NEW HORIZONS FOR PRODUCTIVE TRANSFORMATION IN THE ANDEAN REGION

GROWTH AND PRODUCTIVE TRANSITION AGENDA

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PRODUCTIVE TRANSFORMATION
IN THE ANDEAN REGION

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PROLOGUE

The Andean Region is at a time when sound decision making is essential. Following the Paris Agreement, the world has set in motion a decarbonization agenda. There are bound to be challenges in its implementation, but the world has decided to move in this direction. The region faces great challenges, yet also many opportunities. Fossil fuel-related commodities account for a quarter of the region's exports and more than 10% of the region's tax revenues. The region still has underdeveloped potential in copper, lithium and other materials; minerals necessary for this transition, which currently account for 20% of exports.

Added to this reality are the consequences of the pandemic. Beyond the high costs in terms of loss of human life and economic activity, the pandemic has also brought structural impacts. In particular, brought about it has been a turning point for digitalization and automation, to the point that an accelerated level of digital technology has been adopted in just months that under pre-pandemic conditions would have taken several years. In addition, the pandemic caused a major disruption in logistics chains worldwide, which has led to the need for their repositioning. Finally, the services sector was particularly affected by the pandemic and some of these effects will persist in the long term. This sector is the largest employer in the region, and, therefore, these shocks have significant social impacts.

These challenges come at a particular time for the Region. After growing at an average of 4.2% between 2000 and 2014, the region's growth has slowed. This growth at the beginning of the century was crucial: the Region went from 58% of the population living in poverty to a Region where 72% of the population is middle class. The long-term growth outlook for the region is 2.9%. This growth will not be enough to improve the living conditions of the population, especially in a context where, as a result of the emergence of this new middle class, the State is registering new demands and social needs that it will not be able to satisfy. Even before the pandemic, there were important social movements in the region, which need to be addressed and have been exacerbated by the current post-COVID reality.

This is not the first time in the history of the Region that the importance of productive transformation has been highlighted. It is a recurring theme in the Region's political debate. However, it could be said that this debate mainly originates from the "abundance" of primary goods in the Region and the desire to have a more diversified productive structure and to avoid the ups and downs of the commodities market. This time, the debate is imposed by external technological changes that are affecting, and will continue to affect, the products that the Region sells. Therefore, transformation becomes a necessity.

In the past, the Region has not been immune to shocks derived from external technological changes, for example: the guano crisis, the rubber crisis and more than one coffee crisis. A common element of these crises was the lack of anticipation and the important economic and social consequences generated by them. However, it should be noted that the coffee crisis at the end of the last century was handled differently by Colombia and important structural changes were produced, thanks to a coordinated effort, which indicates the importance of anticipating these transitions and not only thinking about them when in the midst of a crisis. As emphasized above, opportunities are opening up for Latin America. Unfortunately, the Region has also experienced periods of mismanaged prosperity, such as the various debt crises that followed these periods of prosperity.

For these reasons, it is essential to consider how to address the structural change that is occurring in the world and its impact on the Region. Although some of these changes occurred unexpectedly, particularly those resulting from the pandemic, an advantage is that, it was a foretold transition. Therefore, the Region can plan on how to address it. This paper by the Country Department Andean Group of the Inter-American Development Bank (IDB) seeks to contribute ideas for continued reflection.

This publication is not intended to be an exhaustive treatise on how to deal with the transition. The IDB has been making some recommendations on policy decisions to be taken in this context, as well as on the commitments made by the countries. In addition, some of the Region's think tanks have also been putting forward proposals on this transition. Therefore, what we seek to do in this paper is to complement these proposals.

This publication analyzes the sectors that may benefit or may be affected by this transition: agriculture, production chains, services, and extractive industries. The study seeks to make a proposition to generate opportunities in these sectors. It also addresses the reality of digitalization and how to take advantage of its benefits in the Region. In conclusion, a productive transition agenda is an employment agenda. However, it is important that employment be inclusive; therefore, inclusion issues are an essential part of this research study. This complements the Department's recent study on actions in cross-cutting issues (such as infrastructure, regulation, among others) that should be taken into consideration in the Region to achieve greater growth.

We hope that this will be a source of dialogue on productive transition that complements the Bank's actions to assist and collaborate with our member countries towards the achievement of a common goal.

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Country Department Andean Group

1. INTRODUCTION

THE NEW INTERNATIONAL CONTEXT: TURNING THREATS INTO OPPORTUNITIES

1.1 Transformations in the World Economy

Developed and emerging economies, as well as the international context in which they interact, have faced a series of events that have structurally and asymmetrically transformed their global production processes, leading them towards new local dynamics and commercial interaction. First, the ratification in 2021 (during the 26th Conference of Parties, COP26, on climate change held in Glasgow, Scotland) of the 2015 Paris Agreement[1] reaffirmed the global commitment to continue efforts aimed at adopting comprehensive policies on the different productive schemes to combat global warming and adapt to its effects. Added to this is the fact that the Region is immersed in an increasingly digitized and automated world, fueled not only by the emergence of new technologies but by the rearrangement of a productive structure based on the accelerated change of preexisting technologies[2]. Furthermore, the COVID-19 pandemic shock exposed global socioeconomic frailties, domestic and sectoral heterogeneities, and brought back the productivity agenda for growth[3].

In particular, the Paris Agreement and its reaffirmation in Glasgow[4] is marking an important milestone in the world's decision to review its technological and productive schemes to mitigate climate change by reducing carbon emissions into the atmosphere (decarbonization)[5]. Moreover, these efforts have been integrated into the 2030 Agenda for Sustainable Development which precisely contemplates climate action, among its 17 Development Goals, precisely contemplates climate action[6]. These actions would have substantial impacts not only on the production of energy-related commodities, but also on its trading partners and countries whose global value chains (GVC) are, directly or indirectly, linked to the main

1 The Paris Agreement is a legally binding international treaty that was adopted by 196 parties and officially signed by 175 countries on 12 December 2015, during the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change. This agreement entered into force on 4 November 2016.

2 See Bosch *et al.* (2018) for a summary of global trends, their impact on Latin American economies and labor market.

3 See Cavallo and Powell (2021) for a summary of the pandemic's impacts on Latin America.

4 The reaffirmation of the agreement in 2021, which included the world's major economies, ratified the goal of achieving so-called climate neutrality by 2050. Climate neutrality, or carbon neutrality, implies achieving a balance between the amount of greenhouse gases released into the atmosphere and the amount removed by other means.

5 To this end, it was urged that clear signals be given for the 2020-2030 decade and to limit the global average temperature increase to 1.5 degrees Celsius (2.7 degrees Fahrenheit).

6 For example, Russia and the European Union are committed to reduce their greenhouse gas emissions to 70% and 55% of 1990 levels by 2030, respectively, while the same year the United States put forward to reduce its net emissions by 50% to 52% below it 2005 levels.

implementers of change[7]. These adjustments could alter GVCs, which, while opening up opportunities – such as energy efficient machinery and equipment manufacturing and the refurbishing of infrastructure–, would also entail revising both the energy generation matrix and production processes. Even though some of these adjustments (such as in infrastructure) are labor-intensive, most productive changes involve transitions towards higher capital intensity (Abuelafia *et al.*, forthcoming; Hepburn *et al.*, 2020). Thus, keeping the climate objective alive has the challenge of achieving major improvements in energy efficiency, a revision of GVCs, the diversification of the productive structure and the expansion of the range of options that not only compensate for losses associated with the energy transition, but also yield a net benefit through operational energy savings and revenues from ecosystem services[8].

This occurs in a context where, in recent decades, automation and digitalization have been transforming the way of producing and doing business at an exponential speed. This is the result of the continuous search by companies to improve the performance and scope of their internal processes and their relationship with customers and suppliers. Meanwhile, automation has been developing a wide variety of technologies, which include robots, artificial intelligence and machine learning. Between 2005 and 2014, the stock of robots in the world increased radically, with particular emphasis in the automotive (6.019%), electronics (3.035%) and basic metals (1.172%) sectors (Carbonero *et al.*, 2020). At the same time, between 2015 and 2020, the number of worldwide industrial robot installations grew 9% per year on average (International Federation of Robotics, 2021). Furthermore, the digitalization of companies has mainly consisted of a greater adoption of Information and Communication Technologies (ICT) which facilitate their interaction with workers, customers and supply chains. Evidence of the latter is that global ICT spending grew from USD 2.6 trillion in 2005 to USD 4.2 trillion in 2021 (Statista, 2021).

Automation and digitalization pose risks and opportunities to jobs. Acemoglu (2021) points out that much of the growth experienced since 1980 to date has not been equitably exploited by the population, since it uses machines and algorithms as substitutes of the workforce, especially one with lower skill levels. Looking ahead, in the next decade, about one-third of jobs will be at risk as a result of advances in automation (World Economic Forum, 2020). For its part, while the digitalization of production processes poses risks to employment, it also creates new jobs that make use of new technologies. The strategy would be for workers displaced by the processes affected by digitalization to move over to digital technology-based activities. However, this will not be possible unless digital talent is built to make this transition feasible in an effective and timely manner.

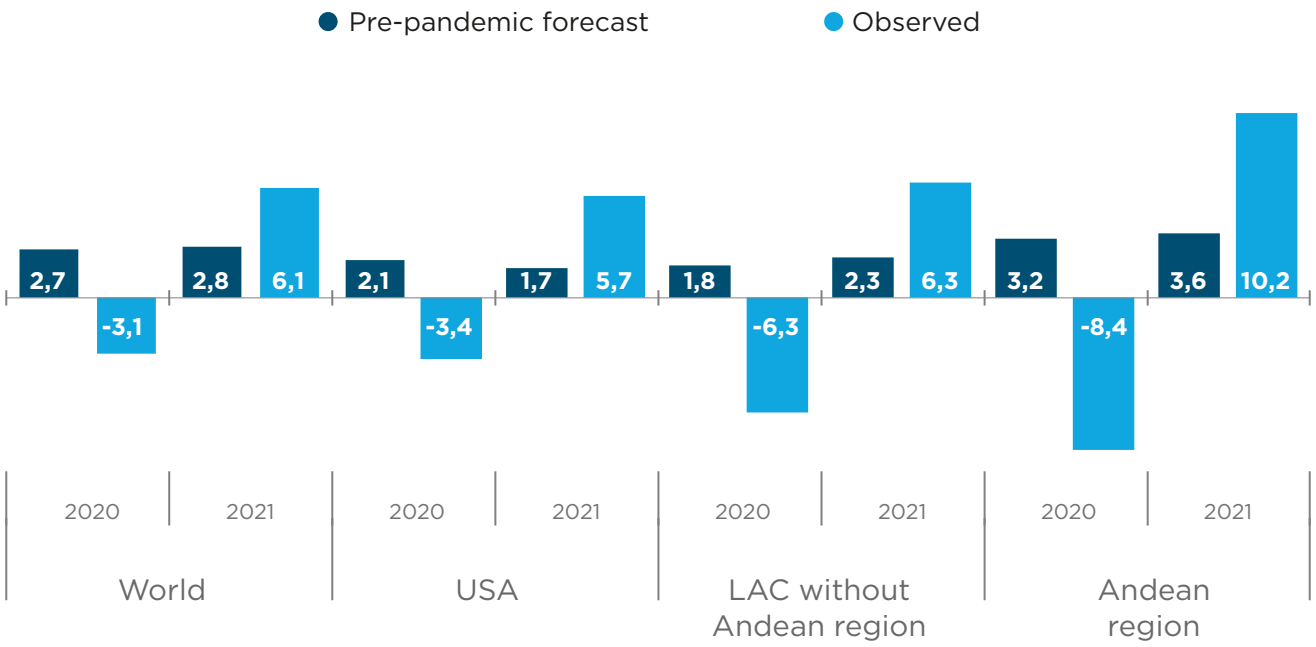
Finally, the COVID-19 crisis has been accelerating the transformation of production patterns and has generated a setback in socioeconomic indicators. Two years into the pandemic, there have been around 520 million infections and 6.3 million deaths worldwide (Our World in Data, 2022). The crisis had differing effects on countries, although they shared common international trade channels, the supply shock generated by the health restrictions established by governments and the demand shock following the sudden drop in household income. As a consequence, the world economy contracted by 3.1% in 2020

7 Recent decarbonization scenarios from the International Energy Agency (IEA, 2021) and the Organization of the Petroleum Exporting Countries (OPEC, 2022) show that renewable energy could reach 60% of primary energy sources. This will result in considerable reductions in oil, gas and coal consumption, with negative consequences on the price of these commodities. In turn, this scenario would lead to significant productive and sectoral adjustments, particularly in clean electrification, as well as in the efficiency of energy use as an industrial and household input.

8 An ecosystem is characterized by the presence of a community or group of living organisms in a given geographical area (for example, plants, animals, bacteria) that interact with each other and with non-living or abiotic components (for example, light, shade, temperature, humidity, soil, air). Ecosystem services refer to the multiple benefits that nature provides to society in terms of provisioning (supply of water, food, fuel, etc.), regulating (benefits to regulate air quality, flood control, soil fertility promotion, etc., supporting (living space for plants and animals, genetic and species diversity), and cultural (intangible benefits by serving as a source of inspiration, cultural identity and spiritual well-being).

(International Monetary Fund, 2022). Moreover, the same year, hours worked per week globally fell by 9%, while the proportion of the population employed contracted by 4% (International Labor Organization, 2022). Thus, it is estimated that in 2020 around 97 million people fell into poverty, of which 77 million correspond to extreme poverty (Gerzson *et al.*, 2021). Although the global economy rebounded and grew in 2021 by 6% (International Monetary Fund, 2022), the outlook in the near future is still far from what was observed before the pandemic and challenges persist over the medium term (see Graph 1.1). For example, the outbreak of new COVID-19 variants has prompted new sanitary restrictions, while less favorable prospects for the Chinese economy (an important trading partner of the Andean Region) raise doubts about the future economic path of the world.

Graph 1.1. Economic Growth (Percentage points)



Source: World Economic Outlook (October 2019 and April 2022) of the International Monetary Fund.
Note: Calculations for the Andean Region and Latin America and the Caribbean (LAC) without the Andean Region considered PPP weightings. This graph does not include data for Venezuela.

The environment of uncertainty has been intensified by Russia's unprovoked aggression against Ukraine. According to the Federal Reserve (2022), the war could reduce world growth by around 2 percentage points (p.p.). For Latin America and the Caribbean (LAC), this impact would be close to 4 p.p. Moreover, Russia's aggression against Ukraine has contributed to a sustained increase in international energy and food prices. The latter, along with persistent GVC disruptions, are causing high and sustained inflation pressures.

The COVID-19 shock interacted with the major trends described above, such as decarbonization. As argued by the International Energy Agency (IEA, 2021; and IEA, 2020), the world is not investing enough to meet its future energy needs, and uncertainty creates a strong risk of volatility for energy markets. In particular, investment in oil and natural gas, dragged down by the collapse of prices during the pandemic, is geared toward a world of stagnant, or even declining, demand for these fuels. However,

in the short term, oil demand has recovered its pre-pandemic level and will exceed this level by 2023. Likewise, although high prices generate incentives to reduce the consumption of these fuels, they have an impact, in the short term, on inflation and investment decisions in the sector.

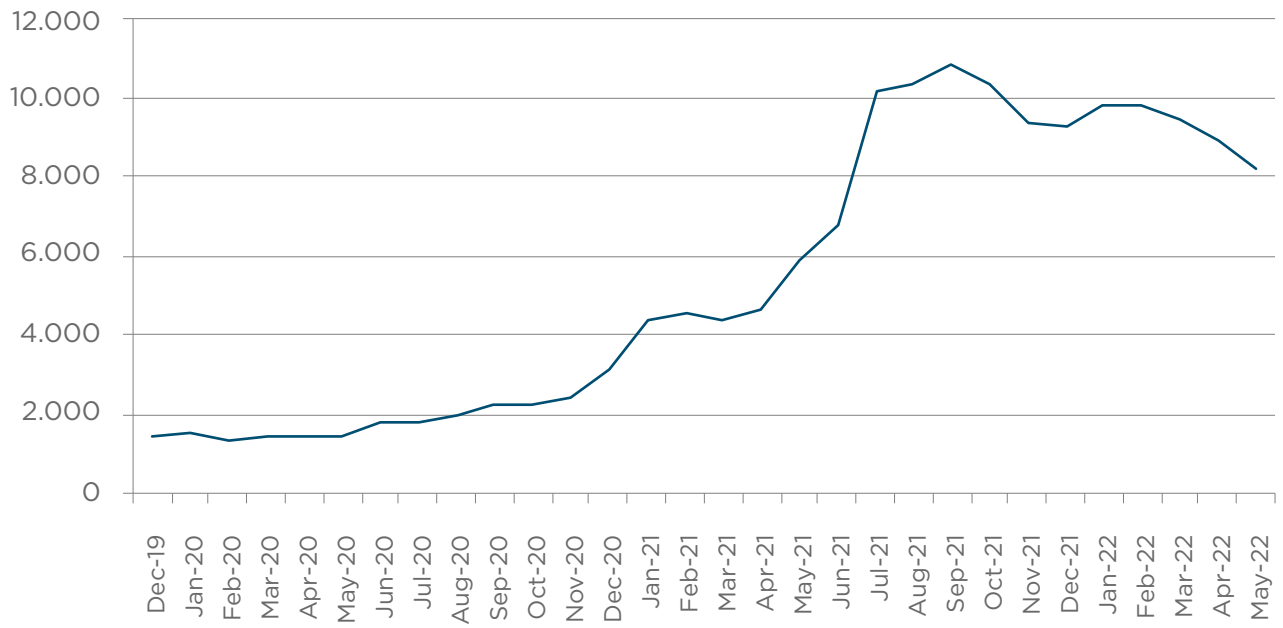
Similarly, the pandemic has marked a turning point for digitalization and automation. COVID-19 has posed an unprecedented challenge on the economic sustainability of companies and has generated radical changes in the way we live, work and consume. In particular, there is a growing preference among workers, suppliers and customers for contact-free interactions. These facts have suddenly increased the need for the greater modernization of companies, to the extent that, within a matter of months, a level of digital technology has been adopted that would have taken several years to reach if the pre-pandemic pace had been maintained (Barrero *et al.*, 2021; Henriquez and León, 2021; and McKinsey & Company, 2020). This increased technological adoption primarily took place through tools that facilitated connectivity, remote work, virtual customer service, as well as the use of advanced technologies in internal operations and decision making (McKinsey & Company, 2020).

Russia's war over Ukraine has contributed to a sustained increase in international energy and food prices

The pandemic has also caused a serious disruption to GVCs. Physical distancing and restrictions and temporary industrial and business shutdowns led to a worldwide shortage of containers, resulting in the exponential escalation of market costs for shipments from around USD 1,500 for a 40-foot container in January 2020 to more than USD 9,000 in January 2022[9]. In parallel, the international market assimilated a significant excess demand for medical products essential to alleviating the crisis, which resulted in more targeted and restrictive trade policies, while those companies highly dependent on GVCs and supply suffered an unfavorable impact on their productivity factors (Beverinotti and Deza, 2020; Beverinotti *et al.*, 2020).

9 See the Global Container Index calculated by Freightos: https://fbx.freightos.com/

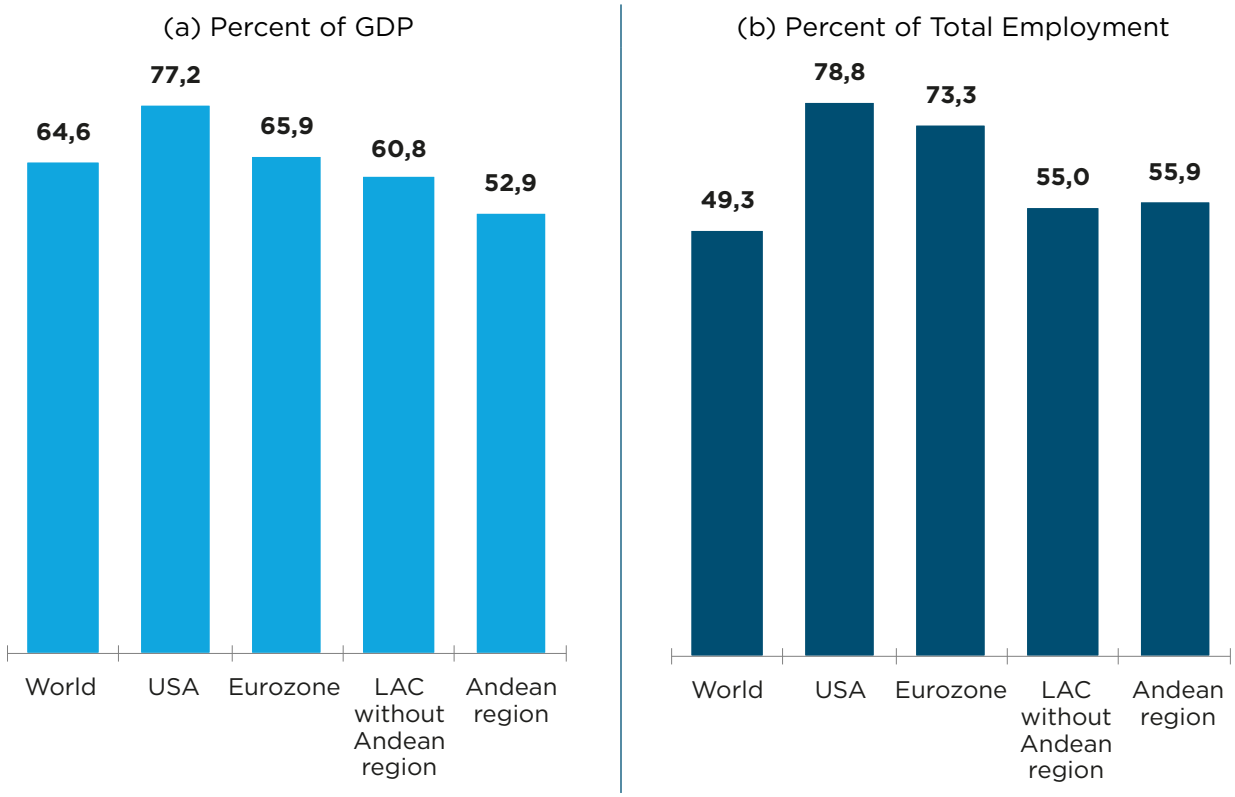
Graph 1.2. Global Container Freight Index (USD)



Source: Freightos Data.
Note: Data for May corresponds to 13 May 2022.

This whole scenario has been specifically affecting the services sector and is impacting the pace of productive transformation, which has both positive and negative impacts on employment. In 2020, the services sector accounted for approximately 65% of the world's gross domestic product (GDP), a figure similar to its share of GDP of Latin America and the Caribbean's GDP (67%), and close to 45% of employment in emerging countries. Additionally, in LAC, the domestic value added in services is relatively high, representing 92.1% of the total (Giordano and Ortiz Mendívil, 2021). Added to this, the LAC Region shows a concentration of the workforce in places with greater physical proximity (such as restaurants and retail stores), as well as greater informality with respect to the rest of the world (Salazar, 2022), which has limited the achievement of greater adaptation to telework. While some activities linked to services (such as tourism and recreation) suffered a generalized shock and almost total paralysis, progress in digitalization has caused other services sub-sectors to migrate to remote activities, as in the case of modern services exports (which, for example, grew 2% for the Andean Region during 2020).

Graph 1.3. Services Sector



Source: World Bank (2021).

Note: Data are an average of the 2015-2019 period. LAC without Andean Region and Andean Region represent simple averages of the countries that they group together. This graph does not include data for Venezuela.

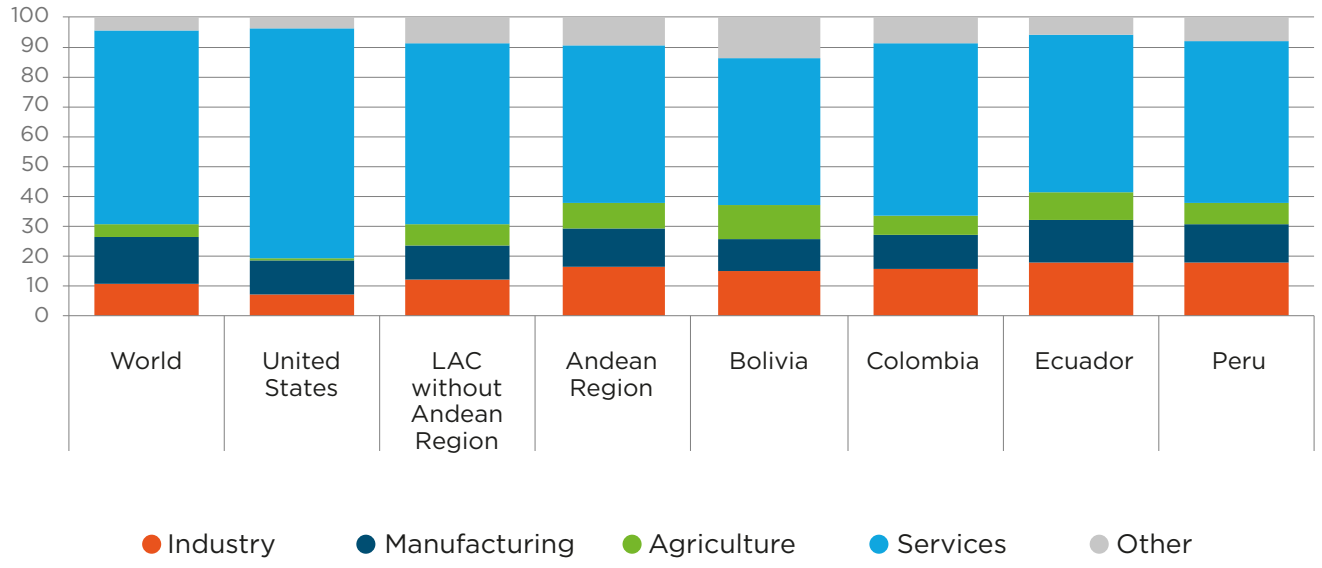
Within this context, renewed reflection is needed on the foundations that provide productive support to the countries of the Andean Region and on how policy makers can take advantage of the lessons learned from their economies to effectively insert themselves into the productive transformation underway.

1.2 The Andean Region Faces Major Production Challenges

The productive structure of LAC and the Andean Region[10] will be affected by the decarbonization trend, resulting in winning and losing sectors. According to a joint report between the Inter-American Development Bank and the International Labor Organization (IDB and ILO, 2020), at least 7.5 million jobs associated with fossil fuel extraction and fossil fuel power generation activities, as well as animal food production, are at risk of being lost by 2030. However, the net gain in jobs is estimated to double in favor of agriculture, plant-based food production, forestry, construction, manufacturing and renewable energy activities.

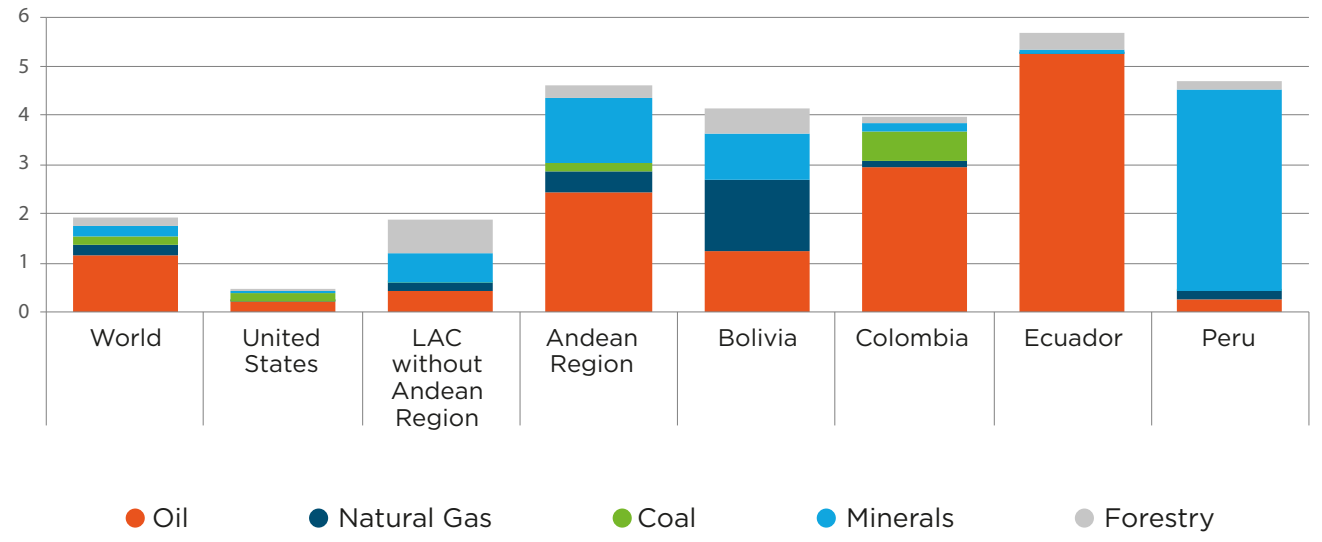
10 For the purposes of this book, the Andean Region includes Bolivia, Colombia, Ecuador, Peru and Venezuela. However, given the challenge of finding data on Venezuela, several calculations and graphs exclude this country and will be clarified accordingly.

Graph 1.4. GDP Composition by Sector (percent of GDP)



Source: World Bank (2021).
Note: Data are an average for the 2015-2019 period. The Andean Region is a simple average and does not include data for Venezuela. Industry includes mining, electricity, gas, water and construction.

Graph 1.5. Natural Resources Revenues (percent of GDP)



Source: World Bank (2021).
Note: Data are an average of the 2015-2019 period. The Andean Region is a simple average and does not include data for Venezuela.

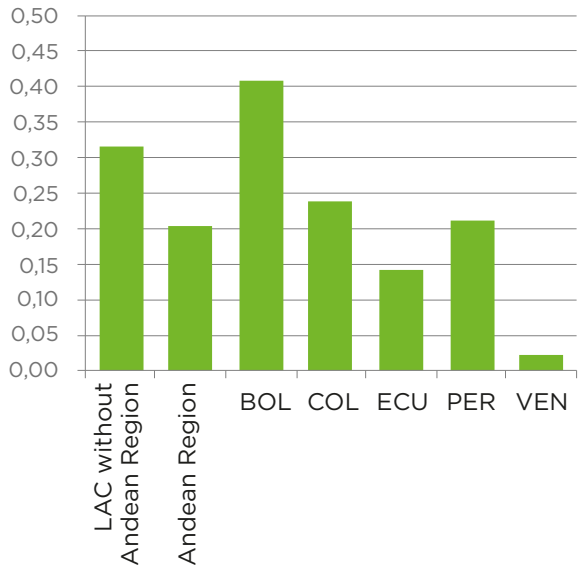
In addition, environmental pressures can also impact the winning sectors of this transformation (Andrian and Álvarez 2022). Socioeconomic conditions as well as climate change will affect future land and water use in Andean countries. Thus, the competition for water between the agriculture sector and all other sectors is likely to increase. The growth of other economic activities and urbanization will have the greatest influence on the future demand of land and water. Consequently, under different scenarios of economic growth and increased productivity for the agriculture sector, it is observed that the demand for water in non-agricultural sectors is growing faster than in the agricultural sector in Andean Region[11] countries. In turn, an increase in external demand through international trade will have an impact on land use in Colombia and Ecuador, while in Bolivia and Peru this impact will be due to an increase in local demand.

The macroeconomic performance of Andean countries is related to the international price cycle of commodity prices. According to Andrian *et al.* (2020), the Andean Region, on average, has low tax revenues and depends on revenues derived from the exploitation of raw materials, which are also the Region's export items. It will be equally important to invest in innovation and the adoption of new technologies, since they could play an essential role in promoting competitiveness and productive diversification. This generates pressures on the public and economy-wide savings-investment gaps. In this sense, the search for a sustainable development scheme poses significant fiscal and external challenges to the Region. In the current scenario, an immediate change in the energy matrix would hamper the accrual of similar tax resources from activities associated with alternative energy sources and, as expounded by Andrian and Alvarez (2022), it would appear that this is not happening at present. In the same way, export diversification is indispensable.

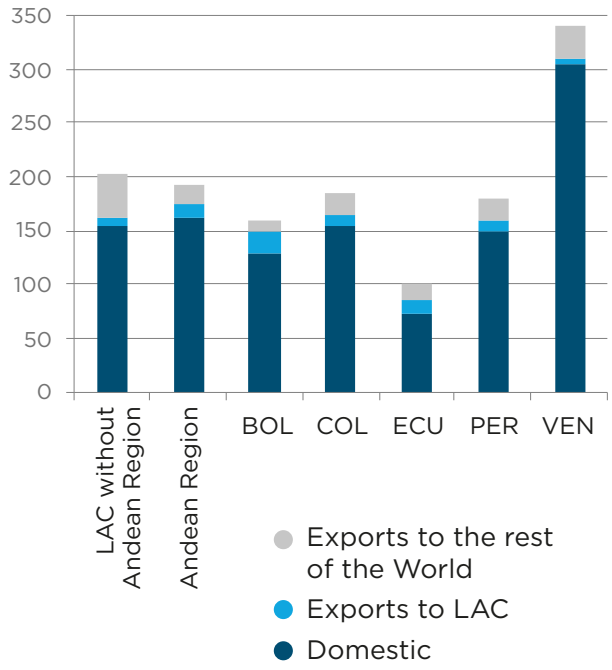
However, there are also opportunities from decarbonization. Climate course correction and the attainment of harmonized environmental policies would reduce the Andean countries' labor vulnerability in the face of adverse meteorological, hydrological, climatological and biological outcomes, which could have a favorable impact on real production. According to the IDB and ILO report (2020) , Bolivia would lose up to half a year of working-life as a result of environmental risk, while Colombia, Ecuador and Peru would lose around a fifth of a year. Furthermore, the GVC's of the Andean Region countries will have their share in the transition. According to data from the Global Trade Analysis Project (GTAP) and the IDB and ILO Report (2020), by 2014, about 17% of the Andean Region's total greenhouse gas emissions were due to its total exports. This is consistent with the weight of exports related to animal-sourced foods and non-renewable energy activities; therefore, climate action will necessarily have an impact on the Regional export structure and, consequently, on its fiscal revenues.

11 This calculation excludes Venezuela due to the lack of information.

Graph 1.6. Working-Life Years Lost due to Risks for the 2008-2015 Period (years)



Graph 1.7. CO_2 equivalent Greenhouse Gas Emissions ($MtCO_2eq$, 2014)



Source: IDB and ILOB (2020).
Note: $MtCO_2eq$ refers to millions of tons of equivalent CO_2 emissions.

In addition, there are benefits that could be reflected in cost structures. The International Renewable Energy Agency (IRENA, 2020) indicates that the average global cost of power generation from new photovoltaic plants dropped by 85% between 2010 and 2020. This situation is not foreign to the Andean Region (for example, public utilities in Peru are already acquiring solar and wind power at the lowest cost in worldwide power generation)[12]. In turn, LAC holds about 20% of the world's total forest area, 25% of the world's lands with medium to high agricultural potential and just over 30% of the world's fresh water resources (Bovarnick *et al.*, 2010; UNEP, 2010). In this way, the consolidation of robust ecosystem services[13] would substantially reduce the incidence of natural disasters, generate public savings and promote ecotourism in LAC.

Conversely, digitalization trends are affecting the Andean Region. According to the World Bank (2016), more than a quarter of working age individuals in Bolivia and Colombia cited the lack of information and telecommunications skills as a barrier to finding work. Likewise, between half and two-thirds of jobs in Ecuador are vulnerable to automation and digitalization[14]. Furthermore, there is evidence that the impacts of the pandemic observed in other countries are being replicated. In Colombia, Abuelafia *et al.* (forthcoming

12 Thus, the acquisition cost averages approximately 3 US cents per kilowatt hour compared to the benchmark cost of 5 to 18 US cents per kilowatt hour to produce electricity with coal, ore or natural gas.

13 Ecosystem services or environmental services are resources (goods and services) or processes of natural ecosystems that benefit humans. They include products such as clean drinking water and processes such as waste decomposition.

14 These results are consistent with exercises presented in Bosch *et al.* (2018).

publication) find that there is a fairly strong hysteresis phenomenon in post-pandemic telework. While, in general, Internet sales and the use of digitalization fell once the pandemic was over, telework is gaining ground and has reached higher levels than those witnessed prior to the initial shock.

The pandemic has also had an impact on the Andean economy. In just over two years, according to Our World Data, the pandemic caused around 12 million infections and 416,000 deaths in the Andean Region. Furthermore, in 2020, the shocks mentioned above had more severe repercussions on the economies of Andean countries, recording contractions of more than 6%[15]. Similarly, the Region has also observed social implications: on average, monetary poverty increased by 6.6 percentage points in 2020 and, in several countries, this resulted in a return to poverty levels that were characteristic of the first decade of the twenty-first century[16]. While the recovery of the Andean economy was remarkable in 2021, its consolidation still faces challenges[17]. In addition to the risk factors noted in the case of the recovery of the global economy, the Andean Region also faces the weakening of its public finances. The Region's public debt rose from 44% of GDP in 2019 to 55% of GDP in 2020. It should also be noted that poverty and employment have not yet recovered to their 2019 levels.

