Paraguay, 2020. "Interview with CAPATIT's Vice President Ricardo Svec". Video of the interview published on YouTube Channel ABC TV Paraguay March 25, 2020. Accessed July 27, 2020. https://www.youtube.com/watch?v=MtCkio4cF_c.
- ACI – Airports Council International. "ACI World data shows dramatic impact of COVID-19 on airports". ACI Media Releases. July 3, 2020. Accessed July 14, 2020. <https://aci.aero/news/2020/07/03/aci-world-data-shows-dramatic-impact-of-COVID-19-on-airports/>.
- Aduana Nacional. "Instructivo AN-GEGPC-IN° 009/2020 Referencia Aplicación del Decreto Supremo 4192 de 16/03/2020". Medidas de Prevención y Contención para la emergencia nacional por el brote de Coronavirus (COVID-19). March 17, 2020. Accessed July 7, 2020. <https://www.aduana.gob.bo>.
- ALADI "Resolution 61 (XIII) Participation of the Relatively Less Economically Developed Countries in the Integration Process". Council of Ministers. October 18, 2004. Accessed July 30, 2020. http://www2.aladi.org/biblioteca/Publicaciones/ALADI/Consejo_de_Ministros/CM_Resoluciones/CM_RES_061_en.PDF.
- Arvis J.F and Shepherd B. 2011. The Air Connectivity Index: Measuring Integration in the Global Air Transport Network. Policy Research working paper; no. WPS 5722. World Bank <https://openknowledge.worldbank.org/handle/10986/3486>.
- ATT – Autoridad de Regulación y Fiscalización de Telecomunicaciones y Transportes. Estado Plurinacional de Bolivia. Información Estadística. Telecomunicaciones. Estadística Sectorial. Accessed July 13, 2020. <https://www.att.gob.bo/content/estad%C3%ADstica-sectorial>.
- Bolivia Segura. National Government of Bolivia Official Website for COVID-19. "Supreme Decree 4196". Published in Edition 1246NEC. Accessed July 7, 2020. <https://boliviasegura.gob.bo/archivos/4205.doc.pdf>.
- Bolivia Segura. National Government of Bolivia Official Website for COVID-19. "Supreme Decree 4205, Law No. 1293". April 1, 2020. Accessed July 7, 2020. <https://boliviasegura.gob.bo/archivos/4205.doc.pdf>.