Recently, Russia's aggression against Ukraine has also had repercussions on the economies of the Andean countries. The consequences of the war between Russia and Ukraine are being felt across the world through pressures placed on international energy and food prices, disruptions in international supply chains and the increased volatility of finance markets. This further deterioration of the international environment puts pressure on countries to implement new fiscal incentives in favor of the most vulnerable households. Nonetheless, the war has also led to a rebound of international commodity prices, which could represent an opportunity for economies dependent on the exports of these resources, such as the Andean economies[18].

Given the current circumstances, not making immediate decisions on policies that address this situation may have consequences on the national income of Andean countries. The pace and dynamics of compliance with the commitments on decarbonization made by the world's countries will determine the speed at which the demand (and price) for fossil fuels will decrease. Except for Peru, which has less exposure to hydrocarbon activity, the rest of the Andean countries would have potential losses in terms of long-term GDP growth under a scenario where the decarbonization process is the result of the promises that countries have made to reduce their carbon use. As several specialized organizations argue, these promises would not lead the world to reach zero net emissions by 2050[19]. In this way, a rapid and accelerated decarbonization process– where the world would reach zero net emissions by 2050– would make Andean countries face considerable losses in their growth potential (see Graph 1.8)[20]. If the Andean

15 According to the IMF (2022), Bolivia contracted by 8.8%, Colombia by 6.8%, Ecuador by 7.8%, Peru by 11% and Venezuela by 30%.

16 Based on national lines, between 2019 and 2020, monetary poverty increased in Bolivia from 37.2% to 39%, in Colombia from 35.7% to 42.5%, in Ecuador from 25% to 33% and in Peru from 20.2% to 30.1%.

17 In 2021, Bolivia grew 6.1%, Colombia grew 10.6%, Ecuador grew 4.2% and Peru grew 13.3%. Meanwhile, according to the IMF, Venezuela would have contracted 5%, its least severe recession since 2014.

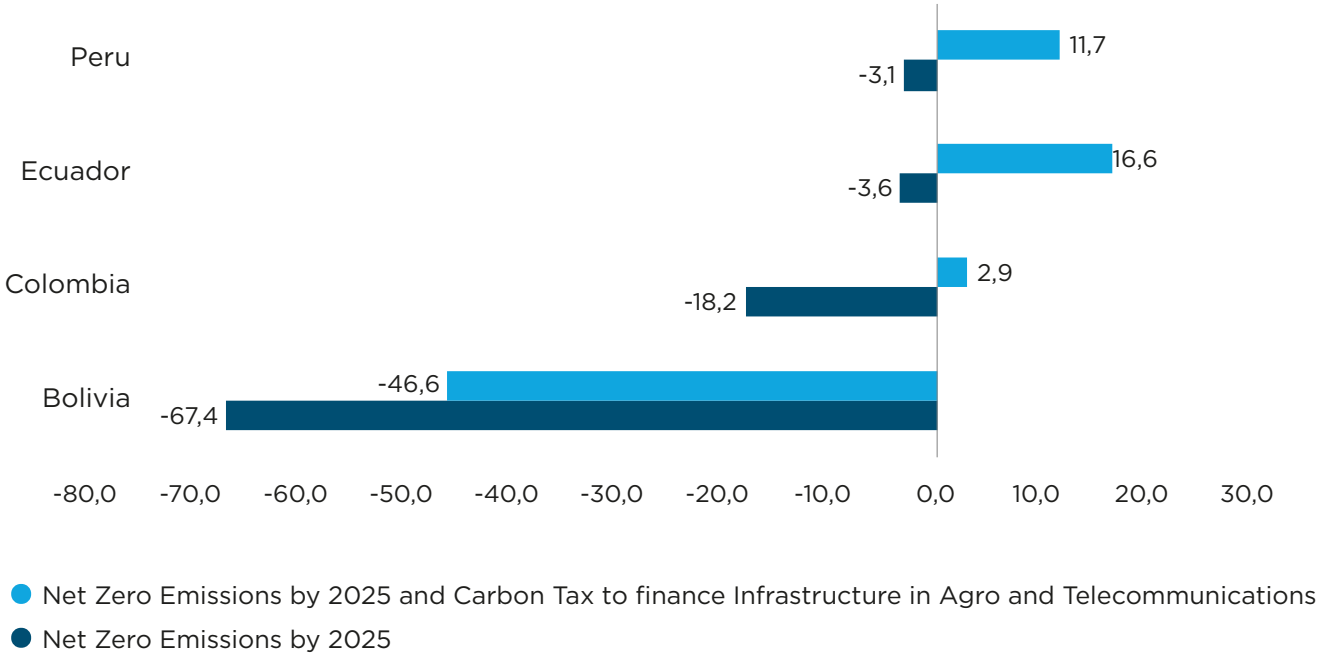
18 For example, the Economist Intelligence Unit (2022) analyzed the capacity of Latin American countries to cope with the current global economic environment. In its report, it highlights that Bolivia, Ecuador and Peru are among the Latin American economies with the best opportunities to take advantage of the context by increasing their revenues from raw materials, which, if well managed, have the potential to reduce the social unrest experienced by these countries. Colombia, on the other hand, shows an intermediate level of vulnerability due to the fragility of its macroeconomic fundamentals, especially those linked to its current account, inflation and level of public indebtedness.

19 The International Energy Agency (2021) developed four global decarbonization scenarios associated with levels of investment, energy demand and supply and CO_2 emissions. The price of hydrocarbons could be in the range of USD 24-88 per barrel by 2050, depending on the extent and pace of global decarbonization. This means that, if the agreements are fulfilled, we would have a major price collapse.

20 See Andrian and Álvarez (2022) for details of these estimates.

economies do not diversify, the opportunity cost could be significant in the face of an extreme scenario of domestic and global decarbonization. However, taking a single measure would change this scenario. If, for example, with the goal of achieving domestic decarbonization, an increase of 20 p.p. is implemented on the fossil fuels use tax, but in the transition this additional collection is used to finance more public investment in infrastructure (around 2% of GDP)– with the purpose of promoting specific productive sectors[21]–, the contractionary effect can be buffered or greater impulse can be given to the economies. The effects will depend on the current structure of the economies and the effect that external financing will have on the economies[22].

Graph 1.8. Potential GDP Loss by 2050
(% of cumulative 2022-2050 GDP relative to the scenario fulfilling the carbon use promises)



Source: Andrian and Álvarez (2022).

A key factor for any productive transition is the business environment and the Region presents important gaps in this regard. As documented by de la Cruz *et al.* (2020), there are significant challenges in the Region. On average, businesses are unproductive, informal and do not grow. This can be explained by regulatory issues that do not generate incentives for formalization and growth. Moreover, there is little participation of the private sector in innovation and a lack of coordination with innovation systems. Added to this phenomenon is the fact that access to credit is limited and mainly affects small and medium-sized enterprises. Finally, the provision of public goods has also been insufficient. The ratio of job training to business demand is poor and there are significant infrastructure gaps. However, these are not all public sector issues. The management practices of the Region's companies also show important gaps.

21 These include the agriculture and telecommunications sectors, related to the issues we will discuss in this publication. See Andrian and Álvarez (2022) for details of these estimates.

22 See Andrian and Álvarez (2022) for greater detail on transmission channels.

At the sectoral level, despite this context, it should be noted that the agricultural sector has been a winning sector, but presents challenges. With respect to other sectors, the agricultural sector grew or declined less quickly (increasing its share of GDP) in the Andean countries during the pandemic. However, the sector presents important challenges in terms of productivity. As discussed in Chapter 2, the Region has a low density of rural infrastructure. In addition, despite having a wide range of support institutions –public, private, related entities, programs and projects– in all Andean countries, the agricultural and livestock sector would significantly benefit from the strengthening of institutional mechanisms and bodies. A GVC vision is also needed to solve the Region's export challenges. Added to this is the relatively low technology adoption in the sector. Finally, climate change will have a major impact on the Region's agricultural sector.

It should be added that the repositioning of GVCs highlights untapped opportunities in the Andean Region. The Region is poorly integrated into these chains and exports are biased towards inputs such as raw materials. As explained above, a series of episodes, such as the 2008-2009 crisis, the COVID-19 pandemic and, more recently, Russia's aggression against Ukraine, have led to the reconfiguration of GVCs. In some cases, this has led multinational companies to seek greater security in the supply of inputs by purchasing them from companies that are geographically closer. Added to this is the search for reducing the carbon footprint generated by these global chains. For the Region, trade development does not seem to respond to the commercial incentive that short distances and an extensive border relationship offers Andean countries with the rest of LAC. This low development is due, in part, to restrictive trade policies, high transportation costs, lagging logistics, high information costs, low access to financing and low connectivity.

The pandemic heavily impacted the services sector, which accounts for more than 45% of GDP and more than half of jobs in the Andean countries. Except for specific activities such as finance, the services sector shows low productivity and high informality relative to other economic activities. The pandemic had a considerable impact on the Andean economies. Part of the contraction observed in GDP could be due to the increasing weight of the services sector in these economies. In turn, the pandemic affected economic sectors heterogeneously, with hospitality[23], tourism and recreational activities being the hardest hit by restrictive measures to contain the spread of the virus. An important effect is that the sectoral heterogeneity of the crisis could also generate persistent changes in the productivity dynamics of the countries. Furthermore, with the advance of digitalization, service exports have gained importance in the world over the last decade. In the case of the Andean countries, the share of services exports is low: it represents, on average, 3% of GDP. Services exports in the Andean Region are concentrated in the travel sector, with more than 50% of total services exports. This would suggests that tourism is the major catalyst of services exports, especially in Ecuador, where tourism accounts for more than 60% of services exports.

Finally, the extractive industries sector, already presented significant challenges even before this transformation process. As explained in Chapter 5, the fact that the extractive industries sector is still seen as an enclave has determined its low impact on local development, since it has repercussions that are not considered in the design of policies. In addition, the lack of solid policies and a support system for the productive sector has limited the capacity for creating linkages. Also, innovation and the adoption of new technologies are increasingly necessary for the industry to become competitive and to adapt to the Region's needs. The sector has been characterized by high levels of conflict due to the lack of trust in government as well as low community involvement. Finally, its fiscal and institutional management has generated challenges in these two areas.

23 The hospitality sector is a broad category of activities that includes accommodation, food and beverage services, event planning, theme parks, travel and tourism. This includes hotels, travel agencies, restaurants and bars.

Two of the greatest challenges that the Region faces are inequality and the urgency for companies to adopt digital technologies.

While the importance of business digitalization has grown, the Andean Region lags far behind in this area. Many studies show the favorable impact of business digitalization on business productivity and employment generation. In addition, as mentioned above, the pandemic has heightened the urgency for greater adoption of digital technologies by companies. However, the Andean countries do not have adequate innovation[24] and connectivity[25] environments. As a result, for example, these countries have a lower share of companies with a web page (65%) compared with OECD countries (79.3%). As outlined in chapter 6, the Region's countries face barriers that hinder the adoption of digital technologies. The first challenge is the lack of digital technology talent. Second, companies experience financial constraints, because digitalization investments are often high-risk. Third, adequate infrastructure for digital technology is insufficiently developed. The fourth challenge is the inadequate support of company managers because they do not fully visualize or trust the advantages of digitalization. Fifth, information problems limit the adequate match between stakeholders and providers of digital solutions. Sixth, the degree of government involvement is insufficient, especially in terms of incentives for digital adoption, updating regulatory frameworks and establishing standards that promote interoperability between digital systems. These challenges are perceived with greater intensity by smaller companies: the smaller the company, the greater the challenge to innovate.

Finally, the transition will have important societal impacts. Traditionally, the Region has faced inequality challenges. As analyzed by de la Cruz *et al.* (2020), although growth in the Region improves social conditions, its impact on inequality is not significant: SMEs and women are the most affected in their productive insertion. It is therefore important to address inequalities, especially in a context where there will be winners and losers. In this sense, micro and small enterprises (MSMEs) in the Andean Region represent more than 90% of the total business environment[26]. Policies towards MSMEs have not been sufficiently accompanied by measures that take advantage of the potential of enterprises that have greater capacity to expand, enter new markets and contribute to development[27]. Overcoming the quality hurdle requires investment, whether it be in machinery, plant, process improvement, workplace conditions or human capital. For their part, women in the Andean Region have low economic autonomy in general terms, as well as in the agriculture, tourism and extractive industries sectors. In general terms, women in the Andean Region are, lagging behind men in the Better Jobs Index and tend to be concentrated in micro and small enterprises in less profitable and low productivity economic sectors. At the sectoral level, the gender division of labor in the agricultural sector perpetuates unpaid female labor in Latin America. The extractive industries sector has a low participation of women at the global level and in the case of the Andean Region, the participation

24 According to the World Intellectual Property Organization (WIPO) Innovation Index, out of a total of 132 countries for 2021, no Andean country is ranked among the top half: Colombia ranks 67th, Peru 70th, Ecuador 91st and Bolivia 104th.

25 According to the Portulans Institute Connectivity Index, out of a total of 130 countries, only Colombia is in the top half of the table (65th place); while Peru is in 73rd place, Ecuador in 90th place and Bolivia in 94th place.

26 De la Cruz *et al.* (2020) pose the challenge of defining a number for the entire Region, since the definition of SMEs is not homogeneous across countries.

27 For example, according to Ruiz-Arranz and Deza (2018), more than 60% of microenterprises in the Andean Region survive but do not grow, a figure that rises to more than 80% in the case of small enterprises.

rate is even lower. In contrast, accommodation and food service activities have an over-representation of women in the Andean Region.

1.3 From Challenges to Opportunities

The crisis opens up opportunities for the Region, but a major public policy coordination effort is required. Although the current context may be challenging for the Region, the sectors described above may be key players in its productive transformation. As highlighted by Gualdron and Manzano (2022), there have been successful transitions in several countries around the world; success defined as the fact that they generated jobs and improved social conditions. However, these transitions required an important public-private coordination effort to identify key interventions for the process.

The Region must address the business climate. As documented by de la Cruz *et al.* (2020), the Andean Region needs to pursue a structural reform agenda to foster private investment and productivity growth. In this regard, there are differences between the barriers faced by large and small companies. Public policy must take these differences into account. The authors also argue that public policies should favor flexibility in the allocation of productive factors. In addition, a business environment that promotes innovation and productivity growth is needed. Furthermore, policies are needed to reduce the barriers to financing that businesses currently face. Finally, there must be youth job training and labor insertion policies, and technical assistance to companies to improve their practices.

The Region has the task of diversification. While thinking about the sectors that most suffered or benefited from the pandemic, it is important to address the challenges of the agricultural sector. As described in Chapter 2, to meet these challenges, the solutions and recommendations that stand out include closing infrastructure gaps for agricultural production and distribution, such as the road network, energy and irrigation. Similarly, policies must also be adopted for productive development, financial support, articulation of production chains centered on small and medium-sized enterprises, and to establish a policy framework that favors food safety and the development of the agricultural export sector; increased resilience to climate change and the adoption of a gender-based approach for the inclusive development of the sector. It is also recommended to take advantage of the niche markets in the Agritech sector with "superfood" products.

In order to take advantage of the opportunity of joining GVCs, the countries of the Region should make better use of existing trade agreements, thereby seeking to reduce trade costs. At the same time, as will be discussed in Chapter 3, a series of structural reforms should be proposed to make the Region more friendly to foreign investment and generate a better business climate. This would be important for greater linkages in GVCs and the development of climate-resilient infrastructure. This should not only occur for roads and ports, but also for digital connectivity. It would also be important to create facilities for access to credit for companies, especially micro-, small and medium-sized ones, in order to give them space to develop and become suppliers of leading companies in the value chains.

The transformations that are taking place in the services sector can be an opportunity for the Region. As explained in Chapter 4, exporting services is an opportunity to diversify the basket of products and increase resilience to external shocks. Some challenges include ensuring that legal regulations do not become obsolete in the face of the rapid pace of technological change, which has allowed trade in sectors that were

previously considered non-tradable. In this regard, it should be noted that the GIG economy[28] is having a strong impact on the services sector[29]. In the Andean Region, there is an increase in jobs through digital platforms. Another opportunity that the Andean Region has lies in tourism; to enhance the competitiveness of this economic activity, improving the business conditions and environment, and the security and protection of tourists[30] is necessary. Due to the sector's high level of informality, it is essential that countries formulate public policies that stimulate formality and reduce labor market dysfunctions. In particular, one of the challenges going forward is that jobs in the GIG economy should not be part of a process of additional precariousness of labor relationships in the Region, but rather a source for the creation of better jobs and modern services exports[31].

Although there are significant challenges for the extractive industries sector, it can be key to productive transformation. In this sense, as developed in Chapter 5, a human capital strategy is key to enhancing the sector's role in local development, as well as its evolution during the energy transition. Similarly, it is important to accompany this strategy with productive strategies. It is also essential to take into account the needs of the communities facing both the benefits in economic terms –thanks to the creation of jobs and dynamism of the local economy– and the costs. This will imply that the debate on the contribution of extractive industries to public coffers must take into account the territories as well as transparency. Finally, in the medium to long term, and as the process of global decarbonization continues, it is essential to review the adequacy of future budgetary resources.

28 The GIG economy is defined as the exchange of labor for money between individuals or companies through digital platforms.

29 Working via platforms enables greater flexibility than other occupations and may allow, for example, immigrants to seek jobs that align with their skills to a greater extent than traditional jobs.

30 In general, the services sector relies on infrastructure. Thus, public-private partnerships (PPPs) can be beneficial for the implementation of industrial policies that can promote modern services exports, for example, through the provision of greater digital infrastructure (Álvarez *et al.*, 2021). Similarly, in the case of tourism, PPPs can also contribute to the improvement of infrastructure. If this is achieved, an enabling environment can be prepared to attract travelers from all over the world and boost the tourism sector.

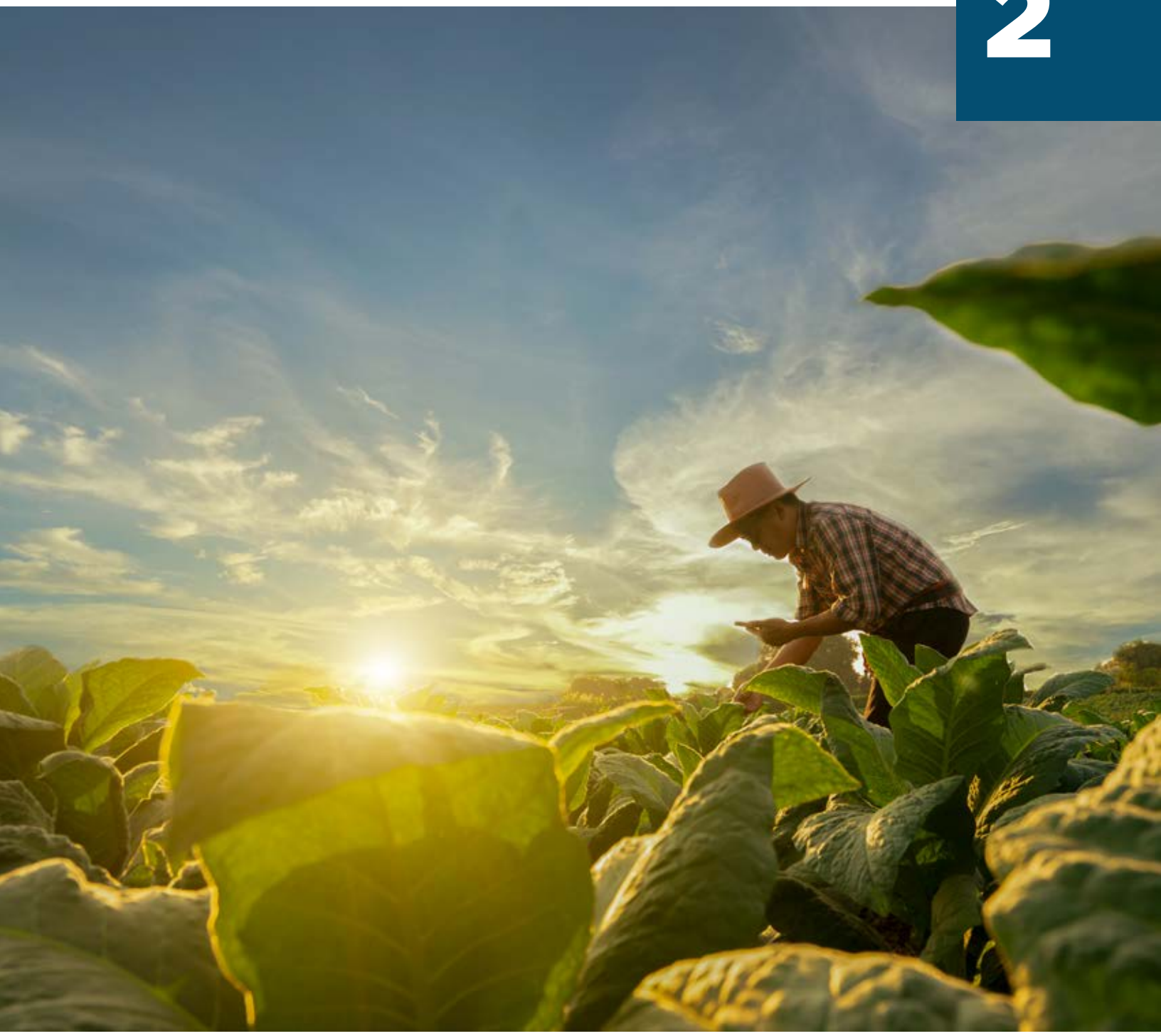
31 One situation to bear in mind is that these platforms are not covered by the labor laws of the countries and do not assume responsibility for the social and labor protection of workers, and are additional sources of informality.

It is necessary to promote business digitalization, and to make it easier for companies to decide what digital technologies to implement and how to do so. This can be achieved through different public policy strategies. In this regard, the main recommendations consist of facilitating access to information on the benefits of digitalization, promoting interventions aimed at strengthening digital skills, promoting investments that improve the quality of and access to connectivity, implementing innovative instruments for financing digital investments, and adapting regulation by strengthening cybersecurity and defining standards. If we focus on the extractive sectors, business digitalization can benefit from measures that maximize digital innovation from a social perspective, and strengthen the articulation between academia and industry. These recommendations, among others, are discussed in more detail in Chapter 6.

A topic that will be developed in Chapter 7, is inclusion. It is important to consider that promoting more diverse and inclusive sectors of the economy is not only more equitable and fair but it is also more profitable. Given the high levels of informality that persist in MSMEs, it is essential to recognize that informality is multidimensional and therefore requires treatment on several fronts. Pull policies will be identified through a process of collaboration and co-creation; they normally involve accompaniment. Strategies focused on reducing gender participation gaps in the labor market must be accompanied by attention to structural factors. The extractive industries sector can benefit from incorporating digital tools into its operations to promote more inclusive environments. Finally, it is important to encourage data collection and research to make a detailed diagnosis of the barriers that women face in specific sectors and in the presence of intersectionality with other vulnerability conditions. Taking advantage of these opportunities will place the Region on the path to strong growth.

Taking advantage of these opportunities will place
the Region on a path to higher growth.

2



AGRICULTURE

2. BETTING ON AGRICULTURE TO ACHIEVE PRODUCTIVE DIVERSIFICATION

2.1 Current Situation in the Andean Region

The agricultural sector has traditionally been important for the Andean economies. The Andean Region is one of the richest in the world in terms of natural resources. According to recent estimates, the value of the natural capital of the countries in the Region amounts to 557% of GDP in Bolivia, 469% of GDP in Ecuador, 382% of GDP in Peru and 200% of GDP in Colombia. It is also a Region characterized by dynamic geological, climatic and ecological systems, which are frequently ravaged by highly disruptive natural phenomena such as droughts or floods caused by *El Niño* phenomenon, earthquakes and landslides. Nevertheless, Andean agricultural communities have known how to take advantage of these conditions for thousands of years.

Agriculture has played an important role, not only economically but socially, for the countries of the Region[1]. Between 2012 and 2021, the agricultural sector presented, on average, 12.6%, 9.2%, 6.2% and 5.7% of GDP[2] in Bolivia, Ecuador, Colombia and Peru, respectively, and currently accounts for 29.7%, 27.5%, 16.7% and 27.8% of total formal employment[3]. The Region has a large number of small productive units in the agricultural sector (agriculture, livestock, forestry, hunting and fishing) with low levels of capital and incorporation of technology. Likewise, they show limitations in achieving economies of scale and incorporating capital and technology into their productive processes.

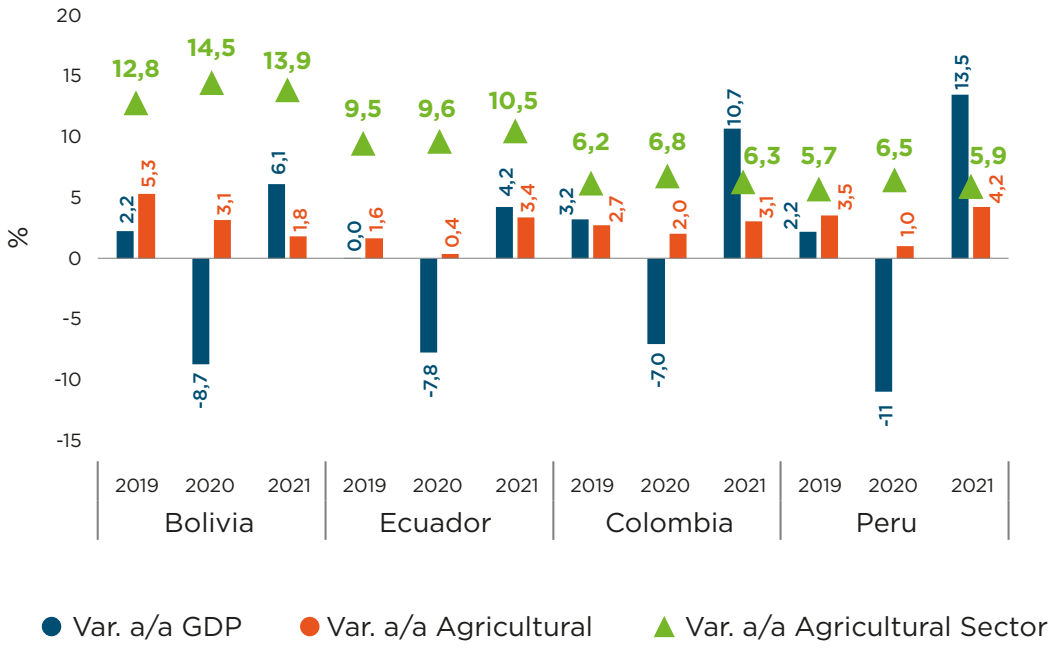
In the context of the shock generated by COVID-19 and the growing commitments related to decarbonization, agriculture is emerging as a sector of opportunity in the Andean Region. Agriculture was among the few sectors that exhibited growth in 2020, when economies experienced significant contractions in all productive sectors. In this sense, agriculture acted as a counterbalance in times of economic and social crisis, highlighting the crucial role it plays in these two areas, especially in terms of food security for populations and employment. Thus, in 2020, while GDP fell sharply, in Bolivia, Ecuador, Colombia and Peru, the agricultural sector grew at a rate of 3.1%, 0.4%, 2% and 1%, respectively, although below average rates between 2010 and 2019 of 4.3%, 3.8%, 3.2% and 4%; it was a sector with positive variations unlike other economic sectors. Furthermore, the international agenda of decarbonization commitments has gained paramount relevance in the public policies of countries. The Andean Region, in particular, has ample opportunity to reformulate its agricultural production strategy towards a more sustainable and resilient model that contributes to reducing the carbon emissions generated by this activity, while addressing issues of concern such as increased deforestation and the efficient use of water.

1 Includes Bolivia, Colombia, Ecuador and Peru, and on some topics, Venezuela, as indicated.

2 According to our own calculations based on data taken from the Central Banks of Ecuador, Colombia and Peru. For Bolivia the information was taken from INE.

3 According to our own calculations based on information from ILO employment data. https://ilostat.ilo.org/topics/employment/

Graph 2.1. Agricultural Sector Growth versus Economic Growth

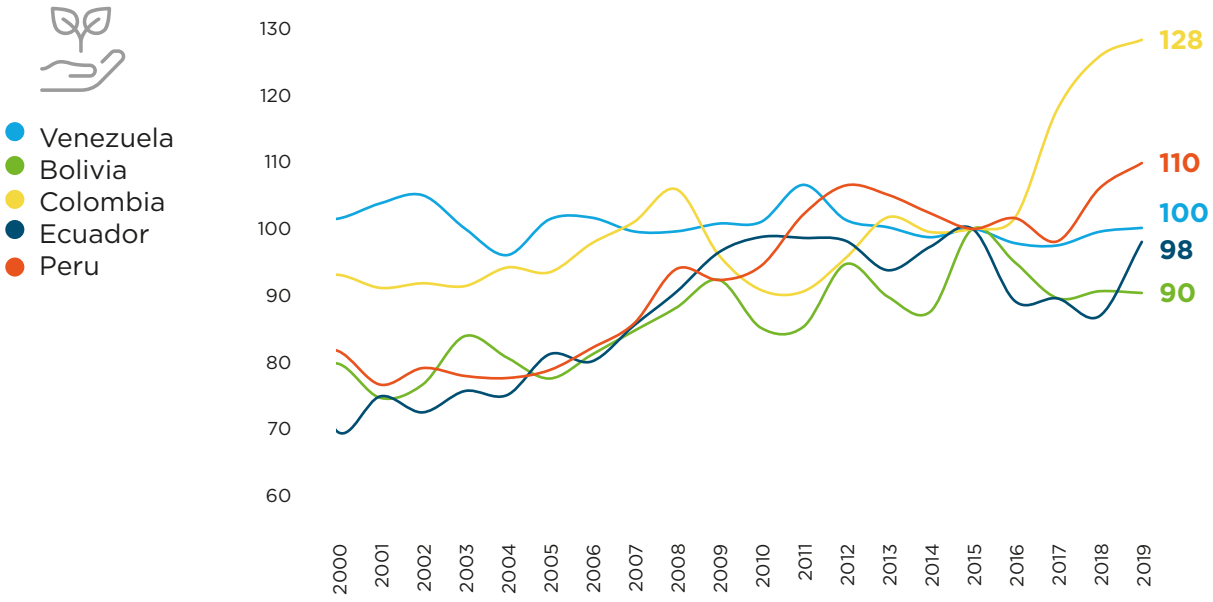


Source: For Ecuador, Colombia and Peru, the data were taken from their respective Central Banks, while the information for Bolivia was taken from the National Institute of Statistics (INE, Spanish acronym).
Note: For Ecuador, the agricultural sector is the sum of the agriculture, aquaculture and shrimp fishing and fishing sectors.

The agricultural sector must also address long-standing challenges associated with low productivity in order to catalyze greater opportunities for diversification and expansion. Although sector productivity is heterogeneous across countries, in the aggregate, it stands out as a major challenge. Low agricultural productivity in the Andean countries is due to limitations in the areas of connectivity infrastructure, storage, refrigeration, digitalization and traceability systems, as well as reduced access to financing; inputs (fertilizers) and health and quality certification mechanisms, among others. Average annual growth of agricultural productivity in Colombia and Bolivia between 2000 and 2009 was one of the lowest, 0.74% and 0.78%, while Ecuador, Venezuela and Peru had higher growth rates, 2.6%, 2.3% and 1.4%, respectively (Trindade and Fulginiti, 2015). More recently, between 2015 and 2019, only Colombia and Peru have experienced significant increases[4], 28.4% and 9.9%, respectively, while rates have decreased for Bolivia and Ecuador.

4 According to our own calculations based on the agricultural productivity measure of the Economic Research Service, U.S. Department of Agriculture.

Graph 2.2 Agricultural Productivity[5] (2015=100)



Source: Economic Research Service, U.S. Department of Agriculture.

Catapulting the agricultural sector should also allow for the promotion of quality employment and, in particular, the empowerment of women working in this activity. Within the Andean Region, agriculture is a sector that includes the participation of women. However, women who make a living from this sector have low economic autonomy, starting with low levels of schooling, low rates of land ownership and smaller parcels of land, less access to financing, and the lowest income received in comparison to men. In Bolivia, 7 out of 10 employed Bolivian women are in agriculture, livestock, hunting and fishing, on the one hand, and in wholesale and retail sales, on the other. In Colombia, the percentage of women over the age of 15 living in dispersed rural areas who do not know how to read or write is 12.8%, a percentage that rises to 25.8% in the case of rural women who consider themselves as being indigenous. In Ecuador, only 60.3% of rural women perceive security of land tenure with respect to displacement or dispossession. In Peru, the number of women agricultural producers represents about 30% of total agricultural producers.

To address these issues, this chapter first provides a summary of the main challenges faced by the agricultural sector, including infrastructure, institutionality and climate change. The analysis of these challenges has a robust analytical underpinning, which can be referred to in greater depth in parallel. Recommendations are also made to take advantage of the sector's potential, offering proposals for diversification and increased value added, marketing and sustainable rethinking of natural resource-intensive sectors. Finally, it concludes by summarizing the sector's importance and its unique positioning to drive more sustainable, resilient and inclusive growth.

5 This index measures the amount of agricultural output obtained from the inputs of land, labor, capital, and material resources used in agricultural production. If total output is growing faster than total inputs, then total factor productivity is increasing. Methodological details can be found here: https://www.ers.usda.gov/data-products/international-agricultural-productivity/documentation-and-methods/

2.2 Main Challenges

Agriculture has emerged as a sector of opportunity in the Andean Region, addressing long-standing challenges related to productivity, quality employment and women's empowerment.

Infrastructure

The role of infrastructure is key to increasing the productivity and impact of the agricultural sector. Several factors explain agricultural total factor productivity. The literature considers road density, irrigation, electricity, trade openness, GDP per capita, education and health (life expectancy) as explanatory variables for inefficiencies in the sector.

The Andean countries have low road density levels, which means high transportation costs and limits to the competitiveness of the agricultural sector in the international market. Colombia, Peru, Ecuador and Bolivia had 205, 166, 89 and 43 thousand kilometers of roads in 2015, mostly unpaved (for example, less than 8,500 km in Bolivia are paved[6]). This is reflected in high average travel times to centers with 50,000 inhabitants. In Ecuador, these are around 2.5 hours, 4 hours in Peru, and in some parts of Colombia, road travel can take up to 90 hours. These deficiencies in the road network result in the inaccessibility of agricultural production to domestic and international markets, limiting the competitiveness and growth of the sector.

There is room for increasing access to energy, which could have a positive effect on agricultural production. While access to electricity is widespread in urban areas, it is not universal in rural areas of the Andean countries. For example, 8.5% of farms in Bolivia have indicated that electricity is their main source of energy (INE, 2020). This figure is much lower for households that are farther away from larger cities. In Colombia, something similar occurs, with the particularity that the reliability of energy distribution is also affected by weather variability due to the composition of the energy matrix: the country relies on hydro (70%) and thermal (30%) power. This problem is magnified in rural areas, where service is often discontinuous and scarce. In Peru, there is a considerable gap in energy infrastructure investments, with rural areas being the most affected by distribution and quality deficiencies.

There are also some deficiencies in production and rural development support services. These include challenges in irrigation, drainage, storage and digital connectivity and infrastructure, which result in high per-unit production costs. Similarly, there is limited access to financing for small producers, who have low levels of associativity and face barriers to the adequate marketing of their products. Finally, phytosanitary deficiencies persist, which are a constraint to the positioning of Andean agricultural products in major international markets. Addressing these challenges would translate into higher agricultural yields and, consequently, higher incomes.

Institutional Framework

High institutional heterogeneity presents challenges to achieving better targeting of objectives and resources. Regional and productive heterogeneity of Andean countries is reflected in the wide range of public and private support institutions and related entities, as well as programs and projects. In the Andean countries, given the geography, land use and agroecological characteristics of its diverse Regions

6 Meijer *et al.* (2018).

–as well as the size of production units–, agriculture and livestock production are highly differentiated and heterogeneous in terms of production, culture and population density.

Low institutional focus often results in the decreased effectiveness of policies and instruments that support the sector. The role played by the ministries of agriculture and rural development and their corresponding vice-ministries[7] is a determining factor in the definition and execution of the sector's public policies. These policies are geared toward the productive development of the agricultural sector, rural areas and the quality of life of their inhabitants. Their institutional framework is usually complemented by a set of entities attached to the ministry in which the operational management of the sector is based, in addition to other related entities. In turn, the functions and services offered by the ministries of agriculture and rural development are complemented by the actions of other ministries and public agencies that operate in the rural milieu and provide support instruments. This wide range and diversity of institutions, programs and projects, and the wide variety of tasks assigned to them, present major challenges to the effectiveness of the public policies and instruments that support the sector.

The high dispersion of resources limits their impact and economies of scale, and makes the coordination and coherence of support to the sector difficult. There are institutional specificities of the sector that stand out in each Andean country. In Bolivia, some special support programs are specifically earmarked for small and medium-sized producers in order to provide greater operational agility and flexibility in terms of content and support mechanisms. One disadvantage of these programs is that resources are dispersed, limiting their impact and economies of scale, making coordination and coherence of support actions between different levels (central, Regional and local) more challenging. In Colombia, what stands out is the articulation and historical organizational structure of the private sector in commissions, councils, guilds and productive chains that have been built with both private and public support.

Climate Change

The Andean countries are threatened by global climate change, since they belong to a highly vulnerable Region. For this reason, it is crucial to have strategic actions at multiple levels of adaptation and mitigation for the agricultural sector. These strategies should be multifactorial and consider various legal and institutional aspects, from their design to the effective implementation of public policies. They should also consider the efficient management of water resources and technological innovation for the construction of resilient and adaptable productive systems.

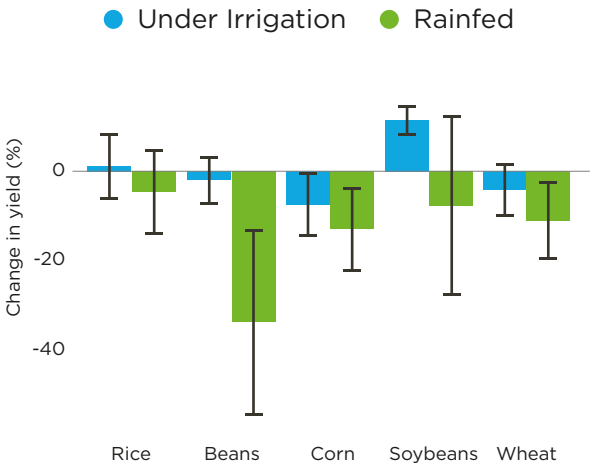
The agricultural sector is very sensitive to temperature and precipitation changes, and to the impacts of climate change with effects on productivity, trade and food security. It is therefore crucial to identify mitigation and adaptation measures, particularly in the case of key crops in economic and food security terms the Andean countries (namely, beans, maize, rice, soybeans and wheat). The biophysical impacts associated with climate change differ according to climate, crop variety and market conditions. Based on general circulation models (GCMs), it has been identified that climate change impacts reduce average increased yields, total area and agricultural production, pushing up crop prices and trade deficits, exacerbating countries' exposure to food insecurity and falling below critical food supply and demand ratios (Prager *et al.*, 2020).

7 In Bolivia, it is the Ministry of Rural Development and Lands. In Colombia, it is the Ministry of Agriculture and Rural Development.

Significant temperature increases are expected throughout the continent, with important impacts on the yield and sustainability of the agricultural sector. Based on the estimates of nine general circulation models carried out as part of a study by Prager *et al.* (2020), the predictions point to an increase in temperatures in the entire Latin America and Caribbean Region of between 1 °C and 4 °C by 2050, with the aggravating factor that, according to these estimates, the tropical part of South America will be the hottest. In light of this, the yields of essential crops such as rice, beans, wheat, maize and soybeans are likely to decline, and this could be more severe in some Regions. Likewise, certain Regions, suitable conditions for banana, coffee and sugarcane cultivation are expected to decline. In contrast, yam and cassava would remain resilient in most areas. Graph 2.3 illustrates the results of crop model simulations of the impact that climate change could have in 2050 for each crop in the Andean countries.

Graph 2.3. Average Projected Yield Change, Key Crops (2020-2050)

Bolivia: According to the simulations, in Bolivia, bean systems in the central lowlands would be the most affected.



Colombia: Climate change could result in a significant decrease in maize yields, but increases in the case of rainfed rice and soy beans.

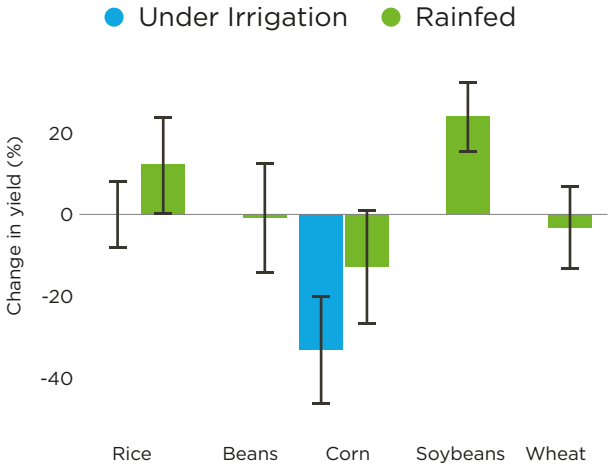
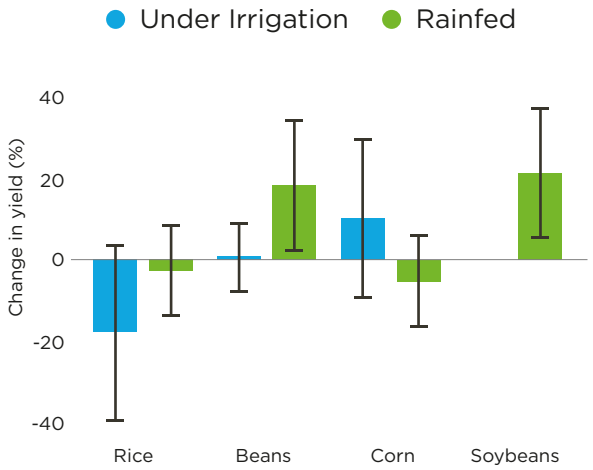
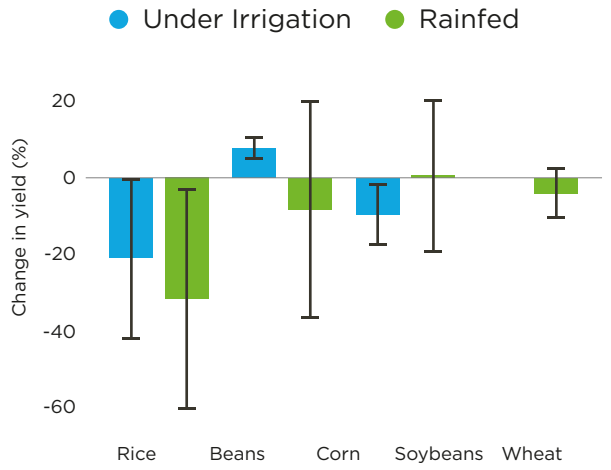


Figure 2: Projected average yield change, key crops (2020-2050).
Error bars indicate the range of production in the new climate models.

Ecuador: Crop model results suggest that yields may increase in the case of rainfed beans, soybeans and irrigated corn.



Peru: Climate change could decrease rainfed and irrigated rice yields, while increasing irrigated bean yields.



Source: Prager *et al.* (2020).
Note: No information is available for Venezuela. Error bars indicate the range of production in the nine climate models.

2.3 Recommendations

Infrastructure: The Key to Maximizing Profits

The performance and productivity of the agricultural sector depends, to a large extent, on the provision of infrastructure assets. While per capita income in the Andean countries has increased, agriculture has decreased its contribution to GDP; it continues to be an important source of employment, extreme poverty alleviation and food security. The impact of agriculture on the quality of life of rural populations depends on several factors, including infrastructure which plays a critical role. Rural infrastructure affects agricultural productivity, competitiveness and food price stability. The following are some recommendations for strengthening infrastructure in support of the agricultural sector.

Improving roadway density. Expanding the coverage and quality of roads facilitates the provision of production inputs and technical assistance to producing farms, while facilitating the flow of agricultural goods to local and external supply centers. Using a stochastic model[8], we estimated the effect of road density and travel times on agricultural technical efficiency for the Andean countries, obtaining, on average, a reduction in technical inefficiency of 0.9% for every 1% increase in road density. The results indicate that the largest marginal effect is found in Peru and Ecuador, with a reduction of more than 3%, on average, for every 1% increase in road density.

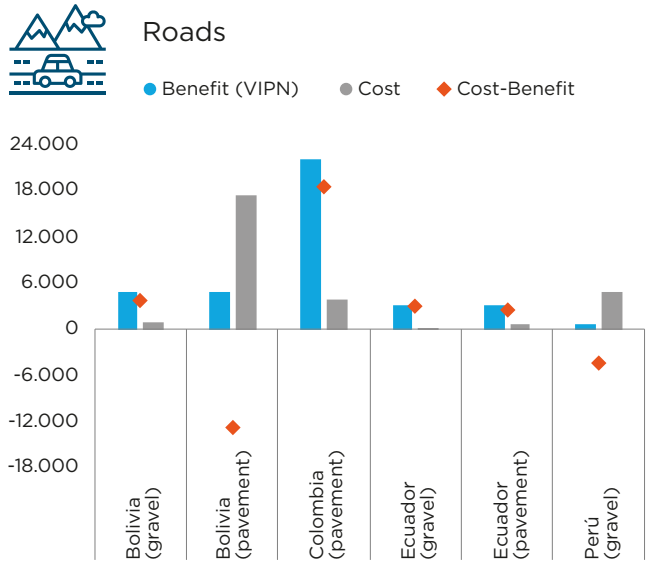
Expanding access to energy. Investments that expand the distribution of energy sources in rural areas have the potential to boost agricultural production. Access to modern energy services can improve working conditions on farms and facilitate access to better quality services, products and technologies, resulting in higher productivity. Using the same model, it is observed that, in Bolivia, access to energy in agricultural activity has the potential to increase the value of production by up to 29%. In Colombia, an impact of USD 520.58 is identified in the value of production with respect to energy use. In Peru, access to energy was associated with an average increase of USD 319.40 in the value of production. Similarly, access to services such as rural extension and credit increases the probability of using electricity in agricultural activities.

Adopting irrigation to double yields in the sector, and as a consequence, incomes. Access to irrigation is associated with higher agricultural production in Bolivia, Colombia, Ecuador and Peru; however, its adoption is costly to farms. In accordance with the model explained above, the analysis was approached with two methodologies. In the first case, farms corresponding to non-irrigated areas were selected and an irrigation cost per hectare was assigned to calculate the increase in productivity over current production. The second case takes into account when non-irrigated lands start producing the same levels as irrigated lands[9]. Only in the second case is the cost-benefit analysis positive in all countries. In Colombia, a 10% increase of an irrigated area would lead to a 3.3% increase in production, *ceteris paribus*. In Bolivia, it would lead to an increase of 0.4%, in Ecuador 1% and in Peru 0.7%, respectively.

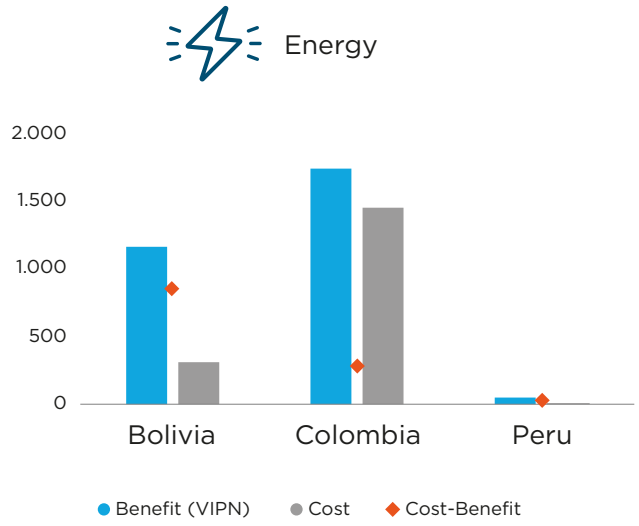
8 Agricultural technical efficiency is estimated using a stochastic production function to assess whether road infrastructure and energy access help decrease agricultural technical inefficiencies (Silva *et al.*, 2020).

9 In this case, the VIPN corresponds to the new production of irrigated land. A crop with an average yield of 15 MT/h and a domestic market price of USD 1.5 per kg has been considered. Also, a net of costs income of 15% and a time horizon of 15 years have been considered.

Graph 2.4. Overall Cost-Benefit Analysis (millions of USD)



Source: Own elaboration.



Source: Own elaboration.
Note: No data available for Ecuador

Institutional Framework: The Pending Agenda for Catapulting the Sector

A strengthened institutional framework is the basis for effective sector public policies. Opportunities exist for strengthening the sector's institutional framework in the Andean countries, taking into account particularities of each country. Among various aspects identified, there is adequate coordination between the public sector and producer organizations to improve the operation of support mechanisms (agricultural insurance, financing, training, technology transfer and market insertion). Also included is the improvement of political and technical coordination mechanisms at the central and subRegional levels by strengthening teams (giving them sufficient authority and decision-making capacity). These opportunities also include focusing institutional strengthening efforts in certain critical areas for agricultural development, such as health and safety; research, innovation and technology transfer; production promotion; planning and policy formulation; and institutional coordination and articulation.

In all of the Andean countries, the agricultural and livestock sector would significantly benefit from the strengthening of institutional mechanisms and bodies for efficient institutional coordination, more effective management and the search for public-private cooperation mechanisms for the production of public goods needed for the development of production chains, such as research and technological innovation, the strengthening production health and safety, market transparency and trade promotion, among others.

Institutional coordination can transform potential strengths into comparative advantages with an impact on the production base and its productivity. Furthermore, new scenarios and global consumption trends open up a range of potential opportunities to expand the supply of healthier, more nutritious foods, with more sophisticated safety, traceability and differentiated quality guarantees, produced under sustainable conditions, and origins associated to territorial characteristics, with a cultural and social identity. Coordinated public and private institutional efforts to transform these potentialities into

comparative advantages through public policies and the provision of public goods play a determining role and have a direct impact onthe sector's productive base and its productivity, as well as on the quality of life of rural populations. Therefore, in the short and medium term, it is urgent to focus on strengthening sector institutions, incorporating technology, developing production chains and agricultural policies that are adequately conceptualized and focalized on achieving food security and the successful integration into international food export markets.

Climate Change: A Vulnerability that Can Turn Into an Opportunity

In the Andean countries, the Nationally Determined Contributions (NDCs) include agriculture as a key sector in their adaptation strategy. Although the recommendations for climate change adaptation vary from country to country, they underscore the consideration of climate change scenarios in the formulation of public policies, promoting research and adoption of new crop varieties, promoting sustainable irrigation and the recovery of degraded soils, avoiding deforestation and adopting climate-smart practices and technology. The recommendations include aspects such as updating the baseline of the country's agroclimatic situation; expanding and integrating the network of agrometeorological stations to achieve Regional and agroclimatic representativeness; incorporating census information instruments; preparing a national climate change adaptation plan coordinated with other public and private agencies; adopting good agricultural practices in production chains; reviewing regulations to protect forests; reviewing governance, management and water resource management mechanisms; and encouraging initiatives and programs for CO2 sequestration in grasslands and forests.

Adopting a climate change adaptation and mitigation strategy as soon as possible would have a positive impact on the productivity of the agricultural sector.

This publication highlights specific recommendations for increasing productivity despite climate change. For example, in the case of Bolivia, crop diversification, the use of improved varieties, intercropping, forest, soil and water management, greater efficiency in the use of water and the development of agriculture research are suggested. In Colombia, it is recommended that research capacity and technology transfer aimed at small-scale agriculture be strengthened, particularly in the coastal and high-elevation Regions, as well as in watersheds. It is also suggested that agroclimatic and market information services be strengthened and the mitigation and adaptation goals be monitored. For Ecuador, recommendations also include better agricultural practices, such as crop diversification, forest, soil and water management, agricultural research impact assessment and resilient crops. In Peru, recommendations refer to the strengthening of agroclimatic information and market intelligence services, promotion of research and evaluation of specific crops, such as yams and cassava, as resilient alternatives to climate change.

Production Chains: Connecting the Agricultural Sector with New Opportunities

There is a potential opportunity in the Andean countries for the development of value chains. In the Andean countries, as in most of the Latin American and Caribbean Region, MSMEs are at the base of the business pyramid and are a majority in the business demographics. In general, Andean MSMEs are characterized by high levels of informality, low productivity and a significant lag in potential growth. A high percentage operate in subsistence mode, and only a few manage to overcome this threshold, but they lack the necessary capabilities to successfully insert themselves into value chains. This niche of enterprises could be a potential opportunity in the Andean countries for achieving aggregate productivity gains and a dynamic boost in formal employment.

Effective insertion into dynamic value chains requires continuous compliance with a series of standards and conditions. For example, compliance with certain quality and standardization standards, delivery reliability, sanitary requirements, labor and environmental standards. As summarized by Sabel and Ghezzi (2021), "the quality hurdle" conceptualizes the conditions and factors required for companies to achieve insertion in modern and dynamic value chains. A series of quantitative studies conducted by Ghezzi and Garcia (2022) provide revealing conclusions about the characteristics of productive units, the cross-cutting constraints they face and the impact of public policies on business development and transformation in overcoming the "quality hurdle".

The findings indicate the need for explicit public policies to take a leap in quality. There is evidence of the potential impact that the State can have on the different stages of business development through public policies that promote production, associativity and access to financing. In order to correctly identify the productive development policies that each country needs, several methodologies are proposed, with the obvious understanding that there is no universal recipe for designing and implementing public policies. One of the main recommendations for the Andean countries is that public interventions –in order to be effective– must be adapted to the specific reality of value chains and productive ecosystems.

Achieving a successful export drive is another key aspect for this sector. This will require efficient policies to promote production, financial support, coordination of production chains, and, in general, a policy framework that favors the development of the agricultural export sector. A first step involves expanding bilateral and multilateral trade agreement networks and improving phytosanitary and zoosanitary conditions, with the elimination of quarantine pests and diseases as a basic condition. Among the advantages of expanding the export capacity of the agricultural sector are the improvement of the sector's productivity, boosting the entire sector's traction –including the productive sectors of the domestic market–, the absorption of labor and job creation, improvements in the trade balance and the country's macroeconomic equilibrium, without failing to mention the generation of prosperity, welfare and quality of life for the population, particularly in rural areas.

New Market Niches: Positioning the Region in a Sustainable and Technological Way

A window of opportunity exists for exploiting the potential of the agricultural sector beyond traditional products. From products with high nutritional content, superfoods, to more sustainable forestry and livestock production, the Andean Region has the potential to diversify and sophisticate its product offering and optimize their trading in international and local markets. Furthermore, clean and organic production processes can open up new markets with high quality standards. The fact that exporters of these products are directly linked to small producers means that the momentum given to these sectors can become a driver of (direct and indirect) employment and boost the generation of resources for producing communities. In terms of production, there are advantages such as the incorporation and promotion of new production technologies, encouraging sustainable and clean production with ecological and organic certification, not only for export, but for local consumption.

The Region can position itself as a producer of superfoods. Superfoods are rich in nutrients and are considered especially beneficial for health and wellness. The Andean Region already exports several of these products and has the potential to develop the market for more products. Among their main common opportunities are their exceptional nutritional attributes; growing international demand for these products; the possibility of developing new competitive varieties at lower costs and better yields; the creation of specific product niches (for example, black sesame) and their relevant socioeconomic impact for producing countries. In addition, common barriers and challenges include restrictions on public goods, the lack of machinery, the use of appropriate technology and low access to financing; low productivity; the inadequate application of agricultural inputs, limited genetic research, lack of certifications (including organic), lack of controls and phytosanitary frameworks for exporting, limitations in the traceability system; and the impacts of climate change. Below are some of the superfoods that can be competitively positioned:

Graph 2.1 Superfoods in Andean Countries

SESAME
4th largest producer in South America, with record exports of USD 18 million in 2020.

AVOCADO
Peru is the second largest exporter in the world (2018, USD 716.7 million). In 2020, in Columbia, it employed 54,000 workers.

PEANUTS
Generates USD 16 million per year and employs 17.800 native farming families.

BLUEBERRIES
From not producing anything in 2014, Peru is now the biggest global exporter with USD 1.000 million in 2020.

CHESTNUT
1st global exporter with 82% of total production, generates 75% of the income of the Northern Amazon and employs 13.500 families.

SHRIMP
The country's most important non-oil export production chain, with USD 500 million exports in 2021.

QUINOA
Both countries are world leaders in production (Peru 50% and Bolivia 47%), together they export 80% of total production and employ 122,000 small producers.

TUNA
Exports for USD 15 million in 2021.

COCOA
Main world producer and exporter of the "Fino de Aroma" variety, and employs 100,000 producers (85% small producers).

COFFEE
Employs 300,000 small producers and the main variety produced is Arabica, highly recognized internationally, with potential for export.

BLACKBERRY
Its destination niche is the United States for its highly competitive production costs and employs 5,300 producers (family farming).

COCOA
Exports 40% of total production of aromatic high-quality cocoa and employs 16.505 producers (90% small).

DRAGON FRUIT
Its niche market is China; its value chain employs 624 producers (90% small) and another 10,780 people in the other linkages.

Source: Own elaboration.

Pastoral livestock farming can contribute to decarbonization and increase productivity and efficiency, particularly in Bolivia and Colombia. Bolivia's current expansion model entails environmental costs with modest productivity growth. The country could benefit from investments in technological solutions to increase efficiency and productivity in addition to improving the safety of the entire production chain. The key to developing this sector with low emission levels would consist of incorporating cleared lands for livestock production, improving productivity by optimizing the extraction rate and opting for low-emission diets. In Colombia, cattle ranching is practiced through extensive production and is economically important given that the value of production triples coffee production with two relevant products: meat and milk. The productivity of these products is heterogeneous in the country's Regions, while environmental impacts have remained relatively low thanks to increased productivity boosted by the reduction of land from deforestation as a percentage of grazing land. The attraction of investment, technical change and health issues related to outbreaks of foot-and-mouth disease and other commercially important diseases are key to boosting the sector. In order for its development to have a low environmental impact, it is crucial to incorporate lands with less biodiversity and where livestock activity is highly productive.

Considering environmental sustainability criteria, the forestry sector is emerging as another opportunity to diversify economic activity in the Andean countries. Between 40% to 60% of the territory and forests of the Andean countries are within the great Amazon basin, which is rich in flora and fauna diversity and is probably, as a whole, made up of the richest forests on the planet. In addition, it possesses important renewable resources, such as wood, fibers, non-timber products, foods, active ingredients for the cosmetics, pharmaceutical and food industries, biodiversity, water, absorbed and sequestered carbon, and many other resources that have yet to be discovered. There is also a wealth of non-renewable resources such as oil, natural gas and minerals. However, currently much more is destroyed than produced (through fires followed by deforestation as part of the main causes of destruction). Among the policies that should be promoted for a sustainable and high value-added use of the Amazon ecosystem are: i) Land-use planning that defines forest resource planning; promotion, control and surveillance; interinstitutional and intersectoral pacts for the management and legal harvesting of timber and non-timber products; (ii) Mitigation of market failures that allow land uses and value chains that lead to population displacement, deforestation, pollution, GHG emissions, among others, to make financial restitution for negative externalities; and iii) Promotion of quality products for both the domestic and foreign markets, which involve more species and mixtures of species sustainably produced in the Amazon.

Incorporating the use of technology into the production and supply of agricultural sector products can expand the trade possibilities frontier for the Andean countries. Support to the agro-industrial sector has been aimed at expanding agricultural production, creating jobs in rural areas, increasing agricultural productivity, strengthening the integration of MSMEs into value chains, expanding agricultural exports and generating foreign exchange, and improving environmental practices. The use of technology and

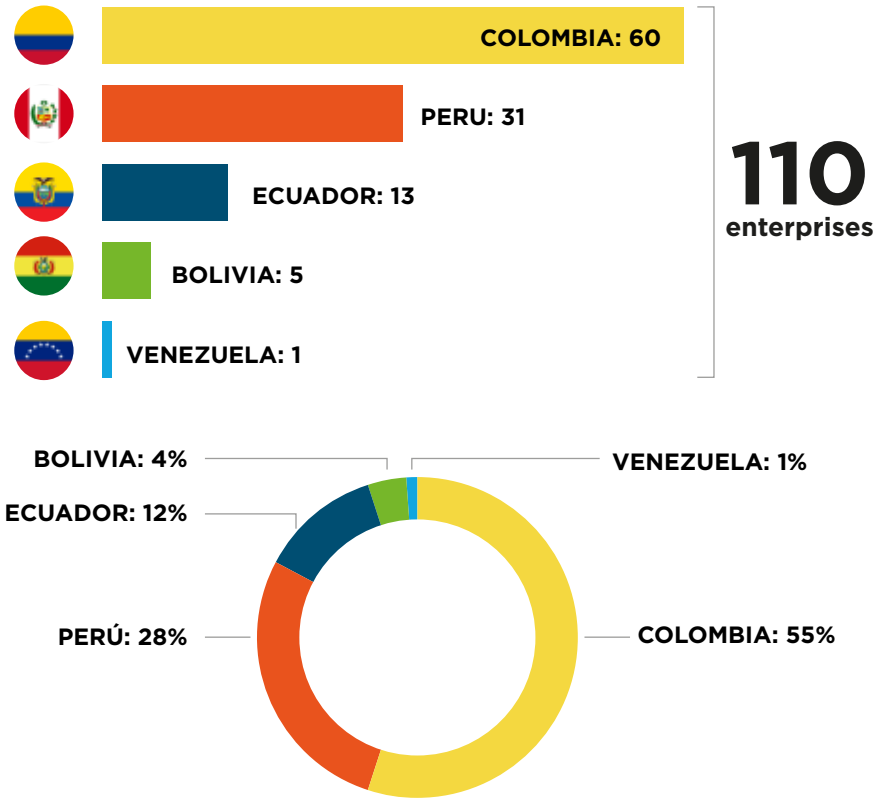
innovation in this sector has given rise to a new universe called Agritech, which includes a wide range of new technologies applied to agriculture for increasing its efficiency, productivity and sustainability. Currently, more than 110 Agtech companies have been identified in the Region, which offer services and products in more than 15 areas, with a predominance of those focused on smart farming, ecommerce and Fintech. Colombia and Peru take the lead in the creation of these types of ventures, which offer actors in the agriculture sector new products and services that address challenges such as the barrier to credit, real-time information, the efficient provision of inputs, and intelligence support for marketing and local and global linkages.

Graph 2.2 Agtechs in the Region

110 enterprises

+80%: Colombia and Peru

Sectors:
- Bio-inputs
- Biotechnology
- Irrigation
- Smart farming
- Machinery and equipment
- Aquaculture
- Traceability
- E-commerce
- Logistics
- Marketplace
- Fintech
- Digital consulting
- Digital transformation
- Value Chain
- Insurance

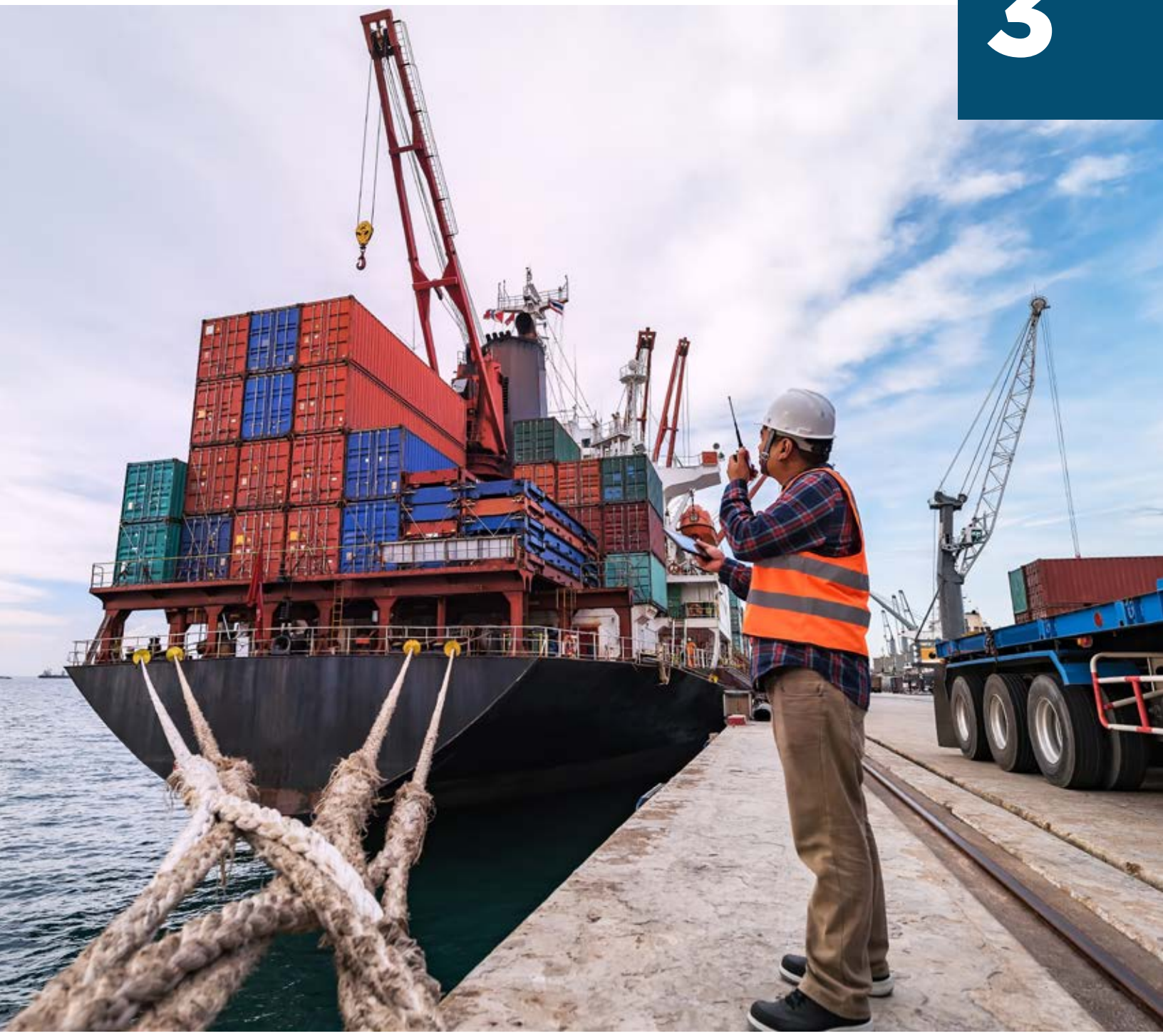


Source: IICA study for the IDB on the Agritech sector in the Andean countries (forthcoming publication).

In conclusion, the Region has a unique opportunity to transform agriculture, one of the most traditional and ancient sectors of the Andean countries, into an engine of growth, socioeconomic development and productive transformation. The importance of the sector is evident not only in its contribution to GDP, food security and employment, but also in its capacity to offset declines in economic growth and social disparities. An example of this was the COVID-19 pandemic, which severely affected all sectors except agriculture. However, its future performance depends on a new value proposition that not only addresses long-standing challenges related to its low productivity, but also knows how to transform climate change into an opportunity. This requires addressing deficiencies in infrastructure and institutional frameworks, as well as rethinking around greater diversification, sophistication and resilience.

This analysis provides proposals for the Region to strategically transform and position the sector, in order to conquer new and more demanding markets and provide greater income to producing communities. Some of these proposals require a new approach, aligned with international commitments to decarbonization, and the use of technology to address information asymmetries and market failures. While there are costs associated with these recommendations, they are insignificant next to the potential economic, social and environmental gains that can be achieved. The most important message of this chapter is that the Andean countries have options to diversify and position themselves as a unique Region in the world, in a sustainable manner and in face of climate challenges. The rewards promise to be generous.

3



VALUE CHAINS

3. TOWARDS GREATER AND BETTER LINKAGES IN THE ANDEAN COUNTRIES

3.1 Current Situation in the Andean Region

Global value chains (GVC) can be understood as the process through which a group of companies, in different parts of the world, coordinate under the leadership of one or more companies to manufacture a product from design to distribution. The participation of companies in GVCs has a series of associated benefits, such as the transfer of knowledge, the diversification of production and trade, the constant search for greater productivity to compete internationally, the attraction of investment and the creation of quality jobs, among others (IDB, 2021). However, these effects are not automatic and require a series of elements to create a conducive environment for the emergence of GVCs in the Andean economies.

A series of episodes have prompted the incipient reconfiguration of GVCs. This process began after the 2008-2009 global crisis and has accelerated as a result of several factors, including the US-China trade conflict, the COVID-19 pandemic and the recent war in Ukraine. These events have highlighted the risks of the current structure of GVCs which, by relying on single suppliers for certain products, face potential supply disruptions and unexpected cost increases. These disruptions have led to shortages of certain critical products and contributed to rising global inflation. In addition to these geopolitical risks, there is growing concern about the environmental impact of trade and, in particular, the carbon footprint of products. As a result, companies are seeking to reduce environmental impact by sourcing, in some cases, closer to destination markets to reduce transportation distances within the supply chains.

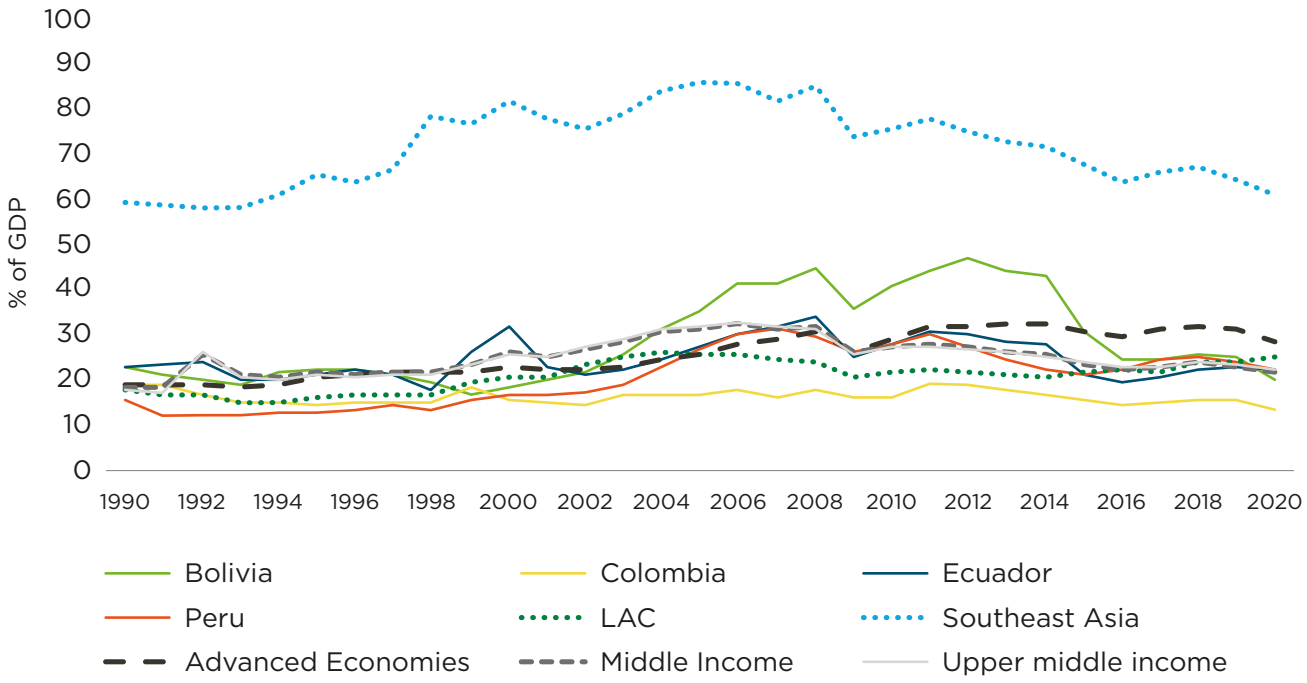
All of this has brought the debate on supply chain diversification to the forefront because, if suppliers of strategic inputs in key industries are concentrated, the risk of chain disruption is high and could lead to serious economic damage. To ensure greater resilience to future disruptions, as well as reduce their environmental impact and lower costs by shortening transportation distances, global companies are taking steps to align supply options closer together, which has come to be known as nearshoring.

In this new scenario, we can think of a world with new opportunities and challenges, especially in a Region such as the Andean Region, where countries such as Ecuador, Colombia, Peru and Bolivia are less integrated into these GVCs and where existing integration occurs, in most cases, in the less advanced links of the production chain, where exported inputs such as raw materials account for a high share of total exports.[1]

Similar to the rest of Latin America and the Caribbean (LAC) and middle-income countries, the countries of the Andean Region are known to have relatively less export-oriented economies when compared to fast-growing countries, such as those in Southeast Asia (see Graph 3.1).

1 Even though it belongs to the Andean zone, this study does not include the case of Venezuela.

Graph 3.1. Exports of Goods and Services (% of GDP)[2]



Source: World Development Indicators (World Bank).

Note: Southeast Asia is represented by the following countries: South Korea, Indonesia, Malaysia, the Philippines, Singapore and Thailand.