- Bolivia Segura. National Government of Bolivia Official Website for COVID-19. "Supreme Decree 4211, April 8, 2020. Accessed July 7, 2020. <https://boliviasegura.gob.bo/archivos/4211.doc.pdf>.
- Bolivia Segura. National Government of Bolivia Official Website for COVID-19. "Supreme Decree 4227, April 28, 2020. Accessed July 7, 2020. <https://boliviasegura.gob.bo/archivos/4227.doc.pdf>.
- CFB, 2020. "Aduana asegura que hace esfuerzos para dar fluidez al transporte internacional en la frontera con Chile". Cámara Forestal de Bolivia Noticias. June 5, 2020. Accessed July 27, 2020. <https://www.cfb.org.bo/noticias/economia-comercio/aduana-asegura-que-hace-esfuerzos-para-dar-fluidez-al-transporte-internacional-en-la-frontera-con-chile.html>.
- Contacto News, 2020. "La Pandemia y sus efectos en el transporte terrestre internacional del país". Transport Section. May 22, 2020. Accessed July 27, 2020. <https://contactonews.co/noticias/8569-la-pandemia-y-sus-efectos-transporte-terrestre-internacional-del-pais>.
- Corcuera-Santamaría and García Sanjinés, 2020. "Resiliencia y transformación de las Aduanas durante el COVID-19" IADB Blog: Integración regional y acuerdos comerciales. June 16, 2020. Accessed July 16, 2020. <https://blogs.iadb.org/integracion-comercio/es/resiliencia-transformacion-aduanas-COVID-19/>.
- DGEEC- Dirección General de Estadísticas, Encuestas, y Censos del Paraguay. Anuario Estadístico 2018. Accessed July 9, 2020. <https://www.dgeec.gov.py/publication-single.php?code=MTE2>.
- _____(2020) "Encuesta Permanente de Hogares 2015-2016, Encuesta Permanente de Hogares Continua 2017-2019. Accessed July 14, 2020. <https://www.dgeec.gov.py/default.php?publicacion=9>.
- DINAC – Dirección Nacional de Aeronáutica Civil. Gobierno Nacional de la Republica del Paraguay. Accessed July 14, 2020. <http://www.dinac.gov.py>.
- DINATRAN – Dirección Nacional de Transporte. República del Paraguay. Remote interview with General Directorate of International Relations and Negotiations. July 7, 2020.
- ECLAC COVID-19 Observatory in Latin America and the Caribbean. Accessed July 6, 2020. <https://ECLACstat-prod.ECLAC.org/forms/covid-countrysheet/index.html?country=PRY>.
- ECLAC Fluvial Infrastructure. "Inland Navigation Ports: Fluvial Infrastructure of Paraguay". Maritime and Logistics Profile of Latin America and the Caribbean Repository. Accessed July 7, 2020. <http://perfil.cepal.org/en/fluvial.html>.
- ECLAC. "Joint UN call for smooth transit and transport facilitation to and from landlocked developing countries". Informative Note. June 10, 2020. Accessed on June 25, 2020. <https://www.cepal.org/es/node/51550>.
- EU, 2020. "Trade Facilitation". Taxation and Customs. Accessed July 31, 2020. https://ec.europa.eu/taxation_customs/general-information-customs/trade-facilitation_en.
- _____(2017) Accessed July 31, 2020. https://trade.ec.europa.eu/doclib/docs/2017/february/tradoc_155332.pdf.
- Hoffmann, 2020. UNCTAD – "The logistics of international trade in times of COVID-19" online presentation at Geneva Macro Labs. July 2020.
- IATA. "COVID-19 Dashboard on State & Airport Restrictions". Accessed July 8, 2020. <https://www.iata.org/en/programs/ops-infra/COVID-19-ais-restrictions/>.
- IATA - International Air Transport Association. "Air cargo improved in May, but a full recovery will take time" Air Cargo Market Analysis. May 2020. Accessed July 14, 2020.
- _____(2020) "Domestic air travel demand shows early signs of recovery" Air Passenger Market Analysis. May 2020. Accessed July 14, 2020.
- ICAO - International Civil Aviation Organization. COVID-19 Airport Status <https://www.icao.int/safety/Pages/COVID-19-Airport-Status.aspx>.
- _____(2020) Data Plus Solutions Air Carrier Traffic Module. Accessed July 25, 2020. https://data.icao.int/newDataPlus/Dataplus/App_AirCarrierTraffic.
- IMO/WCO - International Maritime Organization / World Customs Organization. "Joint statement on the integrity of the global supply chain during the COVID-19 pandemic". 15 April 2020. Accessed July 16, 2020. http://www.wcoomd.org/-/media/wco/public/global/pdf/media/important-notice/2020_04_15_wco_imo-joint-statement-on-the-integrity-of-the-global-supply-chain_en.pdf?db=web.
- IMPO, 2020. "Decreto 195/020 de la Presidencia de la Republica de Uruguay". IMPO Centro de Información Oficial. Normativa y Avisos Legales del Uruguay. Published July 21, 2020. Accessed online July 28, 2020. <https://www.impo.com.uy/bases/decretos-originales/195-2020>.
- INE – Instituto Nacional de Estadística de Bolivia. Accessed July 14, 2020. <https://www.ine.gob.bo>.

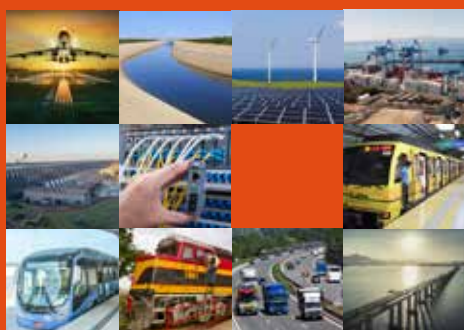
- Infobae (Dinatale, M) 2020. "Alerta máxima en la frontera de Jujuy por los brotes de coronavirus que hubo en Bolivia y Chile" Infobae Politics Section. June 17, 2020. Accessed July 28, 2020. <https://www.infobae.com/politica/2020/06/17/alerta-maxima-en-la-frontera-de-jujuy-por-los-brotes-de-coronavirus-que-hubo-en-bolivia-y-chile/>.
- ITU – International Telecommunication Union. "Core Households Indicators, 2018". ITU World Telecommunication/ICT Indicators Database. Accessed July 13, 2020. <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>.
- _____. (2018) International Telecommunication Union. "Landlocked Developing Countries (LLDCs) in The Americas Region: Connectivity Challenges and Opportunities – Bolivia Report". Telecommunication Development Sector. 2018. Accessed July 13, 2020. ISBN: 978-92-61-25711-8.
- _____. (2017) International Telecommunication Union. "Landlocked Developing Countries (LLDCs) in The Americas Region: Connectivity Challenges and Opportunities – Paraguay Report". Telecommunication Development Sector. 2017. Accessed July 13, 2020. ISBN: 978-92-61-25751-4.
- La Union, 2020. "Coronavirus: Choferes son "discriminados" en su trayecto, denuncian empresarios" La Union R800 AM Asunción, Paraguay. Published March 26, 2020. Accessed July 27, 2020 <https://www.launion.com.py/coronavirus-choferes-son-discriminados-en-su-trayecto-denuncian-empresarios-134951.html>.
- La Razon (Ariñez, R) 2020. "Transporte denuncia que trámites en Tambo Quemado siguen lentos y hay unos 300 camiones parados". La Razon News. Economics Section. June 4, 2020. Accessed July 27, 2020. <https://www.la-razon.com/economia/2020/06/04/transporte-denuncia-que-tramites-en-tambo-quemado-siguen-lentos-y-hay-unos-300-camiones-parados/>.
- MERCOSUR, 2019. "Paraguay implementará la patente MERCOSUR a partir de abril" Transporte. January 9, 2019. Accessed July 30, 2020. <https://www.mercosur.int/paraguay-implementara-la-patente-mercosur-a-partir-de-abril/>.
- Ministerio del Interior. Presidencia de la Republica del Paraguay. Decreto No. 3458 & 3465. Accessed July 7, 2020. <https://www.mspbs.gov.py/dependencias/portal/adjunto/cfeg1a-DECRETON3465.pdf>.
- Ministerio de Desarrollo Social del Paraguay. Programa Tekoporã. Accessed July 28, 2020. <https://www.mds.gov.py/index.php/programas/tekopora>.
- _____. 2020 Presidencia de la Republica del Paraguay. Decreto No. 3456. Accessed July 7, 2020. <https://www.mspbs.gov.py/dependencias/portal/adjunto/aa556a-DECRETO3456DE2020EMERGENCIA NACIONAL.pdf>.
- _____. (2020) Presidencia de la Republica del Paraguay. Ley No. 6524 "Medidas administrativas y financieras bajo la declaración de Estado de Emergencia". Accessed July 7, 2020. <https://www.mspbs.gov.py/dependencias/portal/adjunto/o8b70a-LeyN6524DeclaracinEstadodeEmergencia.pdf>.
- Mundo Marítimo, 2020. "Bolivia avanza en el proceso de implementación de la Ventanilla Única de Comercio Exterior" January 27, 2020. Accessed July 16, 2020. <https://www.mundomaritimo.cl/noticias/bolivia-avanza-en-el-proceso-de-implementacion-de-la-ventanilla-unica-de-comercio-exterior>.
- National Government Press. Presidencia de la Republica del Paraguay. "presidente anuncia que Paraguay redoblará presencia militar en frontera con Brazil". Accessed July 7, 2020. <https://www.presidencia.gov.py/articulo/38012-presidente-anuncia-que-paraguay-redoblara-presencia-militar-en-frontera-con-Brazil.html#.XwQxri17HOQ>.
- Notteboom, Pallis and Rodrigue (2020) "Port Economics, Management and Policy", New York: Routledge. Forthcoming. Accessed online on June 29, 2020. https://porteconomicsmanagement.org/?page_id=1633.
- O'Halloran D. 2020. "5 Ways to Protect Critical Digital Connectivity During COVID-19". Shaping the Future of Digital Economy and New Value Creation, World Economic Forum. Forbes. April 16, 2020. Accessed July 30, 2020. <https://www.forbes.com/sites/worldeconomicforum/2020/04/16/5-ways-to-protect-critical-digital-connectivity-during-COVID-19/>.
- Planzer and Perez, 2019. "Airport infrastructure in Latin America and the Caribbean". Facilitation of Transport and Trade in Latin America and the Caribbean, Bulletin 370. (Number 2. ISSN: 1564-4243). Santiago, Economic Commission for Latin America and the Caribbean (UN-ECLAC).
- Perez, 2020. "Caminos rurales: vías claves para la producción, la conectividad y el desarrollo territorial". Facilitation of Transport and Trade in Latin America and the Caribbean. Bulletin 377. (Number 1. ISSN: 1564-4227) Santiago, Economic Commission for Latin America and the Caribbean (UN-ECLAC).