In this Region, traditional goods[3] (mainly raw materials) are the main component of total exports. Between 1992 and 2021, Bolivian and Colombian traditional goods exports accounted for an average of 67.4% and 54.5%, respectively; while for Ecuador and Peru, this market exceeded 70% of total exports.[4] As a result, export linkages (Koopman *et al.*, 2011) in the countries of the Region are based on forward linkages, namely, the export of natural resources to countries that process them into other products and then re-export them (Amar and Torchinsky Landau, 2019).[5] Linkages such as these, with a larger share of primary industries, tend to be part of what Gereffi defines as "buyer-driven chains", where lead firms in the value chain can capture the greatest value added generated (Gereffi, 1994).

The linkages that exist in the Region leave little room for growth-enhancing linkages, given that much of the extraction of natural resources requires few local inputs. However, despite the fact that intraRegional exports are only 7% of total exports (IDB, 2022), they have a higher level of sophistication than exports to the rest of the world, which consist mainly commodities (Amar and Torchinsky Landau, 2019). In turn, intra-Regional trade is also more diversified than extra-Regional trade. The number of product subheadings

2 Southeast Asia is represented by the following countries: South Korea, Indonesia, Malaysia, the Philippines, Singapore and Thailand.

3 For the Andean countries, traditional goods exports include the following products: natural gas, gold, zinc and oil (Bolivia); coffee, coal, oil, ferronickel (Colombia); bananas and plantains, coffee, shrimp, cocoa, tuna and fish (Ecuador); and copper, gold, iron, liquified natural gas and fishmeal (Peru).

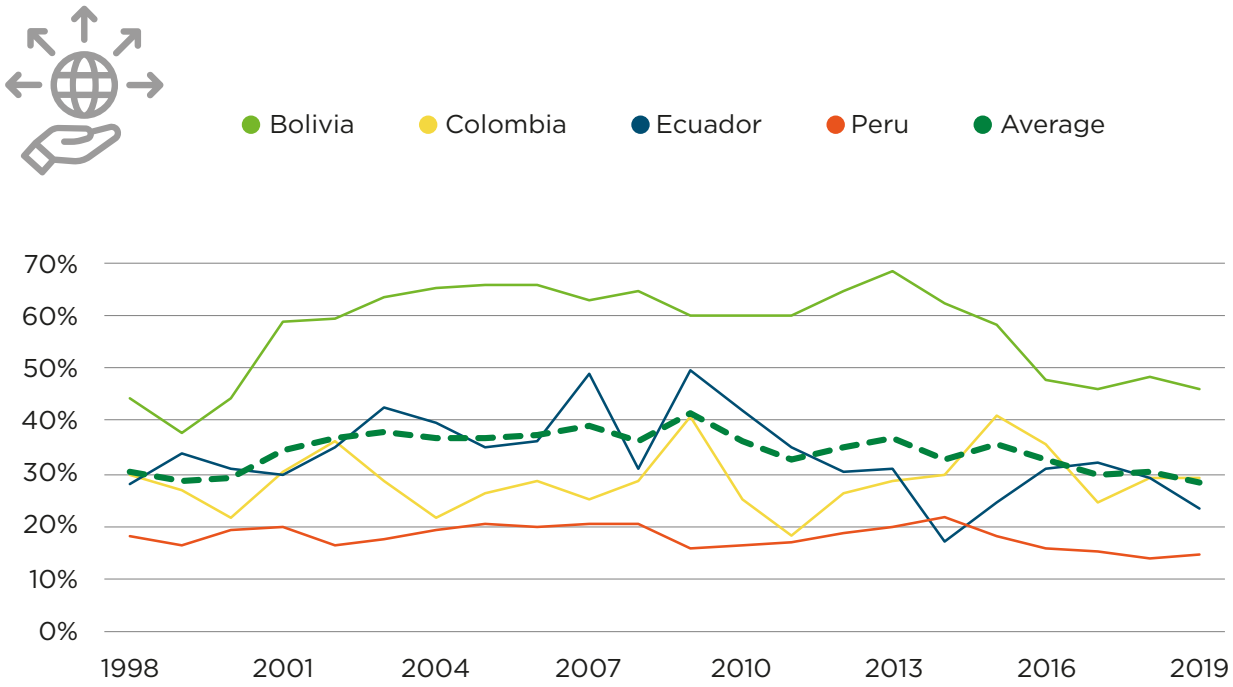
4 Raw materials may be integrated into GVCs. However, in the countries of the Region, this occurs at very early stages of the chain.

5 The paper conducts an exercise for five South American countries, including Peru and Colombia. One conclusion of the paper is that South America is far from away from the final demand for products and services.

exported intra-Regionally reached 457 in 2019, while the number to the main export market (USA) was 109 in the same year, and to China and the European Union (UE) reached 11 and 61, respectively.

Regional integration could be an alternative for moving to a stage of greater backward linkages, that is, incorporating greater foreign value-added to exports. Towards this end, there is room for expanding Regional integration. Bolivia stands out for its high level of intra-Regional trade with the rest of LAC. The proportion of its exports to LAC in relation with total global exports reached around 70%. For its part, Peru is the country with the lowest level of intraRegional trade. However, in proportional terms, intra-Regional trade in the Andean Region lags behind that of other Regions in the world. The average of intra-regional exports (between the countries of the Andean Region and Latin America and the Caribbean) between 1998 and 2019 was 34%, well above the trade levels between the countries of the latter Region, which in 2019 was 14%. However, it is below that of EU countries where intra-Regional trade reaches 59%, and the developing East Asian countries, where it exceeds 41% (IDB, 2021).

Graph 3.2. Intra-Regional Exports between Andean Countries and LAC Countries (% of total)



Source: UN Comtrade database.

There are different methods for measuring the participation of four of the Andean countries in GVCs. By using data produced with multi-Regional input-output matrices, one way of measuring GVC participation is by examining a country's linkages upstream in the value chain. The share the foreign value-added content incorporated into a country's exports is specifically measured. Table 3.1 shows simple averages of this measurement in three different periods for these four Andean countries.

The table shows that the participation of economies within the GVCs is low, where barely 10% of foreign value is added to their exports, while LAC and the EU present, for the 2017-2019 period, average levels of foreign value-added content incorporated into their exports of 18.1% and 43.3%, respectively (IDB, 2021).

These values are not only low in relative terms compared to more integrated economies such as the European Union, but have remained practically stable over the last three decades. Only Peru has shown some growth in its insertion in GVCs in recent years.

Table 3.1 Foreign Value Added incorporated into Exports (as percent of exports)

	1990-1992 Average	2000-2002 Average	2017-2019 Average
Bolivia	9.4%	8.2%	8.7%
Colombia	8.7%	12.7%	10.7%
Ecuador	11.4%	10.9%	9.0%
Peru	8.4%	8.2%	12.1%
Andean Countries Average	**9.5%**	**10.0%**	**10.1%**

Source: IDB with data from Casella *et al.* (2019).

This exercise can also be carried out at the Regional level to assess the formation of Regional value chains, by examining the percentage of foreign value added which comes from the same Region and is incorporated into a country's exports. To this extent, the differences between the Andean countries region and other Regions are even greater. In the 2017-2019 period, for example, exports from this Region contained, on average, 3.2% of value added coming from LAC countries. For their part, exports from Asia contained 20.4% of value-added inputs from Asia, and exports from European Union countries contained 22.7% of value added from the European Union. These values show modest growth over time in the Andean Region, again driven by Peru.

Table 3.2 Foreign Value Added from LAC incorporated into exports (as percent of exports)

	1990-1992 Average	2000-2002 Average	2017-2019 Average
Bolivia	3.6%	3.5%	3.4%
Colombia	1.7%	2.5%	2.2%
Ecuador	3.6%	3.7%	3.8%
Peru	2.2%	2.2%	3.5%
Andean Countries Average	**2.8%**	**3.0%**	**3.2%**

Source: IDB with data from UNCTAD-EORA.

In order to integrate into value chains, one of the key elements is to create the conditions for countries to be attractive to foreign direct investment (FDI) so that it can generate greater potential for supplying the links in value chains that generate greater added value, such as those of developed countries like the U.S. The progress of FDI in the Region was favorable until the arrival of the pandemic. In turn, countries such as Peru and Colombia, members of the Pacific Alliance (PA), have made greater progress in terms of attracting and facilitating investment, which is partly the reason why they receive the greatest flow of investment in the Region. In the Andean Region, a high percentage of FDI goes to the extractive sector (mining, hydrocarbons, quarries, etc.).

According to Regional studies (Andean Community, 2021), there are opportunities for production linkages in the Region in sectors such as animal feed, other chemical products (cosmetics, toiletries, pesticides, etc.) and computer services. However, the countries of the Region have very similar production characteristics and could achieve larger gains by working together to integrate into global value chains with high value-added markets as their final destination.

Since the main destination for Andean Region exports is the U.S., opportunities should be sought in areas where the U.S. is trading with the Andean Region, but also with other Regions outside the Americas in order to be able to supply a greater share of these inputs from a Region that is geographically closer and that provides greater security in light of a possible disruption to supply chains, such as the one observed during the COVID-19 pandemic. In this regard, several IDB works in progress (2022a, 2022b, 2022c) show that the countries of the Andean Region have greater potential in the agro-industrial, textiles, plastics and fishing sectors, depending on the country of origin. In these sectors, among others, there is a potential to substitute producing countries outside of Latin America as input suppliers towards the United States. However, in order to do so, the Region's countries face a series of challenges to become major suppliers of these and other products to final production markets such as the United States.

3.2 Challenges Faced by Countries of the Andean Region

The low participation of Andean countries in GVCs is due to a number of factors. Institutions that regulate trade, physical and digital infrastructure, and access to financing, among others, stand out as the main bottlenecks that the Region faces for greater insertion into value chains in LAC and the rest of the world. At the same time, cross-cutting issues such as improving human capital and R&D investment, among others, are also relevant (Andean Community, 2021).

Restrictive trade policies slow down the opening up to new markets. Blyde and Trachtenberg (2020) argue that low participation in GVCs is due, in part, to restrictive trade policies, including a highly fragmented system of Preferential Trade Agreements (PTA). A lack of coordination impedes the growth of intra-Regional trade and the formation of GVCs with high value added, since it leads to a fragmentation of intra- and extra- Regional supply chains, preventing the formation of longer Regional supply chains. As an example, the countries of the Region have not pursued a common agenda for trade agreements.

High transportation costs are a factor limiting the competitiveness of Andean products and integration into global value chains.[6] This is explained by the lack (and poor quality) of transport infrastructure and the low level of intermodal connections. These lags in transportation systems in the countries of the Region generate high logistics costs that affect productivity (de la Cruz *et al.*, 2020). Within the transport infrastructure ranking of the Global Competitiveness Index (2019) and out of a total of 141 countries, Bolivia, Peru, Colombia and Ecuador rank 122nd, 97th, 92nd and 64th respectively, within the transport infrastructure ranking of the Global Competitiveness Index (2019) out of a total of 141 countries. Moreover, some countries in the Region, such as Mexico and Chile, are ranked 51st and 54th, respectively. In this sense, the quality of roads and highways is deficient and there is a deficit in port and rail infrastructure, where significant investment would be necessary to converge to OECD quantity and quality of infrastructure country levels.

High transportation costs are a factor that limits the competitiveness of Andean products and their integration into global value chains.

According to the analysis of Salamanca *et al.* (2021), based on the Global Competitiveness Index (2019), the countries analyzed present a low result in road connectivity, with Colombia being the best positioned in general, although there are different advantages among the countries of the Region. It is essential to see the differences that exist between Regions in terms of the transportation mode used for trade. CAF (2021a) shows that 94.9% of international trade in South America is carried out by maritime transport; this percentage is much higher than in Central America and Mexico (47.5%) or the USA (68.3%). In the Andean countries this may be partly due to the geographical difficulties of carrying out trade by land and partly due to the types of products exported (mining and agriculture), which usually require maritime transport. These difficulties are even greater in Bolivia given its status as a Mediterranean country. It should be noted that the other three Andean countries considered here (Colombia, Peru and Ecuador) have higher maritime connectivity indexes than the Latin American average (CAF, 2021a). Likewise, there is high potential in Colombia and

6 According to Cigna *et al.* (2022), the decrease in transportation costs for international trade was one of the factors that favored greater integration into global value chains. Furthermore, the same authors identify an increase in these costs observed since 2008 as well as the inconvenience caused by COVID-19 to the transport system as one of the explanations for the slowdown in the expansion process of these chains.

Peru to make use of their air space and offer good airport connectivity or to take advantage of the quality of land routes in Ecuador. In order to close gaps, practices, policies and experiences can and should be shared in the Region to foster the development of connectivity infrastructure in order to close gaps.

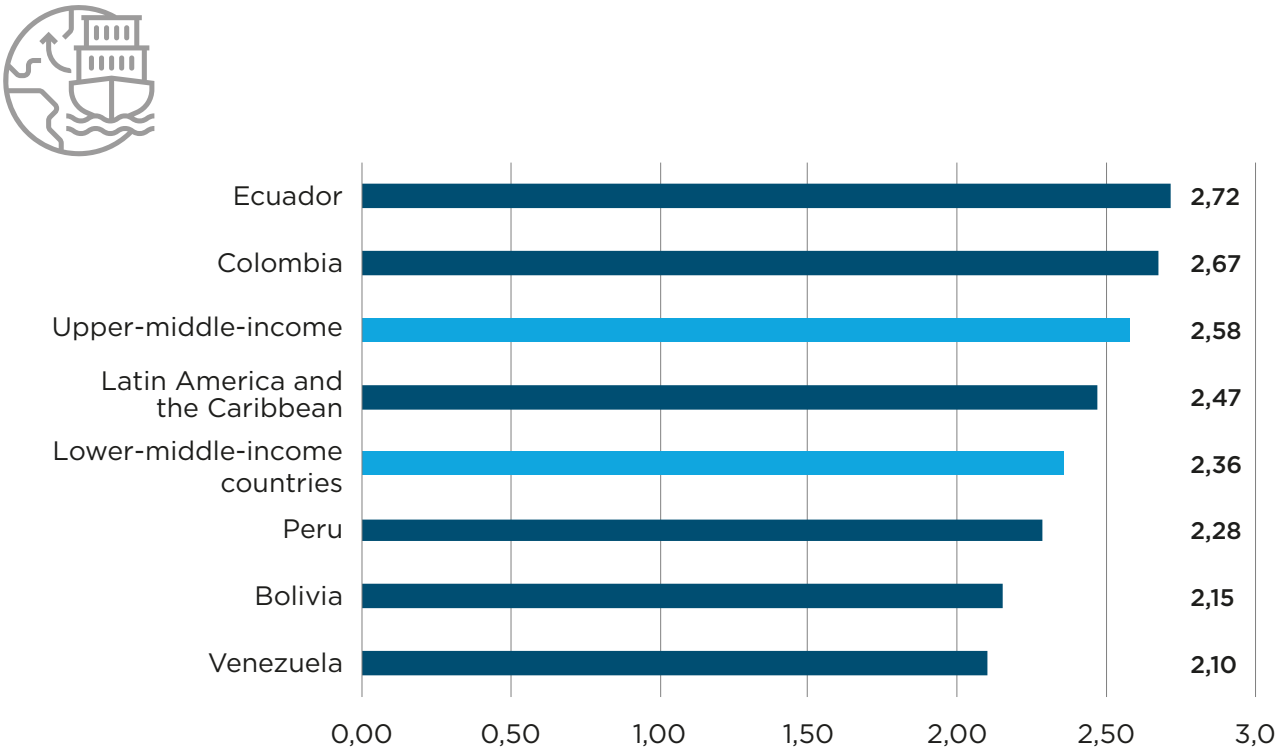
Table 3.3. Scores and Rankings obtained by Andean Countries in the Infrastructure Component of the Global Competitive Index (2019)

	Bolivia		Colombia		Ecuador		Peru	
	Score	Ranking	Score	Ranking	Score	Ranking	Score	Ranking
Transportation Infrastructure	34.4	122	43.8	92	52.8	64	42.4	97
Road Connectivity	56.7	118	65.4	97	64.2	100	64	102
Quality of Land Roads	41.3	100	39.7	104	65	35	36.4	110
Density of Railroads (km/1000km2)	8.1	80	4.8	89	n/a	n/a	3.6	95
Efficiency of Rail Services	26.9	81	12.2	99	n/a	n/a	31.7	74
Airport Connectivity	30	105	68.7	31	39.9	83	58.2	50
Efficiency of Air Services	43.3	116	57.6	78	64.6	58	54.2	92
Maritime Transport Connectivity	n/a	n/a	50.1	33	24.8	62	43.8	39
Efficiency of Port Services	16.6	134	51.5	72	58.1	55	47.1	84

Source: World Economic Forum, Global Competitiveness Report (2019).

In addition, there are lags in logistics. Apart from inadequate infrastructure overall, the Andean Region has poor logistics performance and development of logistics corridors to support the upgrading of value chains. In a GVC integration process, it is essential to reduce uncertainty with respect to the supply chain. According to the World Bank Logistics Performance Index (2018), the Region significantly lags behind other Regions of the world. Thus, the average index for the Region is 2.66; while for Europe it is 3.4 and for East Asia and the Pacific it is 3.13 (IDB, 2021). Within the Region, the behavior is dissimilar: Ecuador and Colombia have a higher score than LAC countries and upper-middle-income countries, while Peru and Bolivia have lower scores than lower-middle-income countries. If one considers their position in the global index, Colombia occupies 58th place, Ecuador 62nd, Peru 83rd and Bolivia 131st. Among the index components, under the dimension for inter-modal development and trade facilitation mechanisms, the case of Columbia stands out, while Ecuador has a better score in customs and infrastructure and Peru in timeliness (Salamanca *et al.*, 2021).

Graph 3.3. Logistics Performance Index: Quality of Trade- and Transport-related Infrastructure, 2018



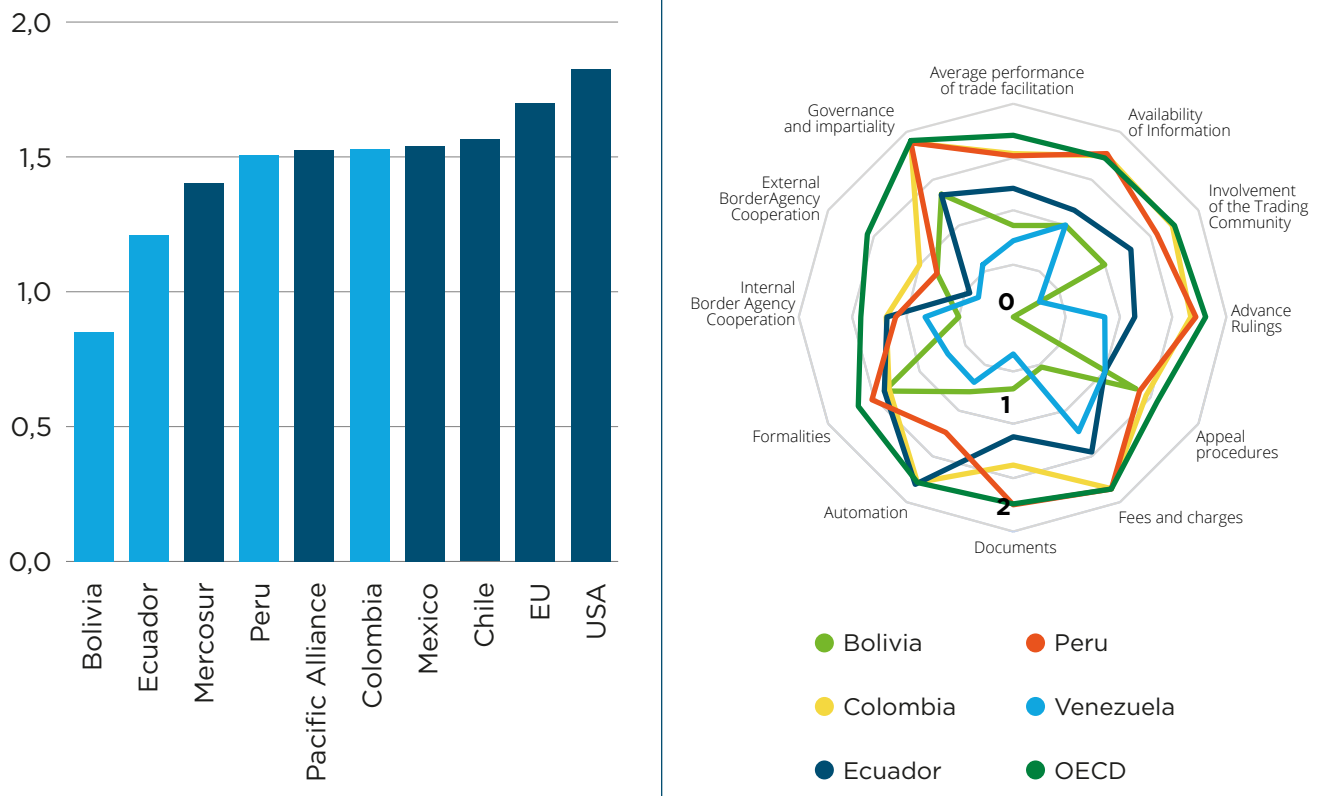
Source: World Bank (2018).

The implementation of trade facilitation measures is important to accelerate the pace and lower the costs of international trade. Trade facilitation, understood as the simplification and harmonization of procedures and information flows associated with imports and exports, is relevant to the cost structure of trade and is therefore a key factor for countries to successfully integrate into global supply chains.

Trade facilitation in the Region's countries is uneven. The trade facilitation indicators collected by the OECD[7] allow comparing different dimensions of trade facilitation, such as cooperation between border agencies, availability of information, costs and procedures. In general, Peru and Colombia, and to a lesser extent Ecuador, are closer to the performance of OECD countries. In an exercise carried out with eleven trade facilitation indicators, the differences between Peru and Colombia and the rest of the countries can be observed. These two countries have levels similar to those of Chile and are above the Mercosur average.

7 See: https://www.oecd.org/trade/topics/trade-facilitation/

Graph 3.4. Trade Facilitation Indicator



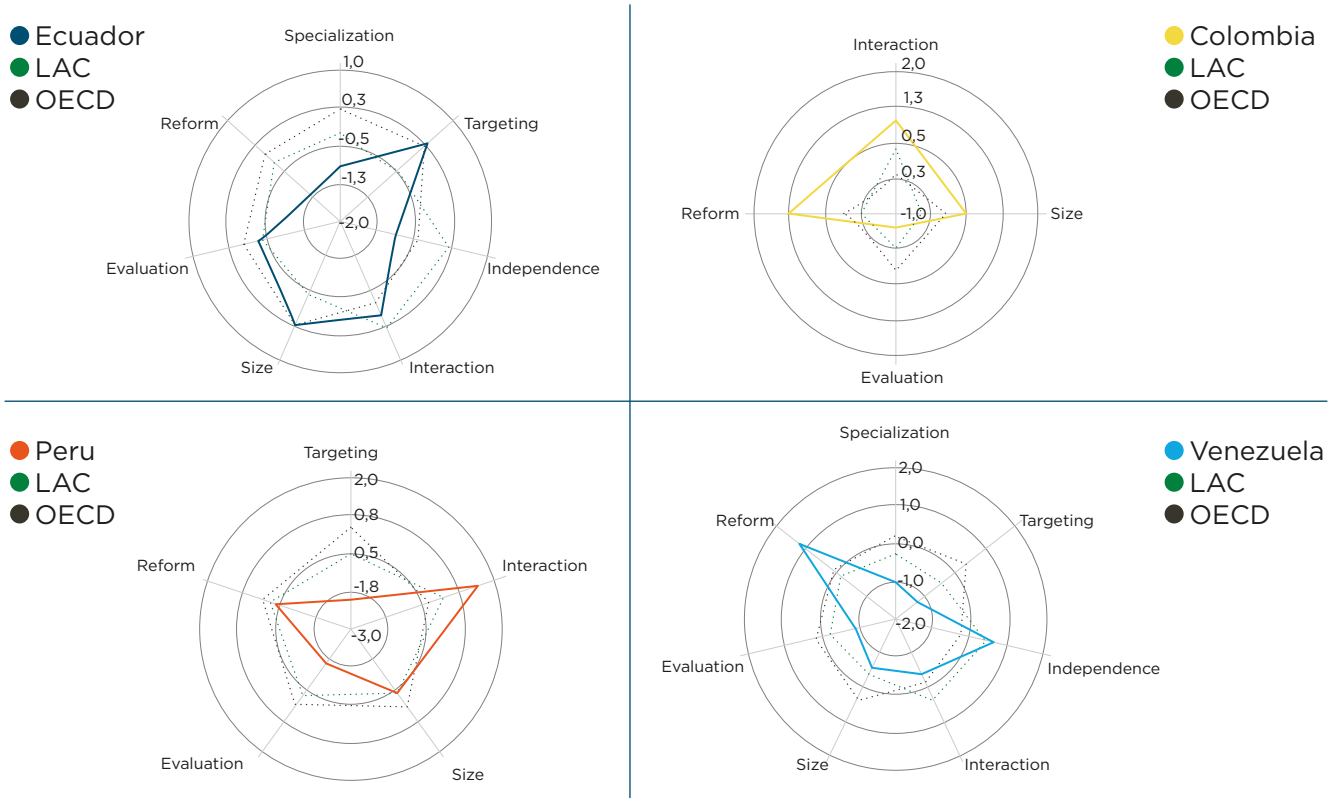
Source: OECD.

Note: The indicator takes values from 0 to 2, where 2 indicates the best performance that can be achieved. Calculated from the information in the OECD database.

High information costs have an impact on the search for new markets and insertion into GVCs. According to IDB (2021), information costs continue to be a significant barrier for the integration of local companies into global value chains. To address this restriction, the countries of the Region have made progress in creating export promotion agencies both to facilitate the integration of local companies and to attract international companies to the country. Volpes Martincus (2010) identifies the positive impact of these types of institutions in the cases of Peru and Colombia on export growth and diversification. When comparing the results of quality indicators in different dimensions of investment promotion agencies in the Andean Region with those of LAC and OECD[8] countries, dissimilar results are observed. In the case of Ecuador and Peru, the analyzed parameters are within the levels observed for OECD countries in almost all the dimensions, while in the case of Colombia, this is only observed for some dimensions.

8 See https://www.iadb.org/es/comercio/como-armar-el-rompecabezas-de-la-promocion-de-inversiones for the creation of interactive graphics, based on Volpe Martincus *et al.* (2019).

Graph 3.1 Scores for Individual Investment Promotion Agencies



Source: Volpe Martincus and Sztajerowska (2019).

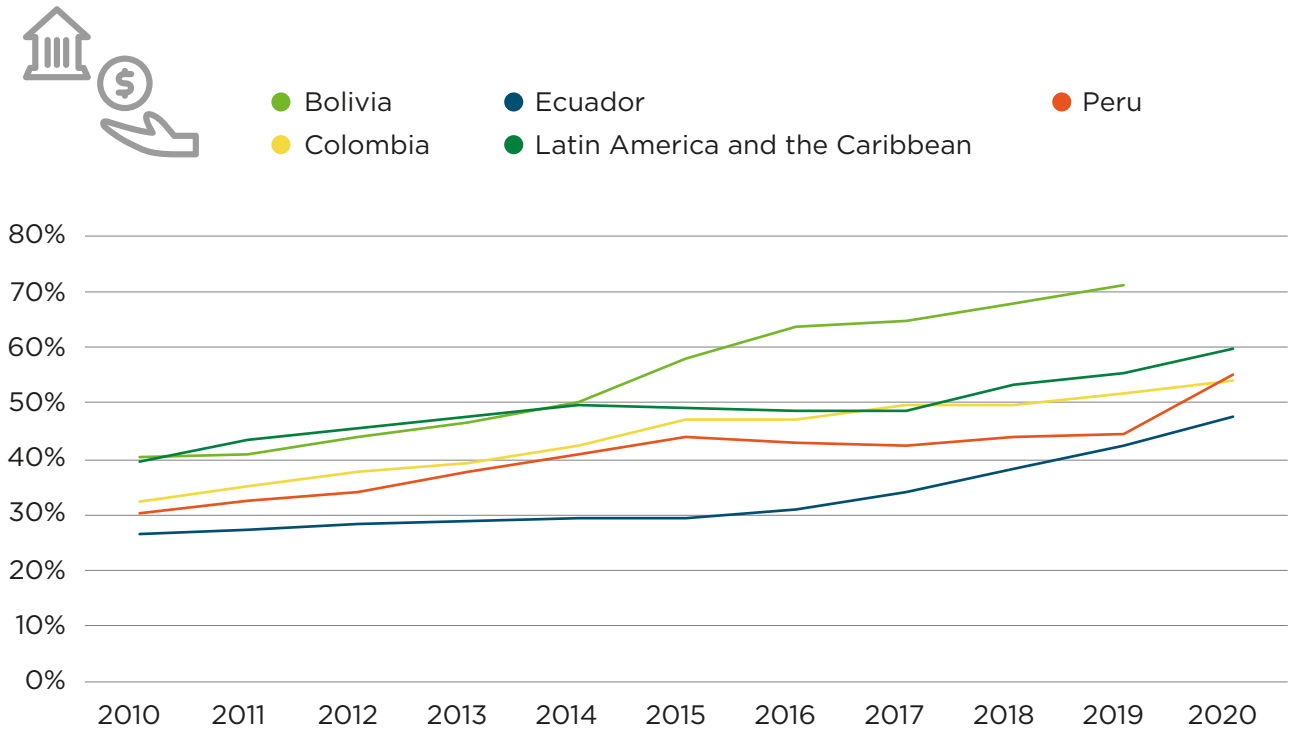
In recent years, there has been an increase in international recognition of investment promotion agencies in the Region. For example, Site Selection Magazine ranks the best investment promotion agencies worldwide (Jones-Kelley, 2020). PROCOLOMBIA was recognized by this publication in 2020[9]. Moreover, none of the Region's investment promotion agencies received UNCTAD recognition in the last fifteen years, while other LAC institutions did.

Access to financing limits the incorporation of the private sector to global value chains. In the Andean Region, companies that have access to financing are 32% more productive compared with those that do not (de la Cruz *et al.*, 2020). Several analyses (Asian Development Bank Institute, 2015; Blyde, 2014; and CAF, 2021a) show that small and medium-sized enterprises need long-term financing from the formal financial sector in order to integrate and grow within global value chains. Based on World Bank data, credit to the private sector for the Andean countries is below the level of other groups, such as the OECD, where this indicator reached 161% of GDP in 2020. Also that year, Colombia and Peru had percentages of credit to the private sector representing 55% of GDP and in Ecuador, this indicator was 47%. Bolivia's progress in relation to other countries in the Region is noteworthy, since in 2019 it showed a credit level of 71.2% of GDP –more than 15 percentage points above the LAC average–, which for that year was 55.2%. In addition to the problem of the general lack of credit, there is the problem of the high participation of micro, small and medium-sized enterprises in economic activity, which have even lower access to financing (de la Cruz

9 Ver: https://siteselection.com/issues/2020/may/top-investment-promotion-agencies-2020.cfm

et al., 2020). CAF (2021b) identifies that the level of access to credit from the banking sector of SMEs is related to the size and age of the firm, affecting smaller firms due to their limitations and shorter track record. In the Andean Region, this type of firm accounts for 95% or more of the business park, as in the case of Peru.

Graph 3.5. Domestic Credit to the Private Sector (% of GDP)



Source: World Bank

Although there is no evidence of strong lags in terms of connectivity, the lack of human capital in ICTs reduces the competitiveness of Andean companies. Based on 2020 data from the International Telecommunication Union (ITU), referring to mobile broadband[10] network coverage as a percentage of the population, there is no evidence of a marked lag in the Andean countries. Thus, Colombia has 100% coverage, Bolivia has 91%, Ecuador has 95% and Peru has 74%. However, there are major setbacks in ICT skills in the Andean countries, where it is observed that the labor force with advanced skills in Peru and Ecuador barely reaches 3% and in Colombia it is 5% (ITU, 2022)[11].

10 3G networks or higher

11 There is no data available for Bolivia. Retrieved from: https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

3.3 Policy Recommendations

In order to take advantage of the opportunity of integrating into a GVC, it is important for the countries of the Region to make progress on a collective agenda that will enable them to strengthen the Regional bloc. Here, it becomes important to move forward with market opening processes, in the harmonization of trade agreements and regulatory convergence between the countries of the Region. This is even more relevant in times of trade and geopolitical tensions such as these and should be complemented with trade facilitation measures such as the implementation of risk-based supervision schemes, authorized economic operator programs, and customs modernization and cooperation.

There is work to be done on a series of structural reforms that allow the Region to become more friendly friendly to foreign investment and generate a better business climate.

Similarly, work should be done on a series of structural reforms to make the Region more friendly to foreign investment and generate a better business climate. This should be accompanied by or even generated through heavy investment in connectivity infrastructure. As explained above, maritime transport is fundamental to the Region, wherefore port investment is important. In Bolivia, the quantity and quality of the road network needs to be improved due to the country's Mediterranean location (Beverinotti *et al.*, 2020). This investment in infrastructure should be resilient to climate change. Countries in the Region can take advantage of their location, time zone, human and natural resources. But without infrastructure development and advanced logistics, it will be very difficult to support a significant number of companies to be a part of GVCs in more advanced links.

This must also be accompanied by investment in digitalization, as well as the training of IT sector workers. Digital connectivity and worker's skills are important for improving business productivity. This development of skills, both in goods and services, will be critical for achieving access to more sophisticated GVC links.

Furthermore, it is important to develop strategies regarding access to credit for SMEs. It is necessary to create lines of credit with affordable rates, especially for those companies that are starting up and have a well-articulated business plan, since it is precisely small companies that have higher rates than larger companies (CAF, 2021b). In turn, it is necessary to improve the assurance of creditors' rights through a more effective judicial system (de la Cruz *et al.*, 2020). All of these factors can allow SMEs to obtain sufficient resources to formalize and carry out their projects and become part of GVCs in the medium term.

In conclusion, the current global scenario creates an opportunity for the Region to improve its participation in GVCs, which has been historically low. Indeed, the incipient reconfiguration of supply chains as a result of the global geopolitical situation and the increased perception of risk due to the COVID-19 pandemic have led larger multinational companies to seek greater resilience for their supply chains by sourcing their inputs from closer locations in order to make their supply chains more secure.

This creates an opportunity for Andean region countries to position themselves as attractive destinations for supplying various links of the GVCs that are relocating. However, this opportunity that opens up for the Region will not materialize automatically. To this end, it will be important to move forward with an agenda of policies that facilitate the business climate and allow this opportunity to materialize. In particular, progress must be made in achieving greater Regional integration through channels such as the promotion of trade facilitation, improvements in logistics, infrastructure, connectivity and the enhancement of technical capabilities.

The situation is also favorable because of growing concern about the environmental impact of "long" GVCs, with a final product that is far removed from the production of its inputs. The carbon footprint of these products is an increasingly pressing issue for some Regions of the world. All this creates opportunities that the Region could take advantage of by taking part in the shortening of the chains, reducing environmental impact and allowing supplies to be sourced within shorter distances of main destination markets.

Hence, there are challenges for those countries producing emission-intensive commodities. All this requires Regional planning and coordination by member countries so that they can meet these new standards and migrate to low carbon industries and processes.

The task is not easy, but the existing global challenges also bring new opportunities for the Region. These can be seized to provide value and development to the inhabitants of the countries of the Andean Region.

4

SERVICES

4. THE SERVICES SECTOR IN THE ANDEAN REGION: CHALLENGES AND OPPORTUNITIES

4.1 Present-Day Services

An economic diversification strategy must take into account the importance of the tertiary sector in Andean economies. The services sector is the main source of income in the countries of the Andean Region. Like the rest of Latin America and the Caribbean (LAC), services account for more than 45% of GDP. In turn, the tertiary sector (commerce and services) has become the most dynamic sector that tends to create employment in the long term (ECLAC/ILO, 2019). The proportion of employees in the Andean countries represents more than half of the total number of jobs reported in the different official employment sources for each country. 62.7% of workers in Colombia perform work in the services sector; while, Ecuador and Peru have 51.6% and 54.8% reported jobs in the tertiary sector, respectively. In turn, the tertiary sector has very heterogeneous activities, and its contribution to income varies across countries (see Graph 4.1). For example, trade and hospitality[1] activities have an average share of 12% of GDP, without great variability between countries, while financial, business and real estate activities range from 10% of GDP in Peru and Ecuador to 21% of GDP in Colombia. In the context of the Venezuelan crisis, special attention must be urgently paid to the development of the services sector[2]. From 2013 to 2019, the services sector contracted by 57%, with a particularly significant 86% drop in commerce (which came to represent just 4% of GDP) and 61% in financial intermediation, real estate activities and rentals[3]. However, the sector went from representing 57% of GDP in 2013 to 67% in 2019, date from which the characteristics of the economic situation have been exploited in recent years[4].