- Pérez and Sánchez, 2019. "Status of implementation in South America of the Vienna Programme of Action form Landlocked Developing Countries for the Decade 2014-2024". International Trade Series, No. 146 (LC/TS.2019/85), Santiago, Economic Commission for Latin America and the Caribbean (UN-ECLAC).
- Pérez, Sánchez and Cipoletta, 2010. "Políticas integradas de infraestructura, transporte y logística: experiencias internacionales y propuestas iniciales". Natural Resources and Infrastructure Series, No. 146 (E/LC(05)/R294/no.150), Santiago, Economic Commission for Latin America and the Caribbean (UN-ECLAC).
- Revista Logística del Paraguay S.R.L, 2020a. "El Ministerio de Industria y Comercio MIC impulsa soluciones adaptadas para ciudades fronterizas afectadas por la drástica reducción de la actividad comercial" Noticias Nacionales. June 4, 2020. Accessed July 28, 2020. <https://revistalogisticaparaguay.com/paraguay-el-ministerio-de-industria-y-comercio-mic-impulsa-soluciones-adaptadas-para-ciudades-fronterizas-afectadas-por-la-drastica-reduccion-de-la-actividad-comercial/>.
- Revollo J.C. 2020. "Impact and adaptation of the Latin American rails to COVID-19: The case of Ferroviaria Oriental (Bolivia)" Presentation by Juan Carlos Revollo, General Manager at virtual conference hosted by International Union of Railways (UIC) and the Latin American Association of Rails (ALAF). July 6, 2020. Available at: https://uic.org/events/IMG/pdf/20200706_part_2.pdf.
- Rodrigue J.P 2020, "The Geography of Transport Systems". New York: Routledge, 5th edition. 456 pages. ISBN 978-0-367-36463-2. Accessed online on July 31, 2020. https://transportgeography.org/?page_id=8869
- Sabatino J.A. "Los puertos frente al COVID-19". Asociación Venezolana de Derecho Marítimo (AVDM)-Comité Marítimo Internacional. <https://www.avdm-cmi.com>.
- SEGIB – Iberoamerican General Secretary. "Iberoamerica facing COVID-19" Summary of measures taken by each country. March 2020. Accessed June 20, 2020. <https://www.segib.org/COVID-19/>.
- Trade News (Galli, E.) 2020a. "Los contenedores no mienten: reacción de puertos, navieras y cadenas de suministros durante la pandemia" Trade News. Accessed June 28, 2020. <https://tradenews-com-ar.cdn.ampproject.org/c/s/tradenews.com.ar/los-contenedores-no-mienten-reaccion-de-puertos-navieras-y-cadenas-de-suministros-durante-la-pandemia/amp/>.
- Trade News (Galli, E.) 2020b. "Malestar del autotransporte de cargas regional con nuevos requisitos sanitarios impuestos por Uruguay". Trade News Argentina. Autotransporte. July 24, 2020. Accessed July 28, 2020. <https://tradenews.com.ar/malestar-del-autotransporte-de-cargas-regional-con-nuevos-requisitos-sanitarios-impuestos-por-uruguay-1/>.
- UN-OHRLLS, 2020. "LLDCs Statement and Call for Action on COVID-19". May 27, 2020. Accessed July 13, 2020. <http://unohrlls.org/custom-content/uploads/2020/05/LLDC-Position-Statement-COVID-19.pdf>.
- UNCTAD Stat– United Nations Conference on Trade and Development. Port and Country Liner Shipping Connectivity Index (LSCI). <https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx>.
- UNECE Observatory on Border Crossings Status due to COVID-19. Accessed July 3, 2020. <https://wiki.unecce.org/display/CTRBSBC/Observatory+on+Border+Crossings+Status+due+to+COVID-19+Home>.
- WCO - World Customs Organization COVID-19 Updates. Accessed July 7, 2020. <http://www.wcoomd.org/en/topics/facilitation/activities-and-programmes/natural-disaster/coronavirus.aspx>.
- _____ (2020) Private Sector Consultative Group (PSCG). "Comments on the Impact of the COVID-19 Crisis: Ideas for the WCO and Its Members from the WCO Private Sector Consultative Group" Statement. April 13, 2020. Accessed July 30, 2020. <http://www.wcoomd.org/en/media/newsroom/2020/april/the-private-sector-consultative-group-outlines-solutions.aspx>.
- _____ (2020) "Secretariat Note: What customs can do to mitigate the effects of the COVID-19 pandemic" May 29, 2020. Accessed July 8, 2020. http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/activities-and-programmes/natural-disaster/covid_19/covid_19-categorization-of-member-input_may-29-2020_edition-4_en.pdf?la=en.
- WEF – World Economic Forum, Klaus Schwab. "The Global Competitiveness Report 2019". Cologny/Geneva, Switzerland. ISBN-13: 978-2-940631-02-5 http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.
- WHO - World Health Organization. COVID-19 Monitoring Dashboard for Paraguay & Brazil. Accessed July 7, 2020. <https://covid19.who.int/region/amro/country/py>.