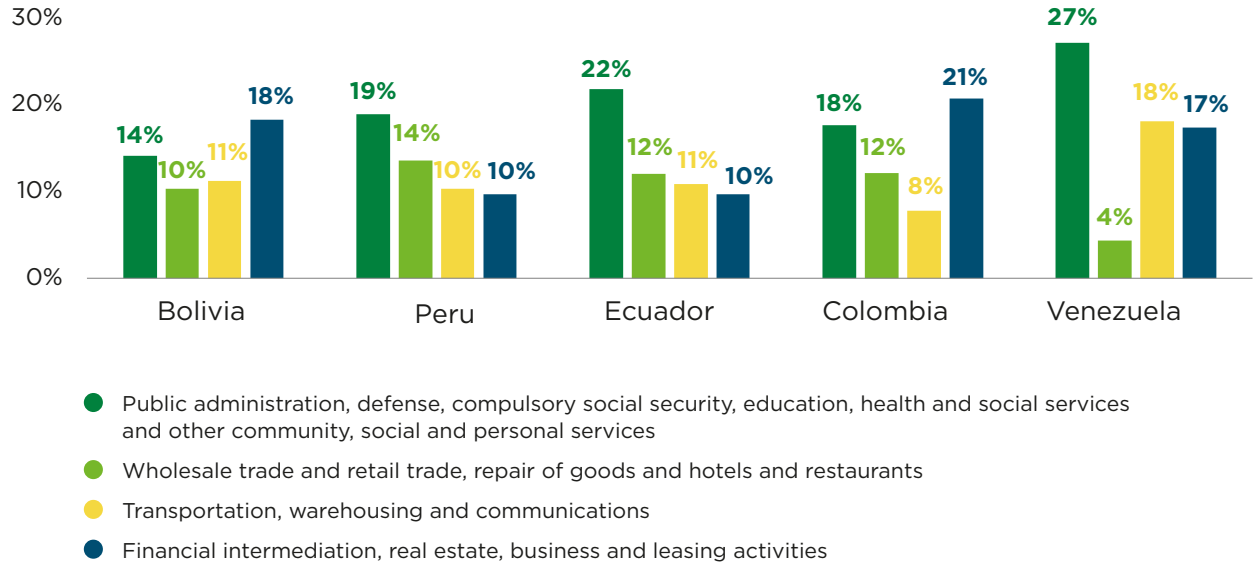
1 The hospitality sector is a broad category of activities that include accommodation, food and beverage services, event planning, theme parks, travel and tourism. It includes hotels, travel agencies, restaurants and bars.

2 The Venezuelan crisis is characterized by structural aspects and generalized effects in all productive sectors. According to the latest official figures available from the Central Bank of Venezuela, the Venezuelan economy contracted by 63% between 2014 and 2019. IMF estimates place the decline in economic activity by 2021 at 80%.

3 The characteristics of the Venezuelan exchange market may have generated distortions in the measurement of telecommunications and financial intermediation activities.

4 Hyperinflation between 2017 and 2021 discouraged investment in the sector. However, the emergence of dollarization has generated increased dynamism in the Venezuelan economy, where the services sector has been the main winner. Thus, given the evolution of the crisis between 2019 and 2021, it is estimated that the sector's weight in economic activity has increased significantly.

Graph 4.1 The Tertiary Sector in the Andean Region (2019)



Source: ECLAC and UNStat for Venezuela.

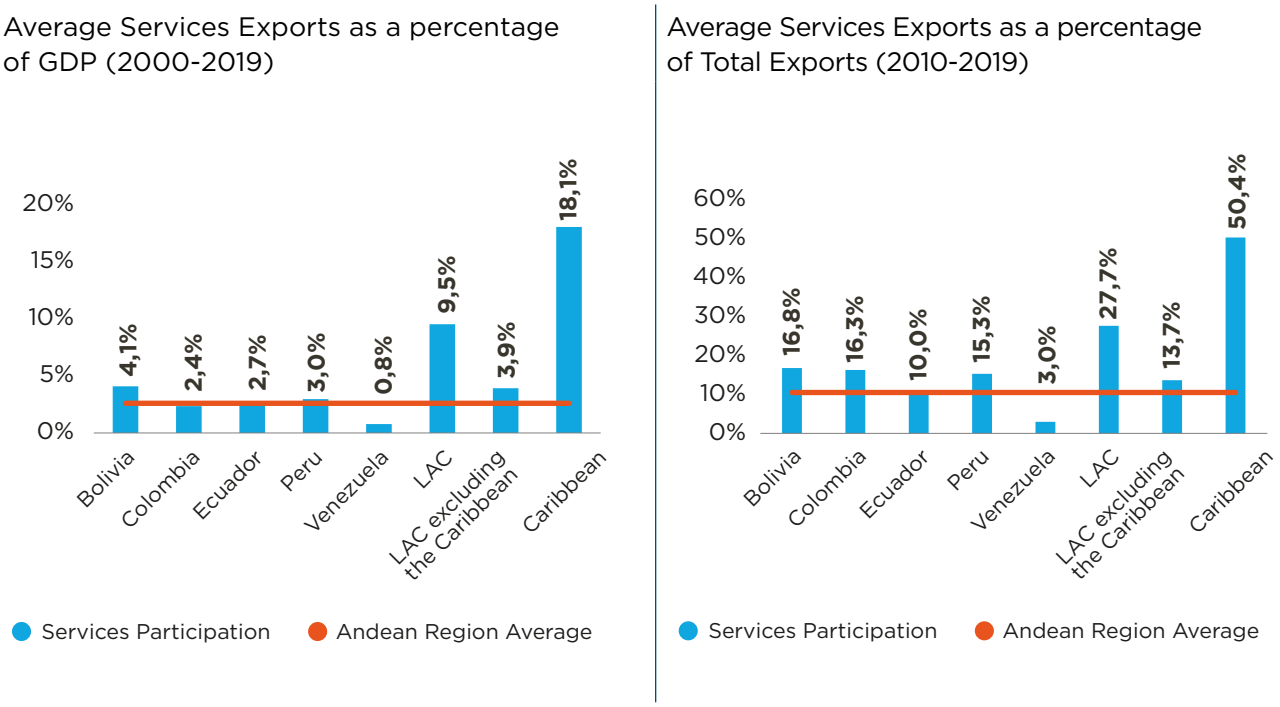
In addition to being the main employer, the tertiary sector, unlike other sectors, tends to have a higher participation of women. For example, in Bolivia and Colombia, women account for 54% and 49%, respectively. In turn, in sectors that require skilled labor, such as the financial services and insurance sector, both economies have higher female participation (55% in Bolivia and 58% in Colombia).

The Andean Region lags behind in services exports, which have gained importance in the rest of the world during the last decade. Technological and communications advances allow some services to be offered across borders with little or no restrictions or new types of services to be created (Giordano and Ortiz de Mendívil, 2021). Over the last two decades, Colombia, Ecuador and Peru have had a relatively stable share of services exports in GDP, which varies around 2% and 3% (see Graph 4.2, left panel). When compared with the other countries of the continent, the share of services exports in the GDP of the Andean countries is low. The Andean countries have an average of 2.6% compared to the Latin American average (excluding the Caribbean[5]) of 3.9%. In the Caribbean countries, the supply of tourism-related services stands out (Giordano and Ortiz Mendívil, 2021).[6] In the Andean Region, these services represent about 11% of total exports (see Graph 4.2, right panel).

5 Bahamas, Barbados, Belize, Costa Rica, Dominican Republic, El Salvador, Haiti, Honduras, Jamaica, Panama.

6 Thus, in Caribbean countries that tend to make tourism one of their main economic activities, because of their geographic location and use of their natural resources, service exports account for more than 30% of their total exports.

Graph 4.2 Services Exports in the Andean Region

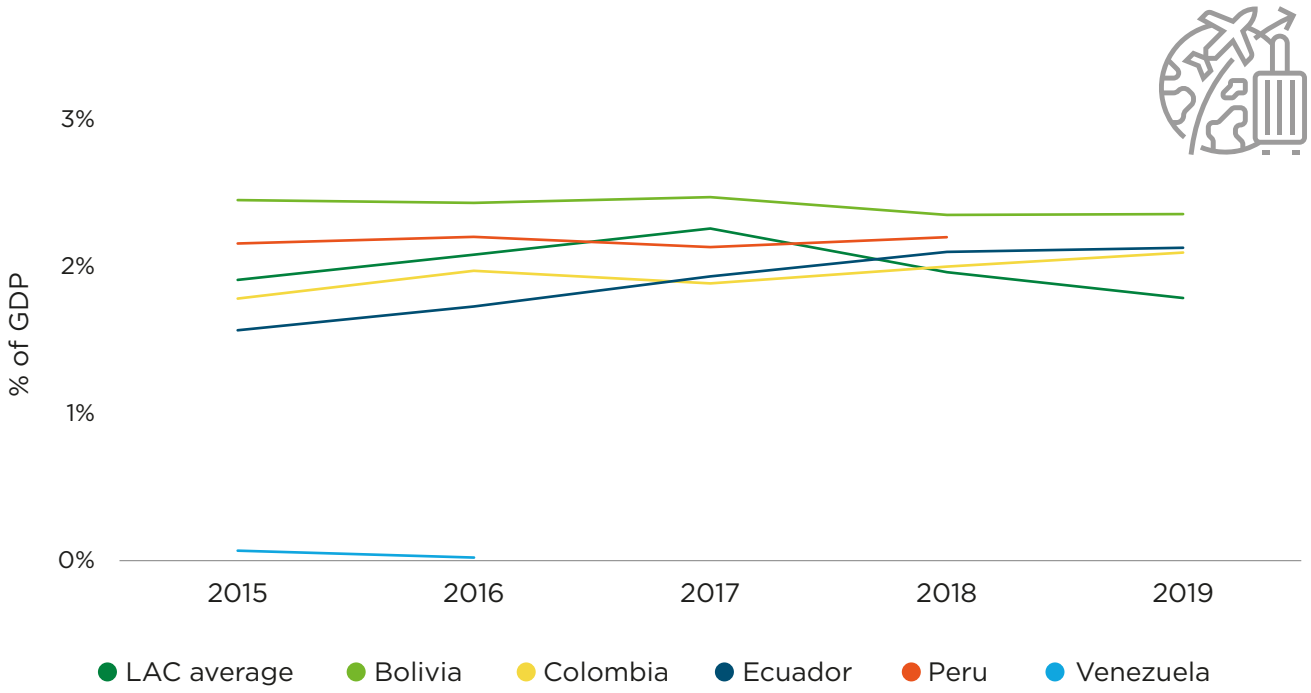


Sources: World Economic Outlook (IMF), Central Bank of Venezuela.

Tourism is the largest catalyst of services exports, particularly in Ecuador, where tourism accounts for more than 60% of total services exports. LAC services exports are concentrated in travel, which account for more than 50% of total services exports, exceeding the world average of 23,4% (Giordano and Ortiz de Mendívil, 2021). In turn, inbound[7] tourism expenditures in the Andean countries have accounted for up to 2.5% of GDP (see Graph 4.3) with an upward trend in recent years compared to LAC (excluding the Caribbean), which has shown a downward trend. This shows the ripple effect that the tourism sector has on other economic sectors, such as agriculture, industry, construction and transportation (Quicaña, 2021). Moreover, for the period between 2010 and 2019, transportation also takes a representative share within the total exports of services in all countries, representing around 20% and 25% of total exports. In addition, the item "other business services" is important in exports from Colombia and Peru. Another item that has a substantial share is "insurance and pensions" in the Bolivian and Peruvian economies.

7 This indicator shows the weight of inbound visitor expenditures as a share of the total value of economic activity in the economy of reference.

Graph 4.3 Inbound Tourism Expenditures as a percentage of GDP



Source: CEPALSTAT.

The countries of the Andean region were among the hardest hit by the pandemic in the world due to the characteristics of the tertiary sector[8]. Part of the observed economic contraction can be explained by the high level of informality and the high contribution of the tertiary sector on their economies. Some characteristics of the Region explain this dynamic, such as a concentration of the labor force in sectors with high physical proximity (restaurants and retail businesses), and greater informality with respect to other Regions of the world, which prevents greater adaptation to telework (Salazar, 2022).

The pandemic has generated structural changes[9], including the rise of the GIG economy[10]. The latter is defined as the exchange of labor for money between individuals or companies through digital platforms that actively facilitate coordination between suppliers and customers, in the short term and through piecework payment[11]. Thus, "since they are not permanent workers, the GIG economy business model breaks away from traditional work schemes"[12]. The insertion of technology worldwide has led to an increase in jobs that are mediated by digital platforms, which have the characteristics of being temporary or for performing specific tasks, that do not require depending on an employer or generating a formal employment relationship. According to estimates of the Pew Research Center (2021), around 16% of U.S.

8 In 2020, Bolivia, Colombia, Ecuador and Peru presented annual GDP contractions of -8.7%, -7.0%, -7.8% and -11.0%, respectively.

9 See https://blogs.iadb.org/trabajo/es/economia-de-plataformas-y-pandemia-es-hora-de-una-mayor-coordinacion/ and https://blogs.worldbank.org/es/latinamerica/la-covid-19-acelera-la-adopcion-de-tecnologia-y-profundiza-la-desigualdad-entre.

10 The term GIC emerged in the United States and was limited to collaborative work in homes. Yet, the advance of technology and the adoption of a new business model developed by companies based in Silicon Valley has allowed its rapid expansion (see https://blogs.iadb.org/trabajo/es/economia-de-plataformas-y-pandemia-es-hora-de-una-mayor-coordinacion/).

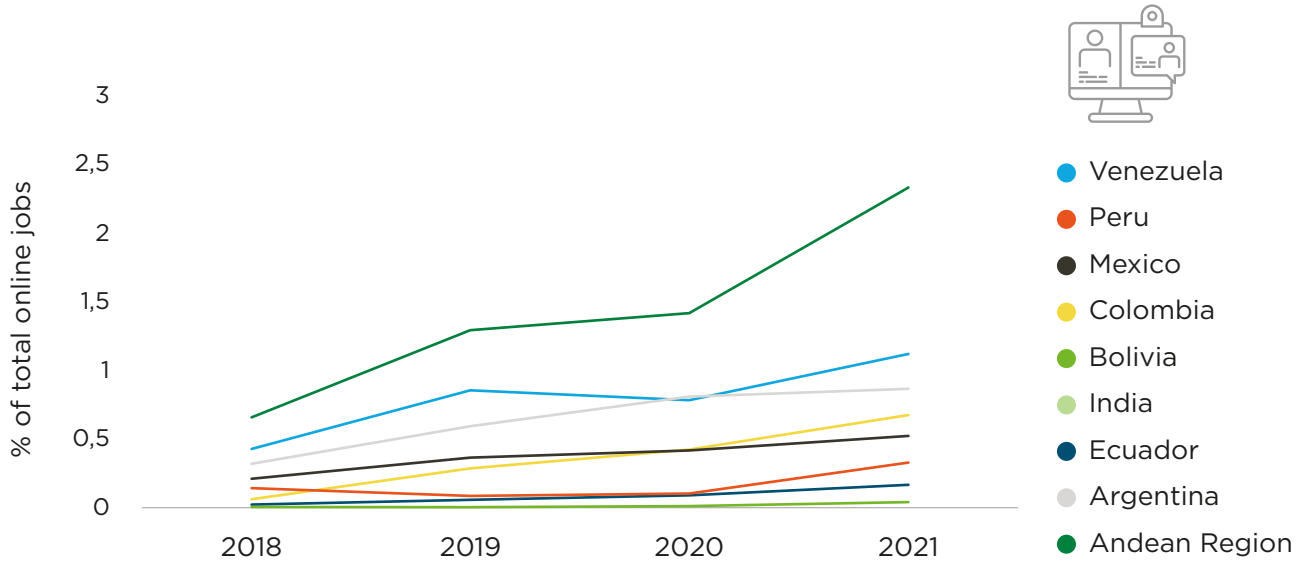
11 See Ver https://www.weforum.org/agenda/2021/05/what-gig-economy-workers/

12 https://blogs.iadb.org/trabajo/es/gig-economy-el-nuevo-paradigma-para-la-generacion-de-ingresos/

residents performed jobs through platforms in 2021, mostly corresponding to the second group. Globally, Kässi *et al.* (2021) estimate that 14 million people are actively working via online platforms and 3.3 million are working full-time via platforms.

In the Andean Region there is an increase in platform-based jobs. The Online Labour Laboratory of the University of Oxford and the International Labour Organization (ILO) have compiled information on jobs performed through the main work platforms on the web. This effort allows analyzing the evolution of this type of work in the countries of the Region and its relevance at the global level. At the aggregate level, the proportion of online jobs performed by residents of the Andean countries increased from 0.65% in 2018 to 2.3% in 2021, presenting the largest increase for the case of Venezuela, which in 2021 accounted for 1.1% of all tasks performed on the analyzed platforms. The value at the Regional level can be compared with 4% in the USA and 26% in India by 2021 (see Graph 4.4).

Graph 4.4. Share of Total Global Online Jobs in the Andean Region



Source: Kässi *et al.* (2021).

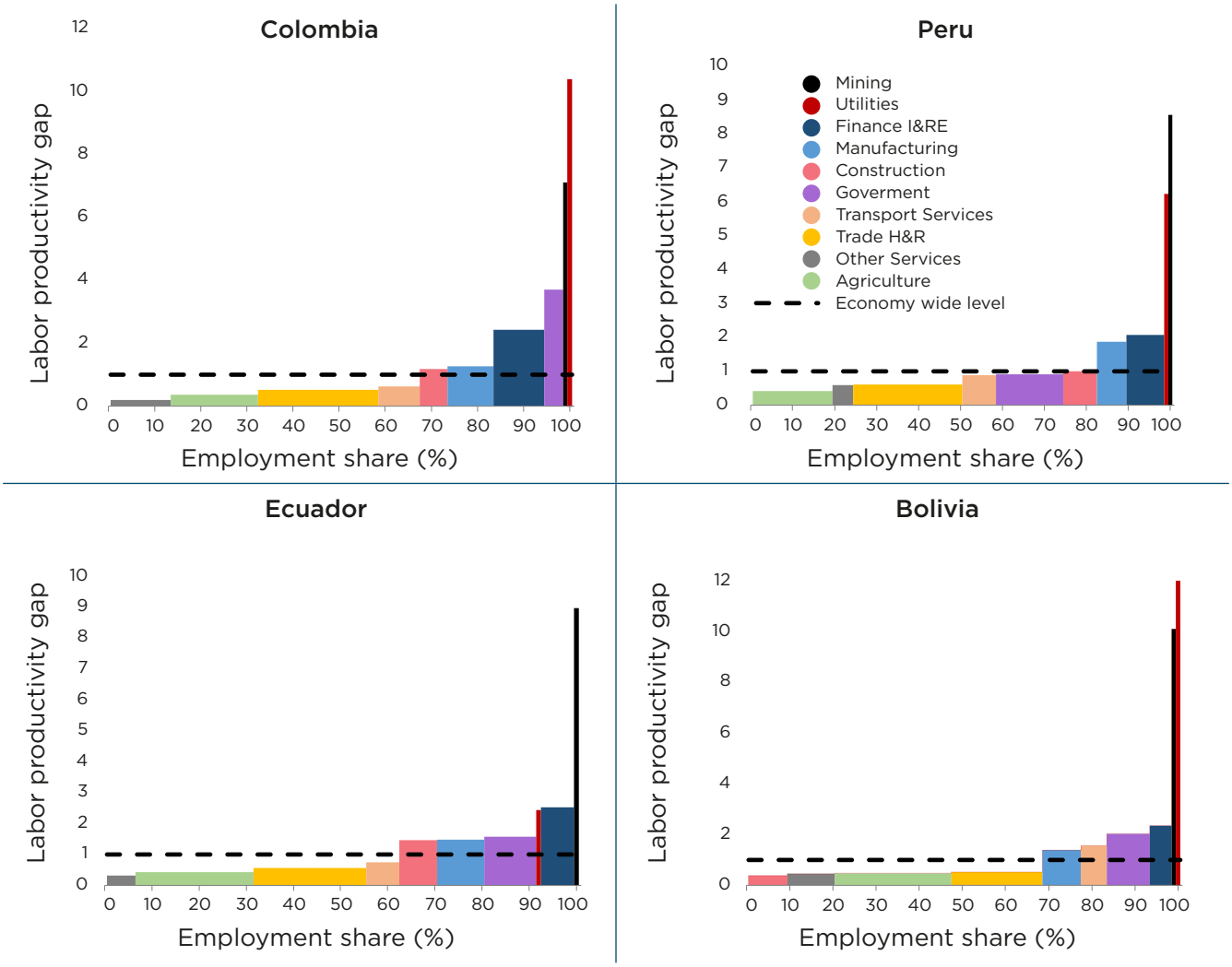
This process has accelerated and the type of work performed has also changed. For example, in 2018, the main type of online work that was performed in Peru, Colombia and Bolivia was related to editing and translation, while in Ecuador it was software development and in Venezuela it was creative and multimedia work. In 2021, the main area of work in Peru, Bolivia and Venezuela was creative and multimedia work, while for Ecuador and Colombia it was software development.

There is limited information about work in the platform economy by location in the Andean Region. Household surveys, the main source of information on labor statistics, do not cover in detail the population working through these platforms. According to examples such as the United States and to the Pew research Center (2021), 16% of the population generated income at some time from platform work, 7% doing home deliveries, 6% doing paperwork or domestic activities and 5% driving vehicles for one of the specific applications. This type of information does not exist for the Region, but as mentioned below, these jobs have become one of the main occupations of migrants.

4.2 Challenges Faced by the Sector

Although the services sector absorbs a significant part of jobs in the countries of the Andean Region, it shows low productivity. In the cases of Colombia and Peru, the services sector accounted for nearly a quarter of jobs in 2018 and a productivity that represents between half and two thirds of the economy's average. For its part, although the share of agriculture in Ecuador and Bolivia is higher, the weight of the services sector continues to be relevant in terms of employment generation, although in terms of productivity it is still below average (see Graph 4.5).

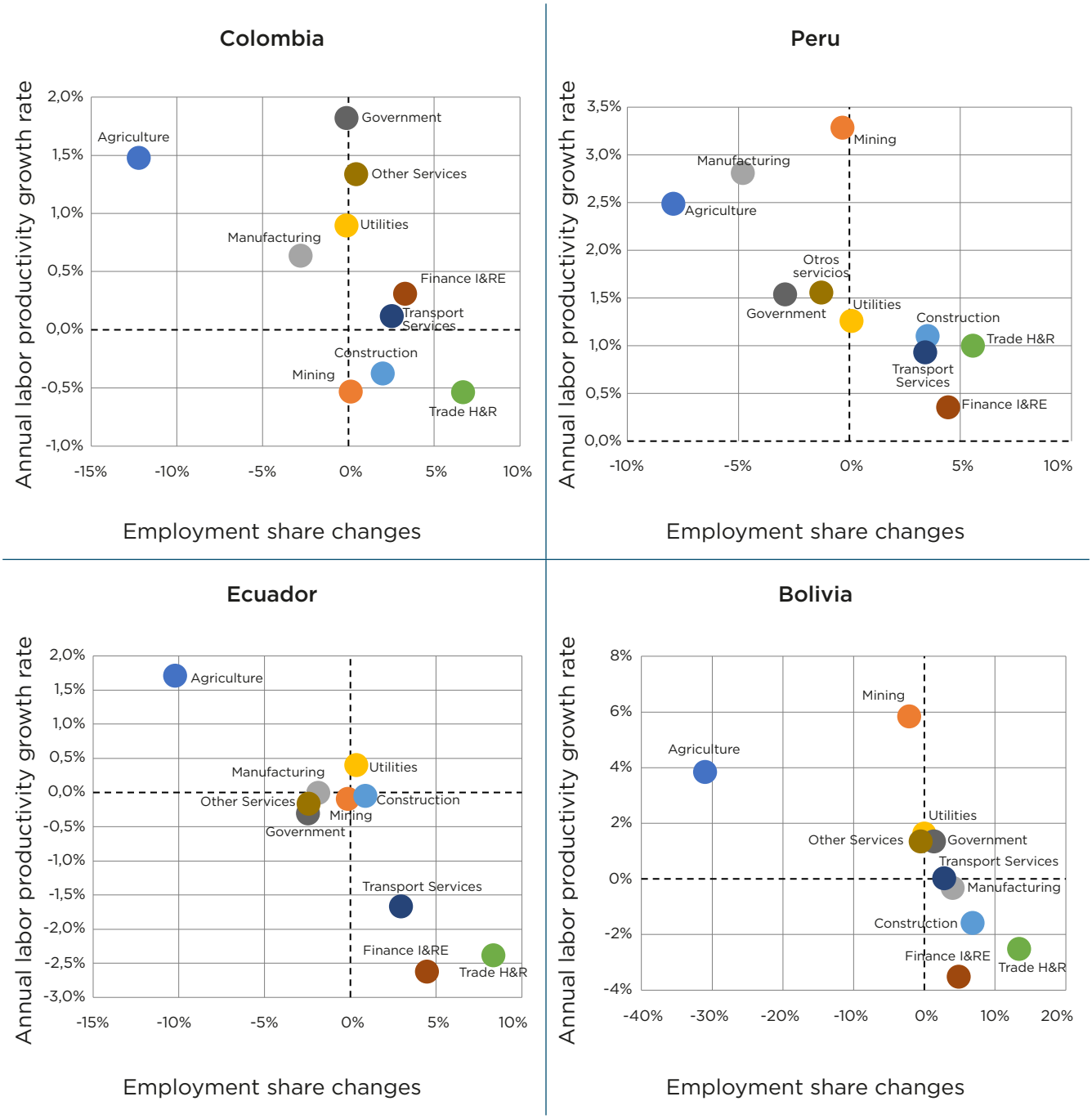
Graph 4.5 Productivity Gaps and Employment Share by Sector, Andean Countries 2018.



Source: GGDC/UNU-WIDER Economic Transformation Database (Vries *et al.*, 2021)

The productive reconfiguration of the Region has caused the services sector to show significant growth in terms of labor absorption over the last thirty years and a decline in productivity of some of its subsectors. For example, in countries such as Colombia, Ecuador and Bolivia, the trade sector reported growth exceeding 5% in terms of labor absorption, while the sector's productivity has contracted in these countries (see Graph 4.6). In this sense, the growth of employment levels in the services sector and the increase in productivity in the agricultural sector (starting from low levels) partly reflect a rural-urban reconfiguration that the Region has undergone in recent years and helps explain the importance that the services sector has for the countries of the Region. This phenomenon has been characterized in the literature by structural change at the international level (see, for example, Diao *et al.*, 2017). In the Andean ccountries, sectoral-level productivity dynamics in recent years show that the performance of the services sector in Colombia and Peru has always been below average. Compared to Asian countries, for example, the services sector in these countries has gained both employment share and labor productivity (see Andrian *et al.*, 2022).

Graph 4.6 Changes in Productivity and Employment Absorption by Sector (1990-2018)



Source: GGDC Economic Transformation Database (Vries *et al.*, 2021).

The crisis generated by the COVID-19 pandemic affected economic sectors heterogeneously, with some services subsectors being hardest hit by restrictive measures to contain the spread of the virus. Unlike previous crises, such as the international financial crisis, which represent demand shocks that affect most sectors evenly, the pandemic generated a supply crisis that had a marked differential effect across sectors and even within sectors (Salazar, 2022). In this sense, while some activities linked to the services sector,

such as tourism and recreation, suffered a generalized shock and almost total paralysis of activities[13], other services were able to migrate by continuing their activities via remote work thanks to progress in digitalization, as in the case of modern services exports. An example of this is the increase in electronic sales (IDB, 2021).

Countries do not yet show levels of employment equal to those witnessed before the pandemic. The Andean countries have shown a significant recovery in jobs after the initial shock, but the services sector continues to lag behind. For example, in Colombia, although the tertiary sector had recovered about 0.7 million jobs between 2020 and 2021, it continues to show an average of 1.2 million fewer people employed in 2021 compared with levels observed in 2020, with commercial and artistic activities being those sectors with the largest recovery gap. At the same time, a change is observed by level of education: individuals with a higher level of education recovered their jobs quicker. The labor market in Peru shows similar dynamics with a significant recovery of jobs between 2021 and 2022 (2.2 million), although with a gap of about 0.8 million jobs in the tertiary sector with respect to 2019. This is reflected in a loss of tertiary sector share in total jobs between 2019 and 2021. In the case of Bolivia[14], the country shows a recovery in jobs in most sectors, although as in previous cases, service subsectors –such as arts and entertainment activities lag behind respect to the levels observed before the pandemic. Thus, the pandemic generated a productive reconfiguration across sectors and within the productive sectors of the economies of the Region's countries.

The pandemic could generate a productive reconfiguration between sectors and inside the productive sectors of the economies of the Region's countries.

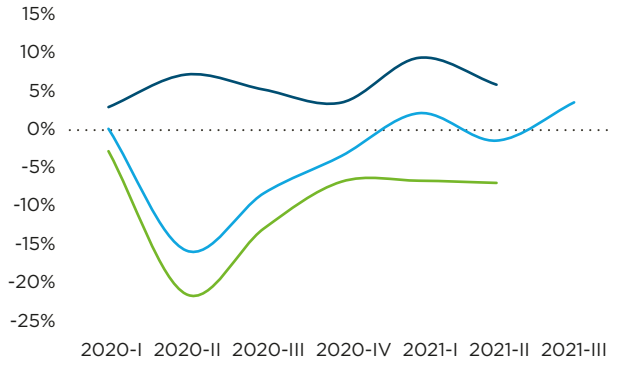
The hospitality sector was one of the hardest hit by the pandemic, and, along with it, tourism-related activities. Graph 4.7 shows the quarterly evolution of value added, employment and economy-wide labor productivity in the hospitality services sector in Colombia and Peru. These series show that the COVID-19 shock was severe on the hospitality services sector resulting in very sharp drops in output and employment, which have shown persistence and are associated with a sustained drop in productivity. This has tended to correct itself in Colombia and is more persistent in Peru. However, this negative shock in labor productivity did not carry over to the economy as a whole. The fall in employment was greater than the fall in outputs leading to an increase in labor productivity, as in the case of Colombia. In Peru, on the other hand, it appears as a shock that becomes diluted over time. Thus, the shocks in the commerce, hotels and restaurants sector are much larger in LAC when compared to OECD countries. Ahumada *et al.* (2022) show that the impact of the COVID-19 shock in LAC generated a negative effect of 2.8% in the productivity of the tertiary sector, 0.8% in the manufacturing sector and 1.3% in the construction sector. In the case of Colombia and Peru (countries of the Andean Region in the estimation), it was found that a larger part of the effects previously identified for the entire LAC sample were explained by these two countries (see Andrian *et al.*, 2022).

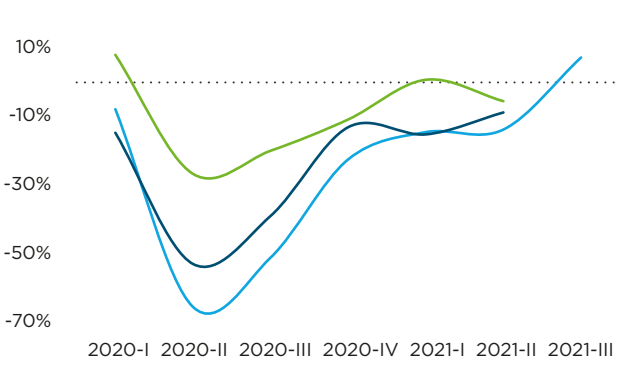
13 Ahumada *et al.* (2022) show that performance in OECD countries and Europe had larger declines in manufacturing output in both 2009 and 2020, while in LAC the output adjustment was particularly strong in retail trade and construction in 2020.

14 Urban area.

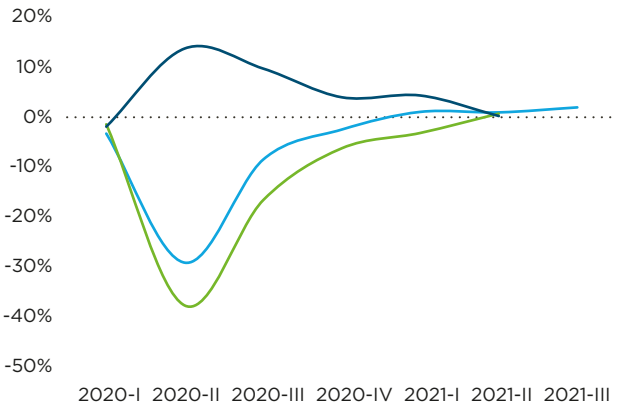
Graph 4.7. Value Added and Employment: General Economy and Hospitality Sector

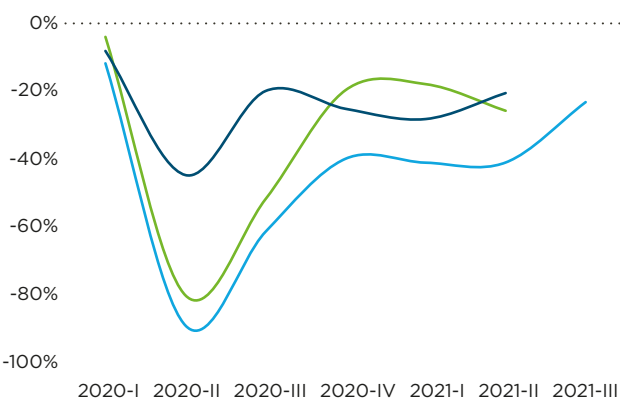
COLOMBIA





PERU



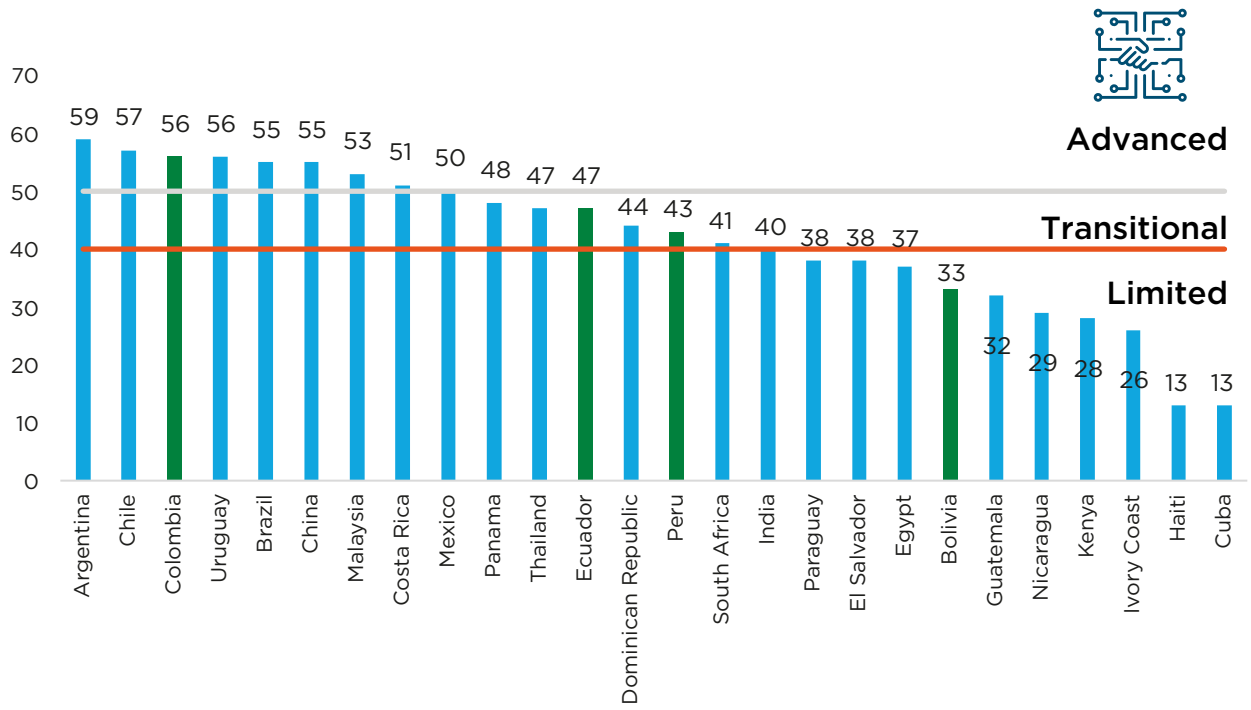


Fuente: Andrian *et al.* (2022).

One of the effects of the pandemic was the increased rate of digitalization of companies. The acceleration of the digitalization of companies in terms of their relationship with customers, supply chains and operations is stressed. This would mean a "breakthrough" effect of about four years and an acceleration rate of about seven years in the increased supply of digital products by companies (McKinsey & Company, 2020). However, increased digitalization was also heterogeneous across firms. In this regard, Cirera *et al.* (2021) find that larger and more productive firms were most likely to adopt digital technologies and innovate their products.