_____ "Updated WHO recommendations for international traffic in relation to COVID-19 outbreak" COVID-19 Travel Advice. February 29, 2020. Accessed July 7, 2020. <https://www.who.int/news-room/articles-detail/updated-who-recommendations-for-international-traffic-in-relation-to-COVID-19-outbreak>.
WSPSP-IAPH (Notteboom and Pallis). "COVID19 Port Economic Impact Barometer" Reports May 15, 22 and July 6, 23. <https://sustainableworldports.org/tag/covid19/>.
WTO - World Trade Organization. Annex COVID-19. Commercial Measures and measures related to commerce (May 29, 2020). Accessed July 7, 2020. https://www.wto.org/english/tratop_e/covid19_e/covid_measures_s.pdf.

Given their geographic situation, landlocked developing countries have been hit doubly hard by the cross-border processes implemented to contain the coronavirus disease (COVID-19) pandemic.

This research provides a detailed explanation of the responses to the COVID-19 pandemic in the areas of international trade and transport adopted by the Governments of the Plurinational State of Bolivia and of Paraguay to limit the effects of the pandemic on trade operations and supply chains in their countries. It also provides a set of policy recommendations to preserve and improve trade facilitation and transport connectivity with transit countries in the framework of Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014–2024.



www.cepal.org/en/topics/logistics-and-mobility



Economic Commission for Latin America and the Caribbean (ECLAC)
Comisión Económica para América Latina y el Caribe (CEPAL)
www.eclac.org



LC/TS.2020/155