There are market entry and skills barriers for the implementation of digital technologies. This is reflected in smaller and less developed companies (Cirera *et al,* 2021). Hence, although SMEs also increased their levels of digitalization, the net effect was the widening of the digital divide across companies. Although the availability of information does not allow the study of the behavior of digitalization in the business sector of the Andean Region, factors such as the high presence of SMEs in the industrial fabric suggest that this effect could have been significant in the Region. In this sense, studies such as that of Ahumada *et al.* (2022) conjecture that the different paths taken by the hospitality sector in LAC and in the IECD and Europe throughout 2020 can partly be explained due to lower digitalization in LAC. In line with this, Katz *et al.* (2020) explore the consequences of low digitalization vis-à-vis COVID in developing countries. Graph 4.8 shows Colombia near the top performing group within developing countries; Ecuador and Peru are within the average; and further behind is Bolivia. This overall evidence reflects the fact that countries in the Region are far behind the most advanced countries in terms of digital ecosystem readiness.

Graph 4.8. Digital Ecosystem Development (2018)



Source: Katz *et al.* (2020).

The competitiveness of modern services in the Andean region is not foreing to the development challenges faced by the Andean countries. The challenges that stand out include the availability and cost of skilled labor, the quality and provision of infrastructure, tax systems, regulations, intellectual property protection and the business climate, among others. Thus, several of the development challenges faced by Andean economies to increase aggregate productivity and diversity exports (see de la Cruz *et al.*, 2020) also affect traditional and modern services exports.

Services activities[15] with export potential and higher value added require highly qualified human capital. Different studies have documented that there is a mismatch between the supply and demand of skills in the productive sector in LAC and the Andean Region, which partly explains the high levels of unemployment and low productivity of countries (Busso *et al.*, 2012; de la Cruz *et al.*, 2020; Gontero and Novella, 2021). Considering the accelerated technological advances that have been made in recent years, particularly in the services sector, there is a possibility that the mismatch between supply and demand in the labor market will intensify, affecting the most vulnerable workers to a greater extent (de la Cruz, 2020; Gontero and Novella, 2021) and will possibly increase services exports.

The countries of the Andean Region have a low level of innovation, which could affect the adaptation of the productive system to new technologies. Colombia, Peru, Ecuador and Bolivia spend less than 0.3% of GDP[16] on innovation, placing the Region at levels far below the OECD average (2.5% of GDP) and other LAC countries, such as Chile (0.35% of GDP). These innovation lags in the Region are key, since the positive effects that innovation can have on productivity are extremely important in developing countries (Fagerberg *et al.*, 2010). R&D investment has essential benefits for companies since, on the one hand, there is a positive relationship between R&D, innovation and productivity, and on the other hand, investment in R&D increases the absorption capacity of new technologies (Cohen and Levinthal, 1989; Asheim and Gertler, 2005), which is a fundamental requirement for enhancing modern services.

The services sector in LAC, with the exception of the financial services subsector, is characterized by high levels of informality, according to the report of the International Labor Organization (2019). The countries of the Andean Region are no strangers to this dynamic. In Bolivia, close to 90% of workers in the commerce, transport, storage and communications sectors are informally employed (ILO, 2019). In the case of Colombia, the services sector presented informality levels close to 48% in 2019[17]. In Ecuador, informality in the commerce and accommodation services sectors reached over than 80% in 2019 (Arias Marín *et al.*, 2020). In turn, in Peru, more than 65% of workers in the commerce sector and almost 80% of workers in the restaurant and accommodation sector were working in the informal sector (INEI, 2019). Among the factors that explain high informality levels are tax or regulatory reasons that make formal hiring more expensive and introduce distortions in labor markets or the economy's business cycle (de la Cruz *et al.*, 2020); and the fact that it is an underdeveloped business sector with little human capital (Cárdenas *et al.*, 2021), which translates into low labor productivity, as seen above[18].

Jobs in the GIG economy have similarities with informal jobs. These new jobs, which arise from the process of deepening digitalization in countries, do not have the characteristics of a dependent relationship

15 Includes: information technology infrastructure management, software development, information technology (IT) consulting, specialized software for research activities, research and development activities, and business management services.

16 Research and Development Expenditure (% of GDP) (World Bank).

17 DANE figures. Large Integrated Household Survey: Labor Market – Informal Employment and Social Security (2019).

18 Also see https://blogs.iadb.org/gestion-fiscal/es/formalizacion-laboral-en-america-latina-y-el-caribe/

nor do they have self-employed workers[19] and, in general, they are not covered by the labor laws of countries. One of the main disadvantages is that platforms do not assume responsibilities in terms of social and labor protection of workers. Some platforms, for example, require workers to get their own insurance coverage. Also worth mentioning is that women are underrepresented in these jobs.

The pandemic has accelerated the dynamics of adoption in GIG economy jobs. According to ECLAC (2021), in previous crises, a transition from formal jobs to self-employment occurred. In the COVID-19 pandemic, the situation was such that informal employees suffered the most from restrictive measures and other impacts of the COVID-19 pandemic, with the tourism sector being amongst the most affected. In the post-pandemic period, the challenge is that new jobs will be concentrated in the informal sector, with its implications for the country from a social and productive point of view. Thus, the challenge is that jobs in the GIG economy should not be part of a process of additional precarity of labor relationships in the Region, but rather a process of improvement.

While the pay may be high, some jobs in the GIC economy involve different barriers to entry and associated costs. In the case of web-based jobs, workers must contribute free time to the preparation of proposals on how to perform the jobs. In the case of location-based platform jobs, such as Uber and Rappi, workers wait idle for a new service assignment. This ends up affecting the hourly income of these activities. Location-based services have lower barriers to entry and do not require advanced digital platform skills. By contrast, web-based jobs (such as graphic design or software development) require extensive technological skills. Location-based platform jobs allow access to employment with low entry costs, which makes them attractive, for example, to migrants. Online jobs require a prior investment in order to get started, such as having a means of transportation, in the case of location-based workers or having reliable internet and computer equipment, in the case of web-based ones. This might very well mean that employees go into debt in order to start working in these markets.

Working conditions for platform jobs can be precarious. Fairwork[20] monitors the working conditions of the most important platform economy companies. Information is only available for Colombia and Ecuador in the Region, where the companies analyzed perform poorly[21], although not so different from other countries included in the sample. Workers report earnings above the minimum wage of countries. Only a few of the analyzed platforms have policies to protect workers from the risks derived from their work, contracts are in many cases complex, there is uncertainty and lack of clarity in the management of work assignments, and the possibility of being suspended exists[22].

19 Although they provide flexibility, working in platforms, especially those that are location-based, implies that certain conditions have to be met (clothing, price of service, complaints are made directly with the platform and not with the service provider, among others).

20 https://fair.work/en/fw/ratings/

21 This index measures: fair pay, conditions, contracts, representation and management. For more details see https://fair.work/en/fw/ratings/.

22 https://www.reuters.com/article/latam-rappi-profiles-idCNL1N2FL14V

The GIG economy is relevant in the Region given the high proportion of immigrant populations. Bahar (2021) highlights that these activities reduce entry barriers and can accelerate the labor integration process of migrants, always taking into account the characteristics of these jobs. The GIG economy can reduce the dislocation between employment and job characteristics of immigrants over time. Platform work allows for a degree of flexibility that other occupations do not provide and may allow immigrants to seek jobs that align with their skills to a greater degree than traditional jobs.

Although there is no detailed information, in many countries the employment of migrants in these companies is high. In the case of Argentina, as reported in Madariaga *et al.* (2019), 84% of Rappi employees and 65% of Globo employees were migrants, and 70% and 59% had a higher education, respectively. In the case of Colombia, Jaramillo (2020) shows that 84% of workers in GIG services are men, mostly between the ages of 26 and 35, and 57% are Venezuelan, and 53% completed high school. Arbelaez *et al.* (2020), calculate that 22% of employees in courier and home delivery services are migrants.

4.3 Policies that Promote Tertiary Sector Development

The Andean countries have the potential of attracting buyers from all over the world to acquire the different goods and services that local producers can offer. Despite the low dynamism in terms of growth and global demand displayed by the traditional services segment (Giordano and Ortiz de Mendívil, 2021), the Andean Region has a high potential for tourism. The World Economic Forum shows in its 2019 Travel and Tourism Competitiveness Report the rankings for the Travel and Tourism Competitiveness Index. Among 140 countries, Peru, Colombia, Ecuador and Bolivia ranked 49th, 55th, 70th and 90th, respectively (WEF, 2019), indicating that despite these countries' potential to attract tourists, they are not the highest rated destinations and, in the long run, this may be a factor that impedes foreigners from visiting these territories. The four countries in the Region have very good scores in the natural resources sector, within the 80th-100th percentile (MEF, 2020). However, in terms of security and infrastructure they are within the lowest percentiles (worst performers). For the competitiveness of this economic activity to improve, the low scores in sectors such as business conditions and environments, safety and security need to improve, which are very low for the most part as a result of crime rates (MEF, 2019). Likewise, public-private partnerships (PPPs) can contribute to the improvement of infrastructure; if achieved, an environment conducive to attracting travelers from around the world and for boosting the tourism sector can be provided.

The creation of quality employment is one of the main ways of reducing high levels of informality in the Andean Region (de la Cruz *et al.*, 2020) and for improving productivity in the services sector. Nevertheless, it is essential that countries formulate public policies, according to their particular contexts, to stimulate formality and reduce labor market dysfunctionalities (de la Cruz *et al.*, 2020). For this, it is of utmost importance that the different types of informality that can occur be understood. In this sense, labor flexibility policies could help to reallocate jobs in more productive activities, although their effect on workers with low productivity should be considered. Policies such as the introduction of simplified taxation schemes, the creation of job training programs or greater efficiency in social spending that allow for greater accumulation of human capital in the population should also be taken into account. The reduction of taxes and social security contributions, the implementation of simplified taxation schemes and the revision of legal requirements can encourage the formal hiring of workers. Finally, the strengthening of

the authorities' oversight capacities and greater flexibility in formal jobs should be taken into consideration (see Cárdenas *et al.*, 2021).

Services exports represent an opportunity for diversifying the basket of exported products and increasing countries' resilience to external shocks (Giordano and Ortiz de Mendívil, 2021). This is particularly the case of Andean countries, where dependency on commodity exports has an impact on growth and external and fiscal accounts. In fact, during 2020, while exports of traditional services fell by an average of 28% per year for the Andean Region, exports of modern services increased by 2%. Despite the diversity of items that enter the services sector, it is characterized, by its nature, as labor-intensive. In this regard, Giordano and Ortiz de Mendívil (2021) show that services exports have higher domestic content than goods exports. Therefore, a larger portion of revenue stays in the exporting country. In LAC, the domestic value-added in services represents 92.1% of the total, while in manufactured goods it stands at 77.7% (Giordano and Ortiz de Mendívil, 2021).

Services exports offer an opportunity to diversify the basket of exported goods and increase Andean countries' resilience to external shocks.

Export costs are high in the Andean Region. Giordano and Ortiz de Mendívil (2021) show that Colombia and Peru are among the countries in the Region with the highest tariff costs for exporting services. It is also necessary to eliminate non-tariff barriers. These authors show, for example, that in the financial and audiovisual sectors, policies are more restrictive than in the rest of the world. Also important are the impediments that affect services traded through electronic networks (Giordano and Ortiz de Mendívil, 2021)[23]. The nature of services is different from that of goods, and their intangibility poses challenges when it comes to developing sound regulations for international trade (Giordano and Ortiz de Mendívil, 2021). In turn, legal standards should not lag behind the fast pace of technological change, which has enabled trade in sectors that were once considered nontradable. In the future, agreements covering e-commerce will be key modernizing factors that are needed to boost trade in services (Giordano and Ortiz de Mendívil, 2021).

Public policies are required to generate a conducive environment for the growth of services exports. For example, Álvarez *et al.* (2021) explain that PPPs are beneficial for the implementation of industrial policies that can promote modern services exports through increased digital infrastructure. In this respect, there is a great opportunity for Colombia, given that its PPP scheme is one of the most robust in the Region (de la Cruz *et al.*, 2020).

For online jobs, the possibilities of regulation are very limited since it can be based on an interaction with companies based abroad, for example, the attempt to regulate Uber in different countries. The potential contribution of such activities to local innovation makes striking a balance relevant to allow strengthening the sector while providing a framework for regulation. There are relevant issues for the sector, such as: guaranteeing a resource transfer scheme, establishing a system that facilitates compliance with tax obligations and retirement insurance contributions, expanding digital connectivity, promoting more timely job training (Ripani, 2017), and the use of digital tools and the English language. For location-based jobs: labor regulations in general are focused on stable employment relationships, which makes it relevant to consider the change from the concept of employment contract to the services contract so as to reduce existing informality in the sector. Likewise, efforts should be made to promote the development

23 The barriers affecting this type of trade are: infrastructure and connectivity, electronic transactions, payment systems, intellectual property rights and other obstacles affecting trade in services with digital technology.

of platforms that favor a better distribution of income (Ripani, 2017), improve worker protection and favor the inclusion of women. Finally, there are opportunities to improve access to financing for working capital.

Statistical information is scarce and dispersed. Despite the fact that the services sector accounts for 50% of GDP and employment, there is insufficient data for the implementation of public policies in the sector. The diversity of items that comprise the sector, the challenges imposed by digitalization and the GIG economy require immediate efforts for improving tertiary sector statistics.

5

EXTRACTIVE INDUSTRIES

5. THE EXTRACTIVE INDUSTRIES AS A LEVER TO DRIVE TRANSFORMATION

5.1 The Extractive Industries Sector is at a Crossroads

The global extractive industries sector is facing a context of transformation with important implications for its development of the sector in Latin America and the Caribbean (LAC) in the short, medium and long term. On the one hand, the commitment outlined in the Paris Agreement to achieve zero net carbon emissions by 2050 implies changes in the global energy matrix, where energy from fossil fuels will lose strength in favor of non-traditional renewable energies such as wind and solar power. On the other hand, the hydrocarbon market has experienced important changes, marked by Russia's war in Ukraine and the consequent refusal of Western countries to purchase oil and gas from Russia, which has led to a recovery in oil, natural gas and coal[1] prices, following the price crisis experienced during 2020 caused partly by COVID-19[2].

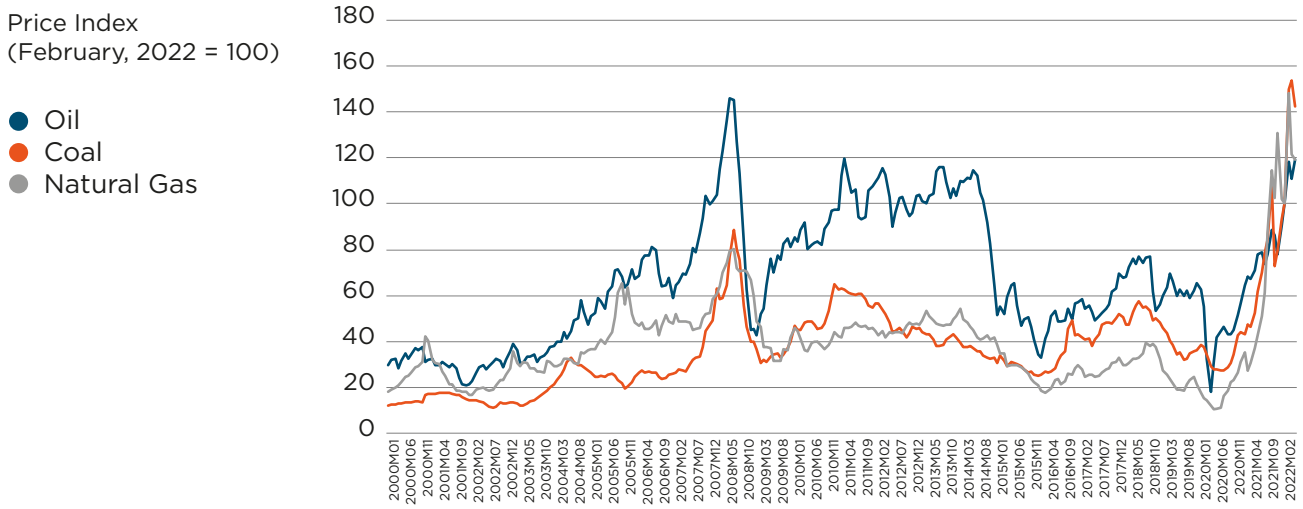
Graph 5.1 shows the evolution of oil, natural gas and coal prices over the last two decades. It shows the high volatility that fossil fuel markets have recently faced. Oil, for example, went from reaching very low levels during the pandemic, which had not been seen since the late 20th century, to a recovery exacerbated by the conflict in Ukraine starting in the last week of February 2022. Since then, energy security has been at the center of the international agenda. Especially for Europe, where around 40% of total gas consumption and 27% of total oil consumption was imported from Russia[3]. It is thus becoming key for Europe to replace gas and coal with alternatives such as nuclear power and renewable energy alternatives. However, this dynamism faced by the sector in response to the conflict in Ukraine does not modify the global need to face climate change with cleaner energy sources.

1 In the case of coal, the price increase is a consequence of the restrictions on oil and gas, which has led to an increase in the use of coal-fired power plants.

2 https://blogs.iadb.org/energia/es/la-crisis-de-los-precios-de-petroleo-ante-el-covid-19-recomendaciones-de-politica-para-el-sector-energetico/

3 Eurostat: https://ec.europa.eu/eurostat/cache/infographs/energy/bloc-2c.html

Graph 5.1. Oil, Coal and Natural Gas Prices (2000-2022)



Source: Prepared by the authors with data from the World Bank's monthly raw materials report (Pink Sheet).

Note: the reference Price for oil is WTI (West Texas Intermediate); for coal, the simple average of coal prices in Australia and South Africa was calculated; for natural gas, the simple average of prices in the United States and Europe was calculated. Prices updated as of 2 June 2022.

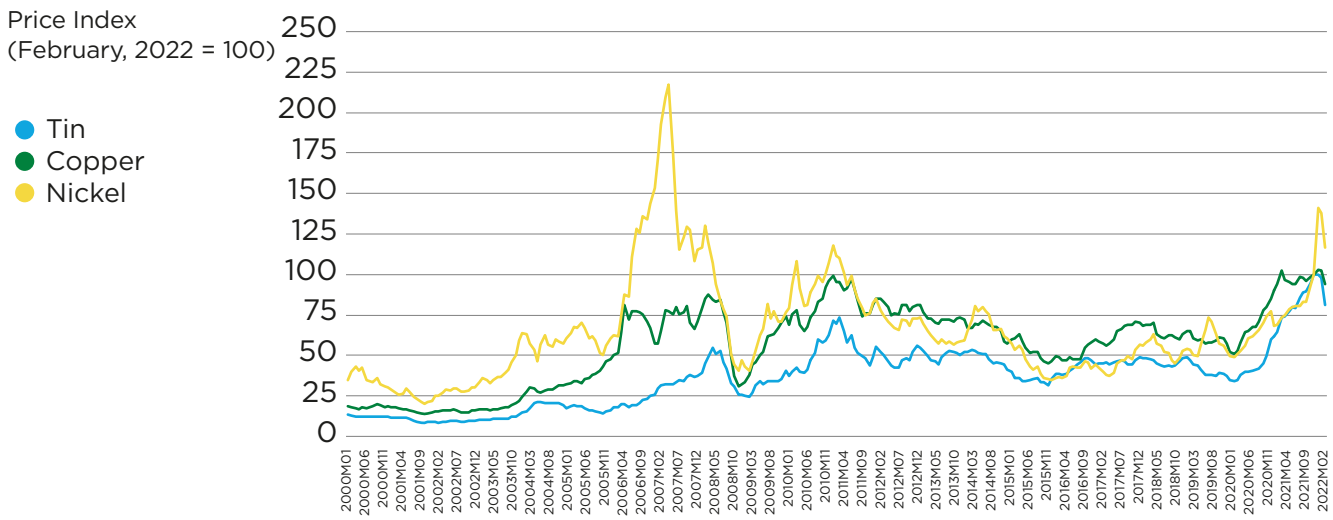
Latin America can harness its great potential to contribute to the global energy transition. Within the Region, it is important to highlight that more than a quarter of primary energy is already generated from renewable sources such as hydropower (IRENA, 2019), and there is great potential for the use of geothermal and solar[4] energy sources (Gischler *et al.*, 2020). In addition, the wealth of natural resources in LAC, and the Andean Region in particular, could play a decisive role in the supply of minerals and metals critical for the global energy transition. Graph 5.2 shows the rising trend in prices of some of these metals in recent years. The three metals included in the graph –copper, nickel and tin– are essential for energy storage in batteries, along with lithium, aluminum and rare earth elements[5]. Similarly, nickel is used in the production of geothermal energy and hydrogen, while copper has applications in solar power generation, wind power, power grids and hydropower (IEA, 2021).

Demand for energy transition metals is expected to increase significantly in the coming decades. According to estimates by Hund *et al.* (2020), the annual demand for lithium, cobalt and graphite in 2050 could amount to more than 450% compared to the demand in 2018. This represents a key opportunity for the Andean countries, especially considering that Bolivia has the largest lithium resources identified so far in the world and Peru is the country with the third largest copper reserves in the world, after Chile and Australia (U.S. Geological Survey, 2022). However, this does not mean that the market for energy transition metals does not represent a key opportunity for the other Andean countries. In Colombia, Peru and Venezuela, increasing exploration activities for energy transition metals and minerals is also profitable, in addition to the advantages in hydrocarbon wealth for the production of green hydrogen.

4 The Andean Region has a constant luminescence throughout the year as it is located in the tropics and within the Andean countries; Bolivia has one of the highest levels of solar radiation on the planet (see https://globalsolaratlas.info/map).

5 Rare-earth elements are a group of seventeen chemical elements that are not usually found in pure form, hence they are called "rare earths". They are important for the development of renewable energies due to their magnetic properties. Elements such as neodymium and dysprosium belong to this group.

Graph 5.2. Tin, Copper and Nickel Prices (2000-2022)



Source: Prepared by the authors based on data from the World Bank's monthly raw materials Pink Sheet.

Note: London Metal Exchange (LME) reference prices, updated as of 2 June 2022.

However, natural advantages are not enough to ensure an optimal use of the opportunities offered by the global energy transition scenario. As described by Balza *et al.* (forthcoming publication) the literature on the subject of the "natural resources curse" is extensive, which addresses the experience of certain countries with natural advantages that have failed to develop and may experience setbacks in terms of growth and other variables. Although recent research argues that "curse" does not exist, it would appear that the lack of an adequate environment is the main reason behind the sector's low contribution to development. Therefore, an alignment between the objectives of the public sector, private sector and communities is needed to create the basis for the investments required to compete at a global level. Another important consideration is that this investment must be executed in a sustainable and inclusive manner in order to be an effective driver of development in the Region.

The productive transition, which will depend on each country's main non-renewable product, may affect the way in which the sector impacts the local economy.

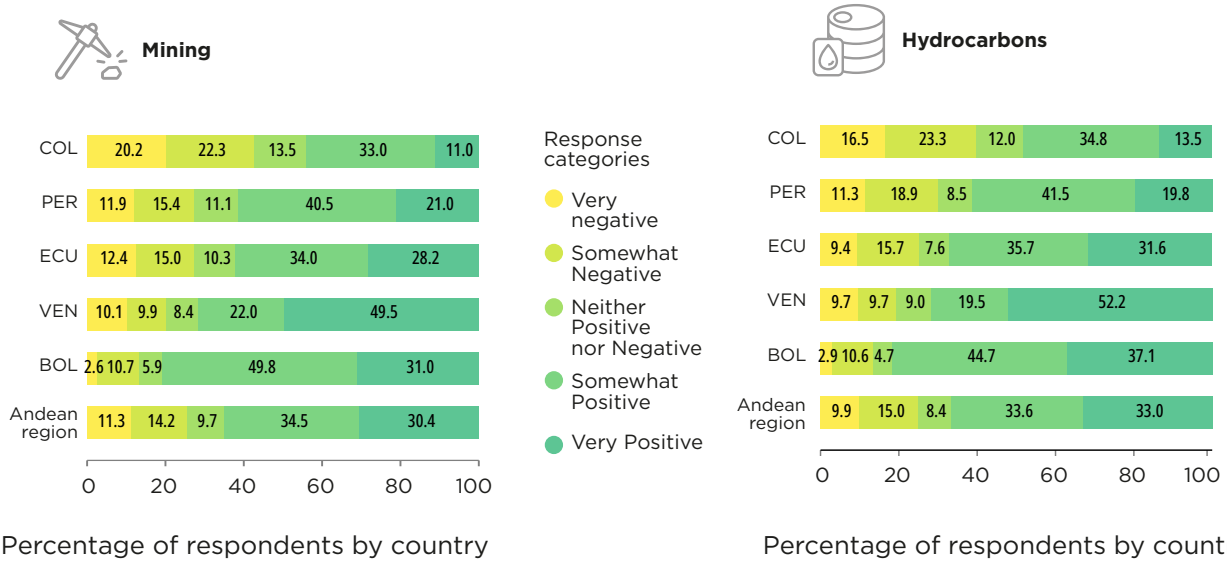
Historically, the sector has not been a catalyst for development in the Region, beyond its fiscal contributions. The Region has not been an exception to the findings mentioned in the previous paragraph. Its impacts at the local level have been limited or even negative. For example, although the oil sector has given rise to the development of energy-intensive industries, there has been little supplier development (Tordo *et al.*, 2013). Likewise, the sector has a series of local impacts that have not been taken into account in policy design. For example, Acuña *et al.* (2022) review recent literature on the negative impacts of the sector on human capital decisions (enrollment decisions in the educational system, on the types of skills sought, etc.). Furthermore, the current decarbonization context brings significant challenges in terms of job losses associated with oil extraction and coal mining, which could leave some of the industry's workers in a vulnerable situation.

However, the sector also has the potential to retrain and absorb current human capital. This is key because several studies on production transition have highlighted the role of human capital in driving these transitions and the role that the "exiting" sector can play in generating skills. A Carbon Trust study (forthcoming publication), which assesses the impact of digitization in the extractive industries sector, has identified both positive and negative potential impacts on the labor market. On the one hand, digitization of the sector may generate job losses due to automation and remote operation. On the other hand, it may increase the demand for workers with specialized profiles to operate new equipment, and generate new jobs derived from digitization throughout the value chain, such as programmers, software developers, robotic systems designers, data analysts, etc.

The Region is characterized by high levels of conflict surrounding the sector, even though it is viewed positively by the population at the aggregate level.

Moreover, extractive activities carry the intrinsic risk of generating environmental impacts. Their prevention and mitigation are important, both for the conservation of the environment itself, as well as for the adverse effect that they can have on the communities surrounding the projects in terms of affecting their environment, their livelihoods or health problems. Currently, LAC is the Region with the highest levels of conflict around mining in the world (Andrews *et al.*, 2017). According to the Observatory of Mining Conflicts in Latin America (OCMAL), in the last two decades there have been 9 conflicts in Bolivia, 8 in Ecuador, 16 in Colombia, 39 in Peru and 2 in Venezuela related to mining projects. However, at the aggregate level, the perception of citizens in the Andean countries is mostly positive (see Graph 5.3). This contradiction could be explained by the phenomenon that Paredes (2016) calls "glocalization", according to which, on the one hand, community mobilization against mining has globalized by receiving support from transnational activist networks, while on the other hand, protests have fragmented domestically.

Graph 5.3. Citizens' Perceptions of Extractive Industries

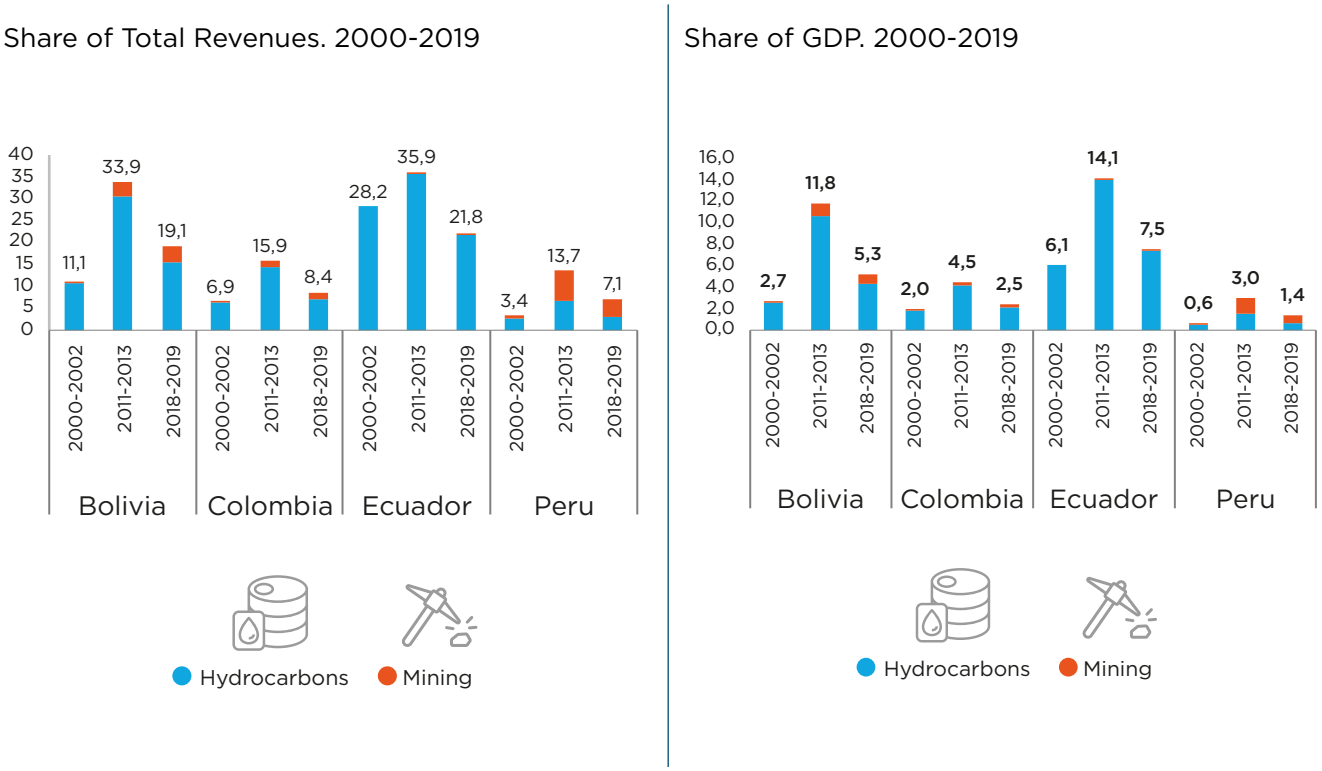


Source: Balza *et al.* (2021b).

Note: replies to the question: "Do you consider that oil and gas mining /exploitation is .....for the country". For a nationally representative sample in each of the countries.

The performance of public finances in the Andean countries has been related to crude oil, minerals and metals price cycles[6]. Taking advantage of the opportunities provided by the current context is therefore of utmost importance to the Andean Region. According to Andrian *et al.* (2020), the Andean countries have a common denominator which is low tax collection and dependence on revenues derived from the exploitation of raw materials. For example, in Bolivia and Ecuador tax revenues from hydrocarbons and mining accounted for more than a third of total tax revenues (see Graph 5.4, left panel) and more than 10 percentage points of GDP (see Graph 5.4, right panel). However, the size of the tax collection has been marked by the evolution of commodity prices (Andrian *et al.*, 2022a). In periods of booming prices (e.g., 2011-2013), a peak of 8.3% of GDP was reached, on average, for the Andean Region (see Graph 5.4, right panel); while in less favorable times (such as 2018-2019), tax collection only represented 4.2% of GDP. In turn, the relative weight of hydrocarbon revenues stands out in Bolivia, Colombia and Ecuador, while in Peru tax revenues generated by mining are predominant (see Andrian *et al.* (2022a) for more details).

Graph 5.4. Tax Revenues from the Exploitation of Non-Renewable Resources by Country and Product (Andean Region)



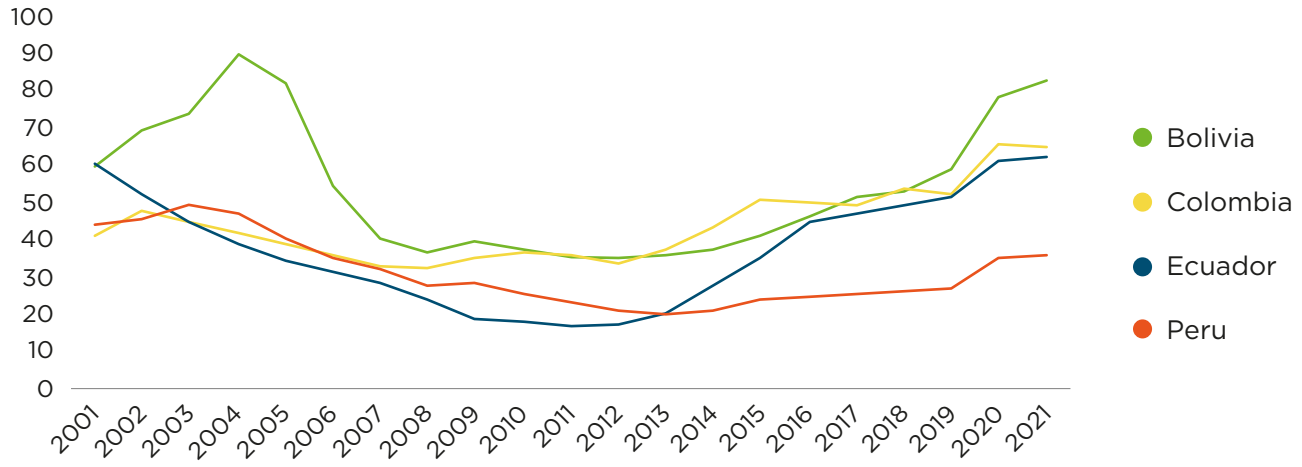
Source: Andrian *et al.* (2022a).

By observing the behavior of revenues and expenditures, it can be seen that debt was reduced only during the commodity price super-cycle bonanza (see Graph 5.5). Additionally, the need for greater resources to cope with the shock generated by the COVID-19 pandemic triggered a significant increase in debt during 2020 and 2021 in the Region's countries (see Graph 5.5). Although these increases in debt have occurred in a context of lower global interest rates, changes in global financing conditions could have

6 Chapter 3, on global value chains, discusses the dependence of the fiscal system on the extractive sector.

significant negative consequences for countries with high levels of indebtedness (Rogoff, 2020; IDB, 2022). At this current juncture, the countries of the Region will have to face lower fiscal revenues derived from the decarbonization process in the medium and long term. In this sense, having adequate fiscal institutions is of vital importance to maintain fiscal stability and continue to face the Region's development challenges.

Graph 5.5. Gross Debt in the Andean Countries (% of GDP)



Source: Prepared by the authors based on the International Monetary Fund`s World Economic Outlook.

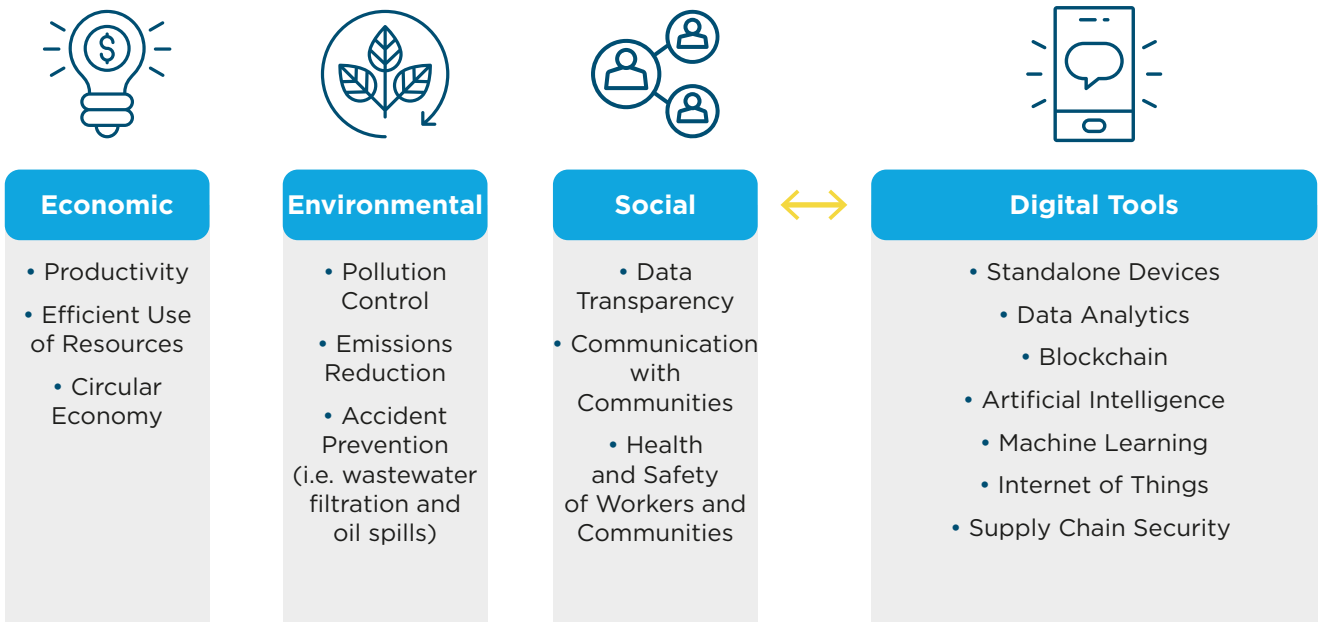
5.2 The Sector Brought Important Challenges to the Andean Region

The fact that the sector continues to be seen as an enclave has determined its little impact on local development, since its impacts are usually not considered in the design of policies. For example, the sector generates new employment opportunities and economic activity that increase the opportunity cost of becoming educated. Balza *et al.* (forthcoming publication) summarize evidence from several studies in Ecuador and Colombia on the effect that extractive industries have on human capital accumulation. On the one hand, extractive industries have had negative effects on the entry to higher education, a delay in the decision to enroll and an increase in the selection of technical degrees rather than university degrees. On the other hand, extractive activities generate rents for the Regions that can be used to improve educational access and quality. These positive effects are observed in high school enrollment and completion, as well as the likelihood of passing the exam to access higher education and obtaining good grades.

Likewise, the lack of consistent policies and a support system for the productive sector has limited the capacity to generate linkages. In terms of economic diversification, Hernandez and Manzano (2016) review the diversification experiences of oil-producing countries in the Region and find that constant changes in productive development policies may have affected the low growth of non-oil exports in these countries. Added to this is the lack of cross-cutting support policies. Bamber and Fernandez-Stark (2021) review the development of linkages around mining in Peru. The authors find that the incorporation of a large number of high-value local suppliers into the copper value chain is limited by the shortcomings of the national innovation system. In addition, they point out that national copper policy places little emphasis on the need to innovate and add value.

In addition, innovation and the adoption of new technologies are increasingly necessary for the industry to be competitive and adapt to the Region's needs. Graph 5.6 summarizes the main drivers of digitalization in the extractive industries sector in the Andean Region and the digital tools identified by the Carbon Trust study (forthcoming publication) are already being applied in some of the region's mining and petroleum projects. However, the industry can still benefit from further dissemination of these tools. There are still significant challenges to ensure that companies in the sector reach digital maturity. Interviews conducted by the Carbon Trust (forthcoming) with different companies and institutions in the sector revealed that the greatest challenges to digitalization are the availability of economic resources to finance the investment and a lack of knowledge about the benefits associated with the adoption of certain technologies.

Graph 5.6. Drivers of Digitalization in the Extractive Industries Sector in the Andean Region



Source: Adapted from Carbon Trust (forthcoming publication).

As shown in Graph 5.6, a valuable application of technology focuses on improving the industry's relationship with communities through transparency and communication. However, the social conflict surrounding extractive industries requires comprehensive attention, from both governments and companies, beyond digital tools. Underlying the conflict is a lack of trust in government, as well as low community involvement. Balza *et al.* (2021b) identify the perception about the government's ability to enforce environmental and social laws as the major determinant of citizens' positions towards the industry. This may be related to the general distrust of institutions reported in the Region. *Latinobarómetro* 2020 reports that 73% of citizens in Latin America do not trust the government, a figure that rises to 75% in Bolivia and Colombia, 84% in Peru and 90% in Ecuador.

It is important to design governance models with effective citizen participation in extractive industry projects. Bustamante (forthcoming) finds that the main source of conflict in extractive industries in the case of Peru is associated with (i) the fears of communities in the vicinity of the projects regarding the impact on natural resources, and (ii) expectations of these communities regarding the role they believe mining companies should play in the development of the local public agenda. The study also describes

the lack of progress in the human development of the population in mining areas and growing inequality as causes of social discontent around mining in Peru. This discontent is framed in a context of growing social unrest and polarization in LAC, motivated by changes in identity factors (visibility, empowerment, confidence, dignity) in addition to inequality (Milano, 2021). Acevedo *et al.* (2022) estimate an average 2% increase in inequality in Latin America between 2019 and 2020, associated with the COVID-19 pandemic, which may increase even more in the medium term once those young people whose quality of education and schooling rates were affected by the pandemic enter the labor market.

Fiscal instruments can accentuate Regional inequalities. Royalties exist in all the countries of the Region, generally with variable aliquot scaling based on easily verifiable criteria, such as level of production, location and depth of the pits, type of extracted resource or other variables related to the cost structure. Tax revenues from the exploitation of non-renewable natural resources are an important source of public resources, not only for central governments, but also for subnational governments. Taking advantage of this peculiar tax base meant an improvement in the fiscal position of several subnational governments, especially those considered "producers" of these types of goods (Andrian *et al.*, 2022a). Royalty systems have had, among others, several important unplanned and undesired effects, such as i) an increase in inequality and fiscal disparities at the subnational level; and ii) the exacerbation of budgetary volatility in subnational governments; and iii) the deterioration of spending efficiency due to the low quality of public investments (see Andrian *et al.*, 2022a).

It should be added that, in this context, given the energy diversification being proposed by the Andean countries, it is clear that these other energy sources will not be able to generate resources to the same extent as the hydrocarbon sector was traditionally doing, specifically because these other energy sources are not generating royalties. Since royalties are the most important contribution received by subnational governments and since they are the tool for territorial development, the impact will be felt with the decrease of high impact projects in the provinces and, therefore, in the resources received by the nation from this industry. It is worth mentioning that the impact that might be generated by the closure of oil fields and mines in some territories, where the economy largely depends on the industry, has not yet been foreseen or studied in depth (Andrian *et al.*, 2022a)[7].

Energy subsidies are economically inefficient and regressive. These are criticized for promoting wasteful energy use and, as a consequence, increasing carbon emissions (Feng *et al.*, 2018). In turn, they are regressive in nature, benefiting higher-income segments of the population that spend the largest portion of these subsidies (see Izquierdo *et al.*, 2018 and de la Cruz *et al.*, 2020). However, eliminating subsidies and taxing energy may be difficult to implement, as it would strongly impact the most vulnerable households that rely on low energy prices (Feng *et al.*, 2018). In a scenario of energy transition towards cleaner energy, strategies that discourage the use of fossil fuels and that do not impact most vulnerable populations need to be thought through (see, for example, Feng *et al.*, 2018).

Similarly, there is room for making progress in fiscal transparency. The current global trend towards beneficial ownership transparency in the extractive industry is found under the Extractive Industries Transparency Initiative (EITI)[8]. According to Vieyra *et al.* (2014), one of the challenges the region faces is strengthening transparency in the regulation of beneficial ownership. There are several risks in the

7 For a more detailed discussion of the recommendations by country, see Andrian *et al.* (2022a).

8 The EITI Standard requires implementing countries to request, and companies to disclose, beneficial ownership information (Requirements 2.5.c). This requirement applies to companies that apply for or hold a participating interest in an exploration or production oil, gas or mining contract or license, and requires them to disclose their beneficial owners (name, nationality, residence), their level of ownership, as well as details about how ownership or control is exercised. Any politically exposed persons must also be identified.

extractive industries sector that are associated with the identification of the final beneficiaries of a project (Vieyra *et al.*, 2014); the main ones include: (i) during the phase of assigning rights to carry out extractive activities, the hidden participation of politically exposed individuals may raise the risk of corruption in bidding and contracting; (ii) in the operational phase, ownership anonymity may prevent accountability for negative environmental or social impacts; and (iii) in revenue management, companies may carry out transactions between related entities (through transfer pricing) to evade taxes. Thus, beneficial ownership disclosure is a key tool to mitigate these risks, as it allows the identification of the beneficial owners of a company or a non-renewable resource operating license.

In a scenario of energy transition towards cleaner energies, it is necessary to think of strategies that discourage the use of fossil fuels.

Countries in the Andean Region show diversity in their adoption of EITI standards. Bolivia is not an EITI member and does not have beneficial ownership registries, Colombia and Peru are EITI members with laws and central registries of final beneficial owners, and in the case of Ecuador there is already public information on company owners in certain cases. According to the Revenue Watch Index[9] (2013), Colombia and Peru were among those countries with a satisfactory index (the highest rating) for natural resource governance; moreover, Ecuador and Bolivia had a partial index (second best rating). An example of good governance and transparency is *Mapa Inversiones* in Colombia, created by the National Planning Department (DNP, Spanish acronym) with the support of the IDB. The purpose is to show data graphically and geographically on royalties originating from the extraction of raw materials. This platform was launched to reduce costs by monitoring the destination of royalties and the execution of projects; this platform is open to officials and citizens in general[10].

On the basis of lessons learned, the countries of the Andean Region can implement different measures to increase transparency (see Vieyra *et al.*, 2019). Based on the experience of *MapaInversiones* it may be highlighted that: (i) using new information and communication technologies strengthens sector management and improves transparency; (ii) the generation and exchange of timely and quality information improves decision making; (iii) transparency needs to be strengthened at the subnational level; and (iv) the adoption of international transparency standards is essential for improving institutional capacity.

The limited diversification of fiscal revenue sources and the lack of consistency in fiscal rules determine the dependency on fiscal revenues from extractive industries. Countries in the Region are characterized by a low tax burden and structural issues that limit greater resource mobilization. Before the pandemic, tax revenues averaged 17% of GDP, below LAC (19% of GDP) and OECD (26% of GDP) countries. Factors that explain this behavior include the limited role of direct taxes, tax bases with few taxpayers, numerous exemptions and the high levels of evasion and informality in the Andean economies (Andrian *et al.*, 2020). With regard to public spending, its behavior is characterized by a procyclical bias, with significant increases in current spending. At the same time, expenditure inflexibility did not allow for countercyclical fiscal policy management or a reduction in spending during the expansionary phase

9 The Revenue Watch Index is a measure of government performance on the oil, gas and minerals industries. It classifies the transparency of 41 countries among the world's top producers of oil, gold, copper and diamonds. https://www.opensocietyfoundations.org/publications/revenue-watch-index

10 For more information, see Lauletta *et al.* (2019)

of the cycle (Andrian *et al.*, 2020). These facts generated a greater dependency of public finances on revenues from extractive resources.

Fiscal rules[11] are intended to eliminate the problem of time inconsistency in public finances and to restrict debt accumulation by setting limits on fiscal deficits. There is dispersion among countries in the Region in terms of fiscal rules (see Table 5.1). Colombia modified its fiscal rule in 2021[12]. The following main aspects of the new fiscal rule stand out: (i) the incorporation of a debt rule through the inclusion of an anchor and a debt limit[13], and (ii) the definition of targets on the structural net primary balance and the strengthening of the methodology for its calculation. Peru has a set of fiscal rules. A fiscal balance rule and limits on debt, fiscal deficit and expenditure growth[14]. It is worth noting that the Peruvian fiscal rule contains the most rigid current spending growth, while serving as a protection for public investment (Izquierdo *et al.*, 2018)[15][16]. Colombia[17] and Peru are the only countries with independent fiscal councils. In both countries, the councils are independent, have their own budget and their decisions are non-binding.

Table 5.1. Fiscal Rules in Andean Countries

Country	Expenditure Rule	Balance Sheet Rule	Debt Rule	Revenue Rule	Coverage	Escape Clauses	Structural Goals	Fiscal Council
Colombia		X			Central Government	X	X	X
Ecuador	X	X	X		Central Government	X		
Peru	X	X	X		NFPS	X		X

Source: Based on Andrian *et al.* (2022b).

11 For a more extensive discussion of macro-fiscal institutions, see Andrian *et al.* (2022b).

12 The main shortcoming of the Colombian fiscal rule was that since its establishment, the fiscal authorities always met targets set by the fiscal rule, but public debt increased continuously since its implementation (see Andrian *et al.*, 2022b). This behavior is partly explained by the cyclical adjustments (in particular, oil prices) allowed by the rule.

13 The debt limit (71% of GDP) is defined as the level of indebtedness above which substantial risks to the sustainability of public finances begins to emerge. The debt anchor (55% of GDP) is defined as the level to which it is intended to converge in the medium term.

14 According to de la Cruz *et al.* (2020), the debt rule establishes that the total gross debt of the NFPS should be less than or equal to 20% of GDP. The balance rule states that the NFPs annual fiscal deficit should be ≤ 1% of GDP. The expenditure rule states that the annual real growth rate of general government primary spending should be less than or equal to the upper limit of the range of +/- percentage points of the 20-year average of real GDP growth.

15 Recent studies find that over the last few years there have been certain inconsistencies in the implementation of fiscal arrangements (Andrian *et al.*, 2022b). As a first point, the existence of three simultaneous rules in the country could be restrictive and lead to coordination problems between different policy objectives. Secondly, frequent changes in the rule's application coverage, quantitative targets and the imposition of time limits or suspension in the rules could have generated credibility problems in the fiscal institutionality.

16 This occurs when imposing a cap on current expenditure growth and as a minimum, investment grows at the same rate (see Andrian *et al.*, 2022b for more details).

17 In the Colombian case, the modifications made in 2021 have raised the institutional quality of the fiscal council, for example, by providing it with greater powers and budget (see Andrian *et al.*, 2022b).

In the case of Ecuador, the new fiscal responsibility framework, which is still in the process of implementation, imposes a limit on expenditure growth and restricts the deficit, whilst it reaffirms the goal of keeping the debt burden below 40% of GDP in the medium and long term[18]. Finally, in Bolivia, there is no fiscal discipline rule for the execution of the public sector budget needed to maintain fiscal balances and that guarantees public sector finance sustainability.

5.3 The Sector Can Be a Partner in the Productive Transformation of the Region

The extractive industries sector has important challenges to undertake in the medium to long term. The decarbonization process offers an opportunity for the scaling up and implementation of new projects in the mining sector. However, the implementation of public policy measures is required to ensure a smooth transition that serves to leverage long-term development in the Region. Dependency on natural resources creates a high degree of vulnerability and uncertainty about the adequacy of future budgetary resources, since a good part of these resources could become "stranded assets". However, the availability of revenues from non-renewable natural resources provides a short-term opportunity to generate higher fiscal revenues. Therefore, the time is right for governments to begin developing strategies that will expedite the utilization of non-renewable natural resources in the short term and the provision of their substitutes in an appropriate manner in the medium to long term.

A human capital strategy is key to enhancing the role of the sector in local development, as well as for the transition. When reviewing experiences outside the Region in transitions of natural resource-producing Regions, human capital policies have been fundamental. As summarized in Balza *et al.* (forthcoming), in cases such as the Ruhr Valley, the Netherlands and Singapore, when they transitioned from coal to other sectors, policies were implemented such as training programs for industries, coordination and planning initiatives to ensure labor demand for highly skilled workers, adaptation of curricula for skills development to meet labor demand, among others. This is relevant for the Andean Region, where extractive activities have positive local economic impacts (direct and indirect) that are measured by increases in economic activity, improvements in employment and higher wages. However, these shocks also lead youth to drop out of formal education and increase teenage pregnancies and school dropout rates. Therefore, the incorporation of flexible learning modalities can contribute to providing an effective response to the economic reality of the areas where extractive activities take place. Second, investing in evidence-based family planning programs can reduce teenage pregnancy rates.

It is equally important to pair human capital strategies with productive strategies. Reviewing the experiences described above, a key element was the support of development and Regional clusters through institutional support and collaboration of different actors. In particular, financial assistance for applied research stands out, emphasizing the participation of the private sector in innovation and the development of university and technical systems; for example, the emphasis was on cross-cutting policies. In addition, the "positive externalities" of the extractive industries sector can be exploited by promoting productive linkages. For example, in the Ruhr Valley where there was already an installed infrastructure capacity for the transportation of minerals, the development of a modern packaging and transportation industry was promoted, leveraging on the existing infrastructure.

18 The new system also incorporates some elements that could reduce fiscal procyclicality, such as the new stabilization fund or escape clauses to deal with extraordinary situations.

Although many of the elements to carry out a similar strategy are missing in the Region, the literature offers concrete strategies to facilitate a better transition process. For the case of Peru, for example, Bamber and Fernandez-Stark (2021) suggest creating strong institutions and coordination mechanisms (governance) to support the development of a sector supplier for the mining industry, facilitate the entry of local suppliers into the mining value chain, and encourage innovation and upgrading of local suppliers. Each of these areas involves specific actions; for example, developing innovation capabilities requires initiatives related to human capital, R&D infrastructure and commercialization. And in each of these interventions, recommendations for action are made. For example, to improve R&D infrastructure they recommend creating a new public-private R&D center in one of the key mining Regions, with a combination of experienced foreign researchers and local youth, as well as encouraging companies to undertake R&D activities with foreign universities.

A transformation of the industry is required, where digitalization, inclusion and environmental sustainability are promoted. Digitalization facilitates the creation of economic opportunities if the development of the entire value chain is harnessed through the local supply of high-tech services, such as information technology, biotechnology, new materials, etc., so that specialized software and artificial intelligence applications are developed and digital ecosystems are created, leveraging local talent which can even be exported outside of the Region. To this end, it is important to strengthen the connection between industry, the public sector and academia, in order to ensure technical capabilities and the availability of resources. This would promote linkages, generating greater value added. Furthermore, the digitalization of the sector can be a useful tool to facilitate participatory governance models by promoting the exchange of information, improving transparency and providing alternative channels for citizen participation. As mentioned in the previous section, there are also economic and environmental motivations for increasing the level of digitization of the sector.

The government has a fundamental role to play in promoting coordination between different stakeholders involved in fostering digitization. The Carbon Trust Study (forthcoming) finds that one of the biggest challenges to digitization is the risk aversion of adopting new technologies, for which they propose government articulation of centers for steering new technologies and workforce training that generate public-private synergies. In addition, the same study recommends strengthening the regulatory and institutional frameworks for digitalization in the extractive industries sector. In this regard, there are four important fronts to consider in the Andean Region: i) *Data management and information systems.* Regulation should consider aspects such as information management ownership, privacy and security, as well as the establishment of information standards to ensure interoperability between companies, communities and government; ii) *Transparency and traceability.* Governments could coordinate efforts to improve systems for generating social and environmental indicators, especially to ensure traceability throughout the production chain; iii) *Digital ecosystems.* Governments can contribute to the consolidation of digital ecosystems through strategies such as promoting platforms that encourage the exchange of

information or establishing regulations on the private use of 4G and 5G spectrum; and, iv) *Barriers to innovation.* Barriers that can be overcome through government programs that promote innovation and competitiveness[19].

It is also important to take into account the needs of the communities, who deal with both the benefits in economic terms –thanks to the generation of jobs and the local economy's dynamism– and the costs of environmental risks and social fabric deterioration[20]. However, the definition of community can be confusing insofar as communities are made up of groups with heterogeneous priorities. Boutilier (2014) proposes the use of the concept of stakeholder network that encompasses these diverse groups as well as those located outside of the area of direct influence, but who are involved with the extractive activity. When this network of stakeholders accepts the activities of mining and oil companies, what is referred to as the social license to operate is achieved (Prno, 2013; Poelzer *et al.*, 2020).

While it is true that extractive activities have a direct impact on the environment, it is possible to develop an industry that is committed to best environmental practices and considers the needs and concerns of citizens. The public and private sectors must be more effective in communicating with communities to clearly convey the benefits of extractive activities, but also to consider citizens' concerns in a timely manner. There are important heterogeneities within communities and it is essential that this diversity be considered in order to foster an inclusive industry.

Making progress in beneficial ownership transparency would have additional benefits for the government and society. Beneficial ownership transparency is considered one of the main tools for combatting illicit financial flows related to corruption, money laundering, among many others. It consists of identifying the natural persons who effectively and ultimately have ownership or control over companies (or other types of entities such as trusts) operating in the economy[21]. For example, it would improve tax collection and reduce money laundering by identifying the ultimate beneficiaries of the exploitation of extractive industries. It would prevent corruption and improve the quality of concession and exploitation contracts, increasing public revenues and socio-environmental conditions at exploitation sites by those parties that are ultimately responsible for the contracts. Finally, it generates transparent information for the society which benefits from extractive resources.

The discussion on the contribution of extractive industries for public coffers must take into account the territories and prepare them for economic diversification to mitigate possible socio-environmental effects. At the same time, royalty systems should be reformed to improve territorial equity; reduce the volatility of subnational revenues; and promote efficiency in the use of these resources. The challenge is to pursue fiscal reforms that improve the fiscal position of national and subnational governments without compromising growth which tend to be progressive. In de la Cruz *et al.* (2020) a menu of fiscal reform options is provided in all areas, both taxation and expenditure. At the national level, there is room to increase direct tax collection, particularly personal income tax, either by increasing rates progressively or by eliminating exemptions and deductions. Likewise, there is room to reduce VAT tax expenditures, without harming the most vulnerable such as the "personalized" VAT (see Barreix *et al.*, 2012). Similarly,

19 With respect to this last point, the study highlights some important initiatives that have been developed in the Region. However, they need to be further promoted and disseminated throughout the Region.

20 Milano (2018) presents a diagnosis of the concerns around the extractive industries sector in Latin America, including the potential increase in alcohol consumption; the imbalance in the number of men versus women; the potential increase in gender-based crimes; and the initiation or increase in prostitution activities.

21 The concept of beneficial owners, also known as beneficial owner or ultimate beneficial owner, can generate confusion because the same term is used (although with a different meaning) in various legal frameworks, including treaties to avoid double taxation, the financial regulation of listed companies or the Anglo-Saxon regime.

there is a need to devise tax schemes that encourage formalization, such as the negative income tax (see Pessino and Alarcon, 2021)[22].

Although, in theory, well-designed and implemented fiscal rules can eliminate the cyclical bias of countries, empirical results show that this is not always the case[23]. Therefore, having a fiscal rule is not enough to achieve proposed fiscal objectives: these must be well designed and accompanied by high-quality fiscal institutions (Wyplosz, 2012); Eyraud *et al.*, 2018: Casello and Reynaud, 2020; Andrian *et al.*, 2022c). For this reason, the countries of the Region should advance in instruments that allow smoothing out the behavior of public finances over time. The use of stabilization funds or hedges (such as financial derivatives) are two strategies that can be complementary.

The main function of stabilization funds is to protect the public budget from the volatility of commodity prices, allowing the accumulation of resources during periods of high prices and the decumulation of resources when prices fall, thus allowing a smoothing out of the cycle. On the one hand, financial hedges can also be a relevant element to mitigate the impact of international commodity price fluctuations. These hedges reduce income volatility and can reduce sovereign debt risk spreads (Andrian *et al.*, 2022b). However, stabilization funds take time to accumulate resources and are subject to the temptation of governments to use these funds for purposes other than their creation (Andrian *et al.*, 2022b). On the other hand, the use of hedges can be costly and politically difficult for other branches of government to accept, since their benefit is only perceived when they are implemented in the event of an adverse shock (Andrian *et al.*, 2022b). Currently, only Colombia and Peru have sovereign wealth funds representing 0.9% and 2.6% of GDP, respectively[24].

Finally, it is important to continue making progress on the challenges that the extractive industry has been facing in the Andean Region. It must continue to promote legality and accelerate compliance with the Sustainable Development Goals. The inclusion of more women, as well as other minority communities, in the industry (this topic is developed in greater depth in Chapter 7). The new energy transition context represents a development opportunity for the Region, provided that shared value is generated around the extractive industry, among the communities living in mining areas, the general public, government and other economic sectors in the value chain. To this end, it is important to design innovative public policies that facilitate consensus and make it possible to take advantage of this window of opportunity.

22 On the expenditure side, there is room for generating savings of up to 5% of GDP by improving the quality of the provision of public goods and services. Among other measures, there is room for improving public procurement, for example, by centralizing public procurement and unifying it onto a digital platform. Also, by improving the targeting of subsidy and transfer programs so that they reach the most vulnerable population (for more details see Izquierdo *et al.*, 2018). One of the important aspects for implementing these reforms focuses on their communication and dissemination to society, so that public needs, the scope of the measures and who will be the final beneficiaries are clearly established.

23 See Caselli and Reynaud (2020); Barbier-Gauchard *et al.* (2021); Debrun *et al.* (2007); Heinemann and Yeter (2018). This lack of effectiveness is due to the fact that fiscal rules cannot perfectly anticipate exogenous shocks. Moreover, the rules can be manipulated since many of the targets are constructed based on projected assumptions about different macroeconomic variables, both local and global. In the case of the Andean countries, the effect of international commodity prices is particularly problematic when projecting fiscal targets appropriately. This generates a wide maneuvering capacity on the part of governments that can translate into a loss of efficiency in the fiscal rules applied (Wyplosz, 2012).

24 Taken from official reports and websites of sovereign wealth funds. The International Monetary Fund's World Economic Outlook database (April 2019).

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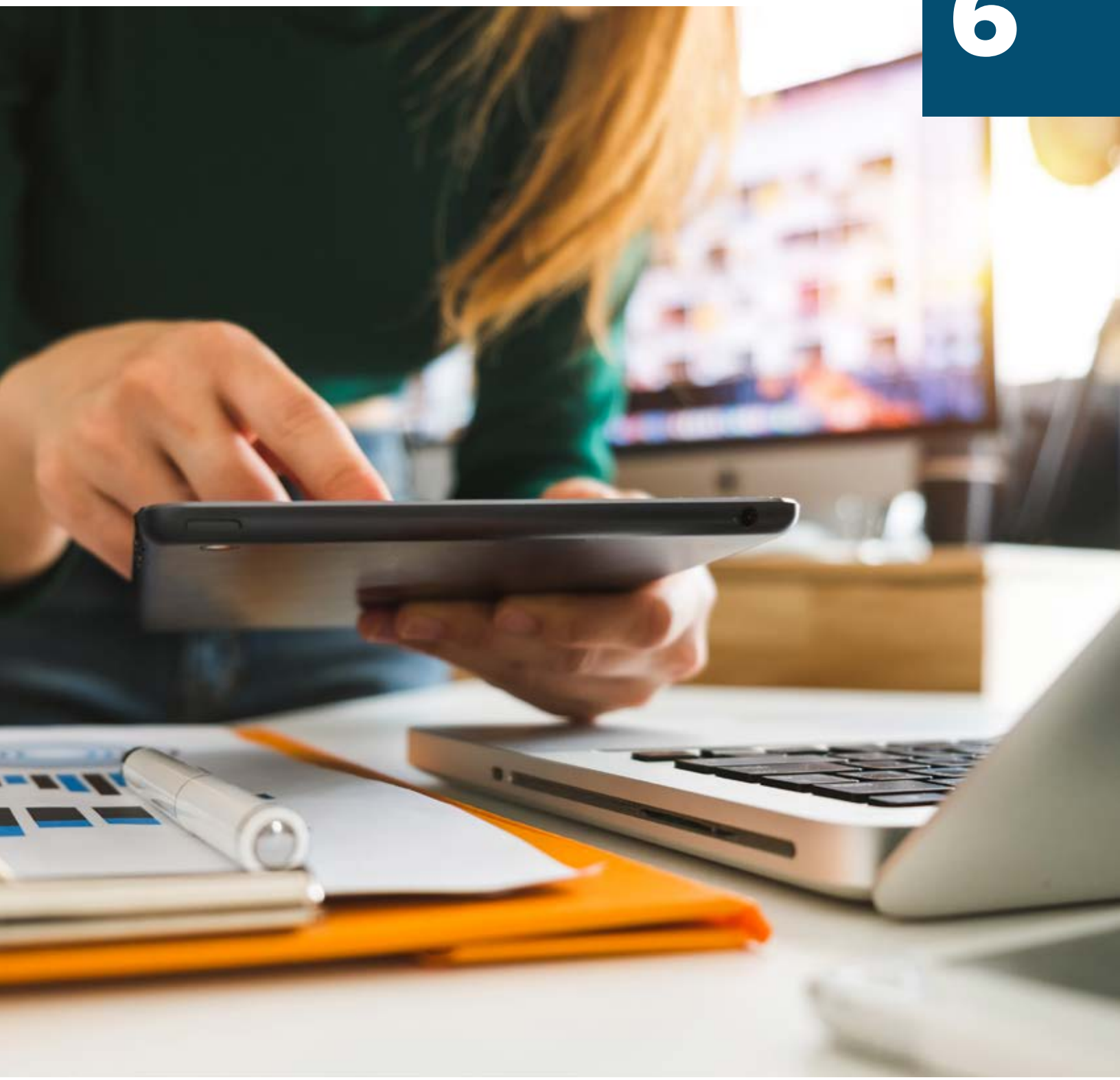
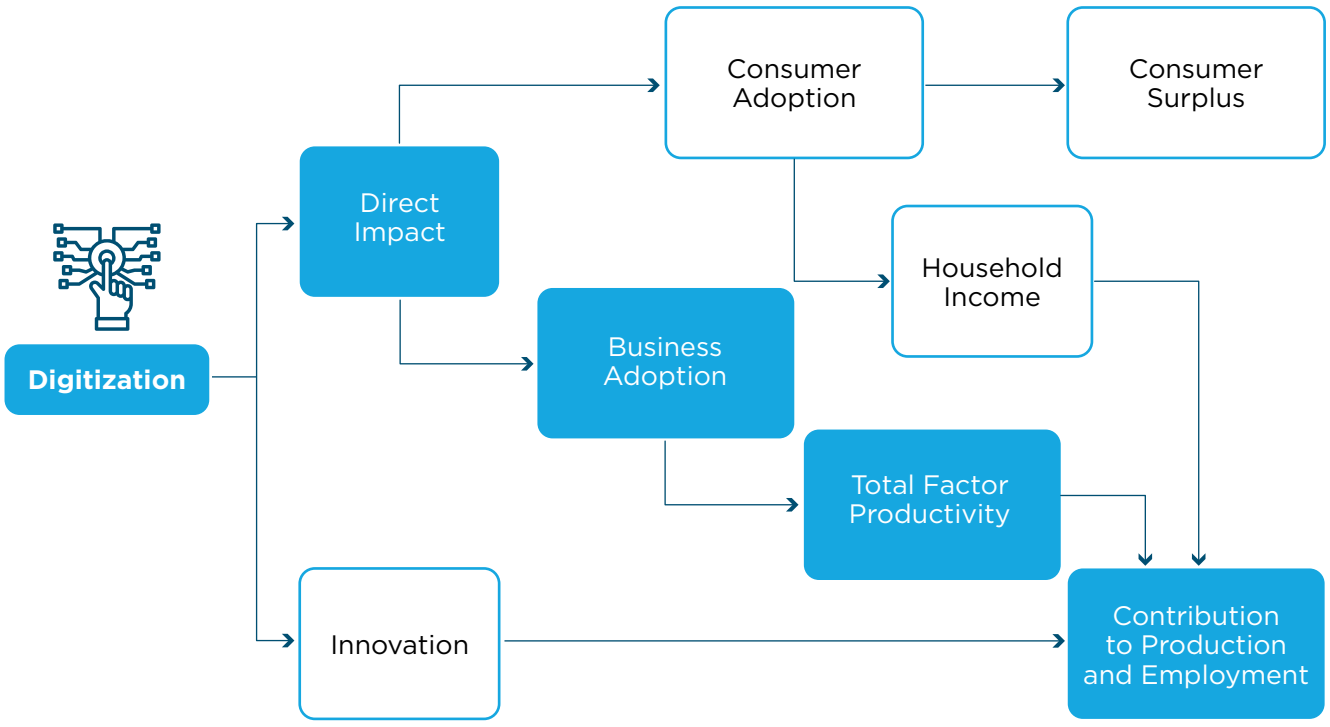


DIGITIZATION

6. TOWARDS GREATER BUSINESS DIGITIZATION IN THE ANDEAN REGION

Business digitization represents opportunities for underpinning productivity and job creation. It consists of introducing and/or deepening the use of technologies in a company to improve its performance and scope, mainly in relation to its internal processes, its relationship with customers and suppliers, as well as its business model (Suaznábar and Henriquez, 2020). The importance of digital adoption in companies is not a new issue, especially because there is ample evidence of its benefits on the performance of companies themselves and labor markets, among other things (Chen and Volpe Martincus, 2022; Acemoglu *et al.*, 2022). Taking this into account as well as the transmission channels outlined in Graph 6.1, this chapter focuses on business digitization because its deepening can translate into higher productivity and employment.

Gráfico 6.1. Transmission Mechanism of the Impacts of Digitization



Source: Katz and Callorda (2015).

However, companies do not necessarily have sufficient capabilities to take advantage of the potential benefits of digitization. Hence, this chapter analyzes the business digitization environment in the Andean Region and explores ways of overcoming existing needs and driving the appropriate use of digitization. To do so, we first review how the importance of digitization has changed as a result of the pandemic. Then, we present the current situation of the Andean Region in terms of digital adoption. Consequently, we explain the main challenges faced by companies in the Andean countries to deepen their levels of digitization. Finally, we present a set of public policy recommendations to overcome these challenges.

6.1 COVID-19 as an Inflection Point for Business Digitization

The pandemic has heightened the need and interest for increased digitization. COVID-19 brought about profound changes in the way we live, work and consume. In particular, the pandemic heightened the need for greater digitization, although with the nuance of being more oriented towards contact-free interactions. On the one hand, consumers have developed stricter preferences in terms of health and hygiene, forcing businesses to adapt quickly in order to survive[1]. Similarly, employees have revalued the use of video calls as a form of contact with customers, work in digital spaces and access to virtual training. We can very well imagine similar changes in the relationship with supply chains and strategic partners.

Thus, the pandemic has transformed business forever and brought it to a technological inflection point. Adaptation implies an explosion in innovation through, specifically, new forms of technology. In this regard, McKinsey & Company (2020) conducted a worldwide survey of companies where the following information stands out:

- **The momentum of digitization has been prominent and rapid.** While the idea that digitization is important is not new, the pandemic drove it with historically unprecedented magnitude. A level of digital technology was adopted in a few months which would have taken several years to achieve in the absence of the pandemic (Henriquez and León, 2021). According to the companies surveyed, the speed of implementation of digital changes was faster than they thought was ever possible prior to the pandemic.

- **Digital adoption has occurred as a result, process and mindset of companies.** Companies accelerated digitization in their interactions with customers and supply chains, as well as in their internal operations (remote work, administration, production, research and development (R&D), etc.). They also accelerated the growth of their digital or digitally delivered products (applications, websites and social networks). Moreover, prior to the crisis, it was not a priority for businesses to deepen their digitization. In contrast, companies now recognize digitization as a key component of their business beyond providing cost efficiencies.

- **Digitalization is pressing.** Companies that bet more on digitization developed greater capabilities to fill talent gaps and use advanced technologies. In addition, these companies showed a more effective response to the crisis (Beverinotti and Deza, 2020).

1 During the first four months of the pandemic, in Latin America and the Caribbean (LAC), the number of households buying online and the number of new online sellers nearly doubled (Gómez *et al.*, 2021). This led to a growth of 157% in e-commerce during that period (Henriquez and León, 2021).

› **Technological changes are here to stay.** Major investments in innovation raised the level of digitization, as it became possible to offer remote work and interaction with customers. With these investments, companies have permanently eliminated bottlenecks that existed before the crisis and, therefore, these changes are more likely to be sustained in the long term.

However, low digital adoption had an impact on the operation of companies, especially smaller ones. According to the World Economic Forum (WEF, 2021), 40% of small and medium-sized enterprises (SMEs) surveyed ceased operations during the pandemic, leading to reductions in employee working hours, layoffs and other cost-cutting measures. Although the main impacts would have been on supply chains, the vulnerability of SMEs was also exacerbated by their insufficient technological adaptability.

As a result, companies have increased their interest in digitalization. Greatest interest has been placed on tools that facilitate telework, cybersecurity, virtual customer service and process optimization. For the Andean Region, this was demonstrated in recent reports for Colombia (Basco *et al.*, 2020; Basco and Lavena, 2021) and Peru (University of Piura, 2020). Furthermore, SME's increased interest in modernizing was more intense than that of larger companies because the latter already had more mature technology management (WEF, 2021). At the sectoral level, even small farmers, who tend to be more resistant to digitization, are now showing greater interest in adopting digital channels to maintain their businesses (Loukos and Arathoon, 2021).

6.2 The State of Digitization in the Andean Region

After examining the relevance of business digitalization, especially as a result of the pandemic, it is time to analyze the current situation of digitalization in the Andean countries.

The environment in the Andean Region is not the most favorable in terms of innovation. According to the 2021 global innovation rankings of the World Intellectual Property Organization (WIPO), out of a total of 132 countries, none of the Andean countries ranked among the top half: Colombia is in 67th place, Peru is in 70th place, Ecuador is in 91st place and Bolivia is in 104th place. In contrast to LAC, the Andean Region shows greater strength in market sophistication, but also greater weakness in its institutional framework and its capacity to produce creative products. Nevertheless, the gaps with respect to more developed countries are widespread, with emphasis in R&D, general infrastructure (electricity and logistics), ease of investment, innovation chains, knowledge creation and dissemination, creative goods and services, and virtual creativity (see Table 6.1).

Table 6.1. 2021 Innovation Index (points between 0 and 100)

Index/ Pillar/ Sub-pillar	Bolivia	Colombia	Ecuador	Peru	Andean Region	LAC without Andean Region
Global Index	**23,4**	**31,7**	**25,4**	**31,2**	**27,9**	**29,3**
Institutions	**37,8**	**66,2**	**44,1**	**62,5**	**52,7**	**59,2**
Political Environment	40,1	55,7	45,1	53,6	48,6	55,7
Regulatory Environment	17,4	63,8	39,8	69,6	47,7	56,4
Business Environment	55,8	79,2	47,3	64,3	61,7	65,4
Human Capital and Research	**34,0**	**28,4**	**20,5**	**34,3**	**29,3**	**26,3**
Education	67,5	42,4	41,6	42,7	42,2	43,6
Higher Education	Not reported	32,7	13,6	53,5	33,3	25,5
R&D	0,6	10,2	6,4	6,8	6,0	10,9
Infrastructure	**29,1**	**44,9**	**39,6**	**38,8**	**38,1**	**38,0**
ICT	51,6	68,3	63,7	62,5	61,5	62,3
General Infrastructure	12,5	23,0	24,8	19,8	20,0	22,1
Ecological Sustainability	23,1	43,4	30,3	34,2	32,8	29,7
Market Sophistication	**48,4**	**50,8**	**50,3**	**52,2**	**50,4**	**42,1**
Access to Credit	45,4	50,4	44,5	56,8	49,3	37,9
Ease of Investment	38,0	24,1	44,0	21,1	22,6	24,2
Commerce, Diversification and Scale	61,7	78,0	62,6	78,6	70,2	62,7
Business Sophistication	**23,7**	**29,4**	**19,9**	**34,3**	**26,8**	**25,7**
Knowledge of Employees	37,4	44,4	28,5	58,0	36,5	30,0
Innovation Chains	13,4	16,8	13,0	16,5	14,9	17,2
Knowledge Absorption	20,3	27,0	18,2	28,3	23,5	30,4
Knowledge and Technology Outputs	**11,1**	**19,2**	**13,2**	**14,9**	**14,6**	**16,4**
Knowledge Creation	4,6	9,6	7,6	9,4	7,8	8,5
Impact of Knowledge	22,0	35,5	27,2	29,5	28,6	25,3
Knowledge Dissemination	6,6	12,4	4,8	5,9	7,4	17,8
Creative Outputs	**13,4**	**19,8**	**18,5**	**21,2**	**18,2**	**24,4**
Intangible Assets	17,7	27,1	29,4	30,3	26,1	34,5
Creative Goods and Services	9,5	7,7	4,6	9,9	7,9	19,6
Virtual Creativity	8,8	17,2	10,7	14,1	12,7	15,2

Source: WIPO (2021).

Note: The traffic light is red for a score of zero and green for the score obtained by the world's top performers in each pillar. Scores with a white background indicate that the minimum amount of information required to adequately assess the pillar or sub-pillar has not been obtained and are therefore not considered. Regional scores correspond to simple averages of the countries considered in the ranking.

At the company level, there are also lags in innovation. On the one hand, according to Beverinotti and Deza (2020), 52%[2] of companies in the Andean Region do not innovate. According to Crespi *et al.* (2022), Andean companies that invest the most in R&D are underrepresented given the sizes of their industries[3], and it is very unlikely that an Andean company substantially invest in R&D[4].

The Andean Region also lags behind in digitization. According to the Portulans Institute's 2021 Network Readiness ranking, out of a total of 130 countries, only Colombia is in the top half of the ranking (65th place), while Peru is in 73rd place, Ecuador is in 90th place and Bolivia is in 94th place. However, the main gaps with respect to more developed countries lie in future technologies, which refer to the ability of investing in and adopting cutting-edge digital technologies; in trust, which refers to cybersecurity issues; and in economics, which refers to patents, labor productivity, and the presence of advanced technologies in manufacturing and exports.

Table 6.2. 2021 Network Readiness Index (score between 0 and 100)

Index/ Pillar/ Sub-pillar	Bolivia	Colombia	Ecuador	Peru	Andean Region	LAC without Andean Region
Global Index	**41,1**	**50,6**	**42,7**	**48,0**	**45,6**	**48,3**
Technology	**29,5**	**44,4**	**37,6**	**37,7**	**37,3**	**40,9**
Access	44,8	62,4	53,0	57,9	54,5	60,5
Contents	22,5	36,5	32,4	33,6	31,3	31,5
Future technologies	21,2	34,4	27,3	21,6	26,1	30,7
Society	**50,4**	**49,1**	**40,5**	**51,1**	**47,8**	**46,1**
Individuals	78,8	63,6	60,8	61,6	66,2	63,3
Enterprises	42,1	41,0	24,5	57,4	41,2	36,5
Government	30,4	42,7	36,3	36,3	36,4	38,6
Governance	**37,1**	**54,1**	**43,5**	**48,5**	**45,8**	**53,1**
Trust	19,1	34,7	22,5	29,9	26,5	34,4
Regulation	39,2	66,5	57,3	63,1	56,5	66,9
Inclusion	53,0	61,1	50,6	52,6	54,3	58,0
Impact	**47,3**	**54,6**	**49,4**	**54,5**	**51,4**	**53,0**
Economy	20,0	37,2	19,9	27,2	26,0	34,2
Quality of Life	63,8	61,5	62,4	68,8	64,1	66,3
Contribution to the SDGs	58,1	65,1	66,0	67,4	64,1	59,8

Source: Portulans Institute (2021).

Note: The traffic light is red for a score of zero and green for the score obtained by the world's top performers in each pillar. *SDGs: United Nations Sustainable Development Goals. Regional scores correspond to simple averages of the countries considered in the ranking.

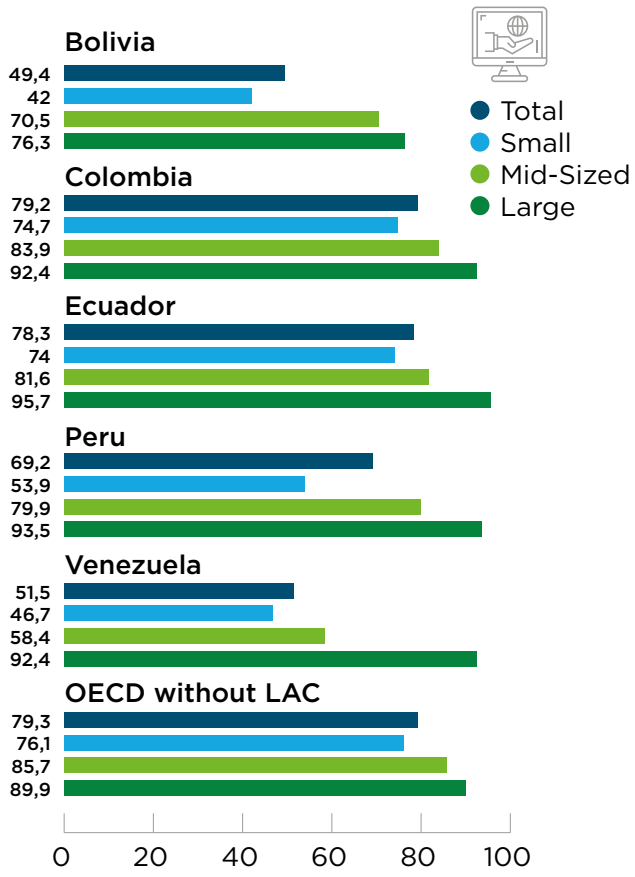
2 This result was obtained from the innovation surveys for each country. Beverinotti and Deza (2020) used a simple average and did not include Colombia or Venezuela in the calculation. In the case of Colombia, companies have a more mature and demanding definition of what innovation implies, so their survey is not comparable with surveys in other countries of the Region. In the case of Venezuela, there is no information available.

3 This finding considers results for Colombia, Ecuador and Peru.

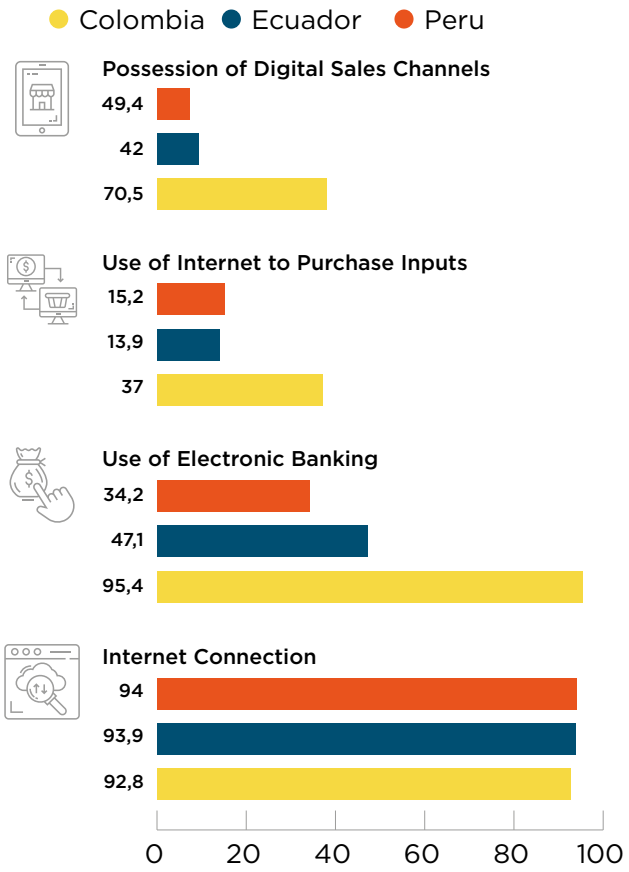
4 This finding considers results for Ecuador and Peru, and the probability is with respect to companies in Argentina.

Lower digital participation in comparison with more developed countries reflects sub-optimal environments for digitization in the Andean Region. According to the Data Center Map and the World Bank, the Andean Region has less than 0.3 data storage centers per million inhabitants (ds/mi), lower than the OECD average without LAC (2.7 ds/mi). Also, between 2017 and 2018, the percentage of Internet users shopping online in LAC was 15.5%, while in OECD it was 64.3% (Gómez *et al.*, 2021). In terms of companies, the Andean countries show greater dispersion than the OECD in the share of companies with web pages according to their size (see Graph 6.2). Furthermore, although most Andean companies have an Internet connection, its use in their supply and sales chains is low (see Graph 6.3). Furthermore, the proportion of companies that invest in hardware and software for innovation is around 4% in Colombia, 5% in Ecuador and 13% in Peru (Crespi *et al.*, 2022).

Graph 6.2. Companies with a Website (percentage of total companies)



Graph 6.3. Business Digitalization, 2018 (percentage of total companies)



Source: ECLAC (2020a) and World Bank.

Note: In Graph 6.2, the data for the Andean countries are from 2017 except for Venezuela, which are from 2010. In turn, the data for OECD countries are from 2018 and 2021. In addition, according to the World Bank, small businesses have up to 19 workers, mid-sized businesses have between 20 and 99 workers, and large businesses have over 100 workers.

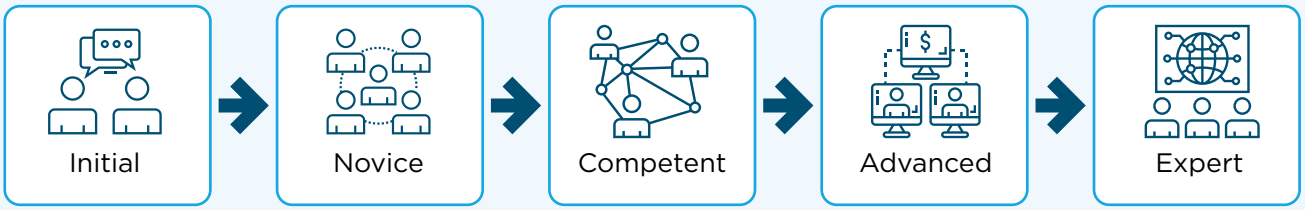
Such lags contributed to the insufficient preparation of the Region in the context of the COVID-19 crisis. For example, CAF (2020) calculated indices (between 0 and 100) for the digital resilience of households and governments[5], where it was found that most Andean households showed a level of digital resilience (Bolivia: 6; Colombia: 32; Ecuador: 12; Peru: 23; Andean Region average: 18 points) that was lower than the LAC average (31 points) and the OECD average (54 points). Similarly, most Andean governments showed a level of digital resilience (Bolivia: 53; Colombia: 69; Ecuador: 61; Peru: 65; Andean Region average: 62 points) lower than the LAC average (66 points) and the OECD average (83 points).

Low digital readiness forced Andean countries to face harsh conditions at the beginning of the pandemic. In Bolivia, only 22% of respondents reported having teleworked (Serrate *et al.*, 2022). Among the main restrictions reported for teleworking were the lack of Internet access (41% of surveyed households), having to combine work and household burdens (19%), and the lack of technological knowledge (18%) and devices (9%). In Peru, 20% of MSMEs closed in 2020. Peruvian companies had to adapt quickly, which was reflected in the fact that, between 2019 and 2020, e-commerce grew by 50% (Peruvian Ministry of Production, 2021).

Box 6.1. Digital Check-Up

The IDB, in collaboration with the *Fundación País Digital,* developed the Digital Check-up virtual tool to measure the digital maturity of companies. With this tool, any company can perform a free check-up of its own situation, in addition to accessing recommendations for deepening its digitalization in terms of resources and skills (Henriquez and León, 2021). To perform this assessment, this tool breaks down digitalization into eight dimensions: 1) technology and digital skills, 2) products and innovation, 3) strategy and digital transformation, 4) people and organization, 5) culture and leadership, 6) communications, 7) processes and 8) data and analytics.

Following the analysis, the tool places the company into one of the following categories according to its level of digital maturity:



It is important to mention that companies participate in Digital Check-Up on a voluntary basis. That is, they self-select. For that reason, the results obtained by the tool do not necessarily reflect the aggregate situation for the country in terms of business digitalization.

5 The household digital resilience index was based on the use of the Internet to use health and education applications, as well as to carry out e-commerce operations and make use of fintechs. For its part, the State digital resilience index, was based on the capacity of the state apparatus to provide continuity in its administrative processes and its provision of public services.

The digital maturity of most companies in the Andean Region remains at incipient levels, according to Digital Check-Up (see Table 6.1). On the one hand, Granda and Campoverde (2022) describe in detail the results of the Digital Check-Up in Ecuador. Between 2020 and 2021, 617 companies participated: 61% were microenterprises, 34% were SMEs and 5% were large companies. According to the platform, 48% of participating companies showed an initial level of digital maturity and 23% were novice. Thus, 71% were at a very early stage of digital maturity. Both of these low levels were more prevalent in microenterprises and SMEs. By contrast, only 8% and 6% of the participating companies achieved, advanced and expert levels of digital maturity, respectively. In this case, both of these high levels were more prevalent in large companies. At the dimension level, Ecuadorian companies reported higher maturity in digital technologies and skills[6], but lower maturity in data and analytics[7]. Finally, the report warns that the most needed type of digital innovation is one that greatly involves organizational strategies, cultures and leadership.

Digital Check-Up was recently applied in Venezuela and is soon expected to be implemented in Colombia. In the case of Venezuela, 58 companies[8] have participated to date. Of these, 43.1% showed initial and novice levels of digital maturity. The digitization dimensions with the highest degree of delay are data and analytics (70.7% of companies are at initial and novice levels), processes (58.6%), communications (55.2%), and culture and leadership (55.1%).

For its part, in 2021, in Peru, the Government implemented its own tool called *Ruta Digital*[9] or Digital Route, which is very similar to Digital Check-Up. Between February 2021 and mid-April 2022, 10,383 MSEs were registered, of which 4,168 were diagnosed. The results available indicate that the distribution of MSEs diagnosed according to their level[10] of digital maturity is as follows: 35.3% are initial, 46% are novice, 17.3% are competent, 1% are advanced and 0% are expert. This shows a very incipient development of participating Peruvian MSEs in terms of digital adoption and highlights the urgency of establishing effective work programs to reverse this situation.

However, the level of digitization in the Region varies not only by company size, but also by sector of the economy. Some sectors faced the pandemic with a higher level of digitization. This is due to the very nature of the sectors, which are more intensive in technological capital, more exposed to digitization or more connected to global markets. Cai *et al.* (2022) find that when trade costs fall, R&D investment is allocated to those sectors where countries have a comparative advantage in production. Below we will focus on examining the state of digitalization in the extractive industries and agricultural sectors because of their relevance to the economies of the Andean Region.

Technology and knowledge in the extractive industries sector can be an important catalyst for development. This is possible if the progress of digitalization in the extractive industries sector goes hand in hand with the training of local workers and research agreements with local peers (Ghebrihiwet, 2019), which could result in benefits for other sectors of the economy. Navarro *et al.* (2016) highlight the example

6 This dimension examines the ownership and use of digital technologies by companies.

7 This dimension examines the ability of companies to use data analysis as a tool for information collection and to support decision-making.

8 The Digital Check-Up results for Venezuela should not be rigorously analyzed, because Digital Check-Up is not only affected by the self-selection bias, but also by the small number of participating companies and because most of them are located in the country's main cities.

9 In the Digital Route tool, companies also participate voluntarily so there is a self-selection bias. Therefore, the results obtained by the tool do not necessarily reflect the aggregate situation of the country in terms of business digitalization.

10 Peru's Digital Route uses the terms "basic" instead of "novice" and "intermediate" instead of "competent", although they are equivalent to each other.

of Norway, which protected itself from the Dutch disease[11] by implementing a series of policies, the most notable one being the promotion of education and innovation around hydrocarbon exploitation. In the following paragraphs, the current state of digitization in the extractive industries sector will be presented, while highlighting its potential advantages and challenges.

Extractive companies in the Andean Region are experiencing pressures towards increased digitization. According to Carbon Trust (forthcoming), global efforts to meet the climate targets of the Paris Agreement will mean increased demand for clean sources of fuel, metals and minerals over the coming decades. This places demands on extractive companies to implement new production strategies that will keep them profitable and operational. Likewise, in the Andean Region, this is occurring in a context in which these companies are rethinking their interaction with the environment and with public opinion. In this regard, the Carbon Trust (forthcoming) identifies three aspects of the extractive industries sector where digitization can have a direct impact. First, economically, where the use of digital technologies would boost productivity and efficiency. Second, environmentally, where digitization would enable the collection of information that facilitates a more complete understanding of the sector's impacts on air quality, natural resources, and accident and disease risks. Third, socially, where digitization would underpin the generation of employment and skills. Simultaneously, local communities would see improvements in their connectivity and links to the sector through greater transparency, in their knowledge of the sector's impacts on their locality, and of female participation in extractive activities.

Agriculture is also being provided with digital technologies to overcome the challenges faced by small-scale farmers. Loukos and Arathoon (2021) examined 131 digital agricultural tools used to benefit small-scale farmers in Latin America. These were classified into digital consulting[12], digital financial services[13], digital sourcing[14], agricultural e-commerce[15] and smart farming[16]. The use of these tools has led the sector to experience a trend towards digital adoption; however, this is still very incipient due to financing restrictions, low quality connectivity, unfavorable regulatory environments, among other reasons.

11 Dutch disease is an economic phenomenon that refers to the detrimental consequences of a sudden increase in a country's foreign exchange earnings. Such negative effects are usually related to the appreciation of the local currency, loss of competitiveness in sectors other than the one experiencing a foreign currency inflow boom, significant increase in imports and higher unemployment.

12 Digital consultancies are information services on best farming practices, market prices, meteorology, as well as financial and digital training.

13 Digital financial services are products tailored to farmers needs and crop cycles. Some may be oriented to reduce the credit risk of small-scale farmers. This brings them into the formal financial economy and makes it easier for them to make larger investments.

14 Digital sourcing refers to solutions that facilitate transparency and digital tracking throughout the agricultural business chain (producers, crop buyers and inputs suppliers). In this way, producers gain greater access to markets and digital footprints which can improve their access to financial services.

15 Agricultural e-commerce consists of digital platforms that facilitate online trade of agricultural inputs and products. It also increases the possibility of reaching new local and international markets.

16 Smart farming is the use of digital technologies (sensors, drones, satellites, etc.) to generate and transmit information about crops or animals.

6.3 The Digitization Challenges Dimension

The challenges of business digitalization are varied and are perceived with greater intensity by smaller companies.

There are several challenges that hinder digitization and, furthermore, they are perceived more intensely by smaller companies (Suaznábar and Henriquez, 2020; Henriquez and León, 2021; and FEM, 2021). As discussed above, despite the growing importance of business digitalization, the Andean Region shows a considerable gap with respect to more developed countries. Below, we present the main challenges that explain this relative lag, with emphasis on smaller companies:

- **Lack of skilled labor in digital technology.** Having a skilled workforce is key to reaping the benefits of digitalization. However, there is a shortage of digital talent[17]. According to the International Telecommunication Union, less than 30% of the population in Latin America and the Caribbean has basic ICT[18] skills, which is considerably lower than the OECD (60%). An example of takes place in Venezuela, where 84% of households surveyed owned at least one device to connect to the Internet[19], but only 54% had an email account and 43% knew how to use Word and Excel (Consultores21, 2021). The shortage of a workforce with digital skills hampers the ability of companies to implement and develop digital technologies. This challenge is more critical for smaller companies because they must compete for scarce digital talent with larger companies.

- **Financial constraints.** Access to financing for digital adoption projects is limited, since these are high-risk uncertain investments. These restrictions are more severe for smaller companies, especially those in the agricultural sector (Loukos and Arathoon, 2021) which, in itself, has low access to financing due to its high default risk. According to the World Bank (2021), 86.6% of the potential demand for financing of MSMEs in the Andean Region is not covered, which represents 24.1% of the Region's GDP[20]. Moreover, especially during periods of crisis, the operations of companies focus on day-to-day operations, which stalls investment plans such as digitalization[21]. According to Beverinotti and Deza (2020), financial constraints generated differences between companies regarding the ability to adopt digital technologies during the crisis. According to the authors, larger firms were more resilient due to their Internet connectivity, while microenterprises were the most vulnerable due to a high dependency on financing obtained through suppliers and customers.

17 In the 2021 Global Skills Index, Coursera defines four categories to determine a country's job skill level: "innovative" is above the 75th percentile, "competitive" is between the 26th and 75th percentiles, "emerging" is between the 26th and 50th percentiles, and "lagging" is below the 26th percentile. According to this index, the ability of the average students in the Andean countries in their platforms is between the "lagging" (Bolivia, Colombia and Ecuador) and "emerging" (Peru and Venezuela) levels.

18 Information and Communication Technologies.

19 The choices were smartphone, computer and tablet.

20 The financing gap is markedly heterogeneous across countries: 43.4% in Bolivia (5% of GDP), 92.5% in Colombia (19% of GDP), 81.6% in Ecuador (18% of GDP), 31.1% in Peru (5% of GDP) and 97.4% in Venezuela (42% of GDP). These financing gaps are estimated as the differences between the potential demand for financing and the observed volumes of financing for each of the countries.

21 According to the survey, the impact of COVID-19 on the cash flow of SMEs encouraged a significant portion of these companies to abandon or postpone their plans to invest in innovation. These companies would no longer be in a position to develop and implement long-term investment plans, because most of their resources are earmarked for the survival of their businesses.

- **Insufficient development of adequate infrastructure for digital technology.** According to the IDB's Broadband Development Index (between 1 and 8), ICT infrastructure development in the Andean Region (Andean Region average: 4.1; Bolivia: 4; Colombia: 4.7; Ecuador: 4.4; Peru: 4.4; Venezuela: 3.5) is lower than that observed in the Southern Cone (5), Central America (4.3) and OECD (6.2). This barrier causes access obstacles to quality Internet and adequate data centers, which are particularly critical in rural areas. Similarly, the low level of R&D investment, especially with respect to more developed economies, makes the lack of availability of digital solutions in local markets persistent. Added to this are the failures in the articulation between the technology sector and its sectoral applications.

- **Inadequate support from managers.** There are still low levels of technological knowledge and awareness, which prevents digital adoption to be taken as a priority by managers. This is also the result of an inadequate vision of the long-term benefits of digital solutions. An example of this occurs in Peru, where 94% of the surveyed entrepreneurs indicated that digital transformation was very important, but only 43% were in the process of digital transformation (University of Piura, 2020). With respect to smaller companies, the WEF (2021), revealed resistance on the part of SME managers to adopt digital technology, because they consider that it will not bring benefits. One possible cause of the insufficient interest of going digital is that SMEs only work in the local market; therefore, they perceive low intensity competition because they do not have to compete in global markets.

- **Information problems.** Even with adequate knowledge of the benefits of digital technologies, companies face difficulties in accessing information that simplifies the decision about which technologies to implement and through which suppliers.

- **Insufficient government involvement.** First, the range of tools that governments offer to drive digitalization is still very limited, especially in magnitude. This was shown in the WEF survey (2021), where companies stated that they did not receive adequate financial support from governments during the pandemic. They indicated that they would have preferred tax incentives, subsidies, employment support and financial relief. Second, the regulatory framework needs to be updated to keep pace with the progress of digitalization. An obsolete regulatory framework slows down the development, testing and adoption of new technologies.

- **Absence of standards.** Standards promote interoperability between digital systems and help define the requirements necessary for the development of goods and services. This makes it easier to migrate to other systems, which reduces the cost of investing in digital technology. The establishment of standards is also important for smaller companies because they use limited digital solutions, which leads to the use of fragmented systems, duplication of tasks and time-consuming data management. All of this limits the potential returns of digitizing.

- **Other challenges include cybersecurity concerns, as well as administrative and organizational barriers[22].** The latter are particularly visible in small agricultural units, which show resistance to adopting digital solutions and prefer face-to-face interaction (Loukos and Arathoon, 2021).

22 The WEF (2021) survey also revealed that there are companies that, despite understanding the importance of digitizing in their businesses, do not have innovation plans, which is clear evidence of structural barriers to digital adoption.

The Region also faces challenges to take better advantage of e-commerce and digital commerce in the post-pandemic recovery. In 2020, the Business-to-Consumer (B2C) e-commerce readiness index (0-100) was 48 points for LAC countries, which is comparatively lower than the world average (55 points) and the average for developed economies (87 points). According to IDB and WEF (2022) and Gómez *et al.* (2021), this is the result of various challenges that still remain:

- **Difficult access to digital payments.** In the countries of the Andean Region, especially in rural areas, there is little or no availability of digital payment technologies. Also, the little technology that is available is prohibitively costly for households and businesses.

- **Low Internet quality.** Broadband download speed in the Andean Region is substantially lower than the average speed in the world and, especially, in developed countries (see Graph 6.4). This particularity is also observable with other connectivity indicators. In addition, massive migration to teleworking has reduced connectivity capacity. All this limits the expansion of digital commerce, and deepens the exclusion of lower-income households and smaller businesses located in areas with limited connectivity.

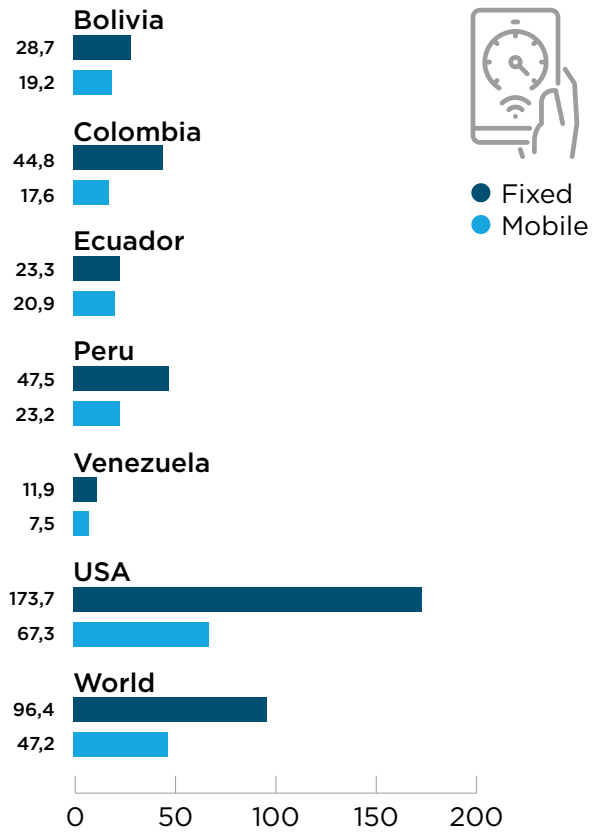
- **Limited financial inclusion.** The use of electronic and digital payment systems increased as a result of the pandemic. However, whether this dynamic will be sustained in the future, especially during the post-pandemic, will depend on how much progress is made in terms of financial inclusion. The pandemic has also led to an increase in the possession of financial accounts or electronic wallets. Nonetheless, the situation in the Andean Region remains at low levels when compared to the world average and to high-income countries (see Graph 6.5). This is due, among other factors, to the population's attitude towards formal financial services (Cathles *et al.*, 2022). According to the World Bank, in 2017, the main reasons why people in the Andean Region did not have financial accounts were linked to their high cost, insufficient funds to apply for them, and a lack of knowledge and confidence about the financial system.

- **Reduced facility for cross-border digital commerce.** In the Region, e-commerce processes are not fully integrated into electronic single windows. Added to this is the inadequate functioning of the postal service. Likewise, the growth of cross-border digital commerce is also limited when regulatory frameworks are not standardized across Regional blocs (for example, Europe, United States, Asia, among others). Said regulatory frameworks can also involve very demanding regulations, which end up generating barriers to entry for electronic and digital payment service providers.

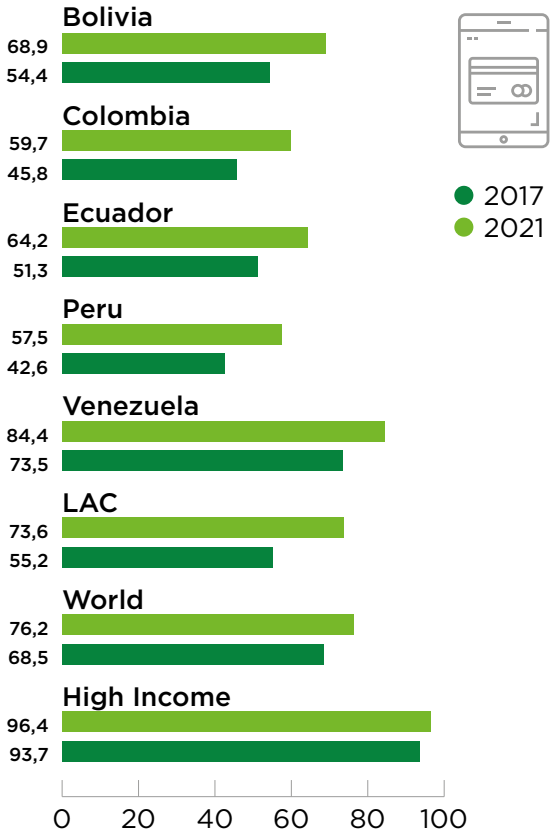
- **Limited competition in the payment systems market.** The lack of adaptation or updating of regulatory frameworks, which translates into barriers to the entry of new providers, contributes to the centralization of the payment systems market in the banking system, which is usually characterized by low competition and high costs for households and businesses.

- **Lack of e-readiness of companies.** This aspect refers to an idea that has already been developed in this chapter: although companies show high levels of Internet connectivity, very few take advantage of this to strengthen their supply and sales channels. This is a product of the shortage of digital talent and insufficient management attention.

Graph 6.4. Average Broadband Download Speed (Mbps)



Graph 6.5. People with a financial account or electronic wallet (percentage of population over 15)



Source: ECLAC based on Speedtest OOKLA and World Bank.

The extractive industries sector in the Andean Region also faces barriers to adopting higher degrees of digitalization. According to the Carbon Trust (forthcoming), in addition to the previously explained digitization challenges, extractive companies face additional barriers such as high-risk aversion to adopting new disruptive technologies and disjointed efforts between industry and academia. On this matter, extractive industries do not have clear strategies for developing technological solutions and assume that these will be produced by the country or abroad. Meanwhile, academia is capable of producing knowledge, but faces a shortage of resources. These barriers, on the one hand, gain strength if the country shows low levels of connectivity; and, on the other hand, they are the outcome of a lack of incentive policy and regulations, which opens up an important area for government involvement.

6.4 Policy Oppportunities in Support of Business Digitization

The main policy options to promote business digitization are to adapt the regulatory framework, generate digital talent and expand access to financing.

Digitalization has favorable effects on the development of individuals, companies and countries. It is also changing the way they interact, hence, the way policies are designed and implemented must also change. A great opportunity lies in facilitating companies to decide which technologies to implement and how to implement them, as well as informing them on how they should organize themselves to manage change at a pace that far exceeds previous experiences. Additionally, digital technology can still have a potential role to play in support of smaller companies.

The first step is to adapt the regulatory framework to a digitization-friendly version. The expansion of digital adoption will most likely occur in environments that are conducive to it, which are mainly conditioned by countries' legal and regulatory frameworks. In addition, it is important to note that the design and implementation of regulatory frameworks often do not consider the possible future dynamics of supply and demand for digital technologies (IDB and WEF, 2022). For this reason, the first step involves greater proactivity on the part of governments to update their regulatory frameworks to a version that is conducive to digitalization, especially in companies. In this way, greater digital connectivity penetration and quality will be possible, as well as greater access to digital devices (Gómez *et al.*, 2021). This task must address different areas:

- In general terms, there is an urgent need to adapt regulation to strengthen cybersecurity, protect personal data held by third parties, define standards that favor interoperability, facilitate the use of the spectrum and reduce the requirements for investment in ICT infrastructure (ECLAC, 2020b; Suaznábar and Henriquez, 2020). It is also crucial that the design and implementation of new regulatory frameworks consider a decentralized approach, for example, one that encourages the involvement of federal, Regional, local and municipal authorities.

- To facilitate public-private agreements that guarantee the continuity and quality of telecommunications services. In this regard, public institutions should work harmoniously with all sectors so that regulation functions as an enabler of digital infrastructure investment (Arias *et al.*, 2020).

- To boost cross-border electronic and digital trade, it is necessary to make logistical requirements more flexible and strengthen Regional cooperation in digital matters through greater involvement of the Andean Region with the Digital Agenda for LAC (Gómez *et al.*, 2021). Digital trade can also benefit from standards that promote financial inclusion, protection of cross-border digital payments through the analysis of digital trade agreements and competition in the payments systems market (IDB and WEF, 2022). The latter would be possible through the adoption of international standards and regulations that favor interoperability.

Another great opportunity for the Andean Region lies in the generation of digital talent. According to the International Labor Organization (ILO), in 2019, only 3% of LAC workers performed remote work. With the pandemic, that ratio increased to just under 10% in 2020. However, according to Cabrol and Pombo (2021), the IMF argues that 25% of jobs in LAC can be performed by telecommuting. Taking advantage of this opportunity would not only boost the productivity of companies, but would also promote inclusion, especially in favor of workers with lower incomes and/or not residing in the main urban centers, as well as people with disabilities, women with children and minority groups who have traditionally suffered discrimination.

However, promoting telework and digital transformation requires the workforce to have digital skills, the scarcity of which has been discussed in the previous section. For this reason, it is crucial to implement public policies aimed at generating and strengthening digital talent. This implies training companies in digital skills and management, applying a gender-based approach and prioritizing MSMEs (Gómez *et al.*, 2021).

Thirdly, the Andean Region will have to reduce the financing restrictions that limit digital infrastructre investments. As noted above, access to financing for digitization projects is limited due to their high risk, especially for smaller companies and those linked to the extractive industries and the agricultural sectors. It is therefore important for policy makers to address such constraints. On the one hand, it is suggested that innovative financing instruments for digital investments be implemented, as well as facilities to access them (Suaznábar and Henriquez, 2020). On the other hand, it is recommended that the implementation of financial incentives be evaluated (Drees-Gross and Zhang, 2020). Such incentives could take the form of subsidies for connectivity costs or the reduction of taxes and tariffs on certain digital technologies. Governments could also consider temporary tax incentives for digital infrastructure investments. The measures adopted should maintain criteria for targeting the most vulnerable areas and social groups.

Other fronts of intervention in the Andean Region are related to the provision of information and assistance to companies and public policy makers (Suaznábar and Henriquez, 2020; and WEF, 2021):

- To facilitate access to information on digital benefits, training and matching with solutions and suppliers, in addition to deepening the use of self-diagnostic tools.
- To make interventions aimed at improving the quality and accessibility of connectivity more proactive.
- To increase the supply of support services and technological assistance, which can be provided through the implementation of new technology pilot centers and platforms that share effective techniques, success stories, financing advice, among others.
- To increase the demand for digitalization by strengthening value chains and public procurement, both focused on digital solutions.

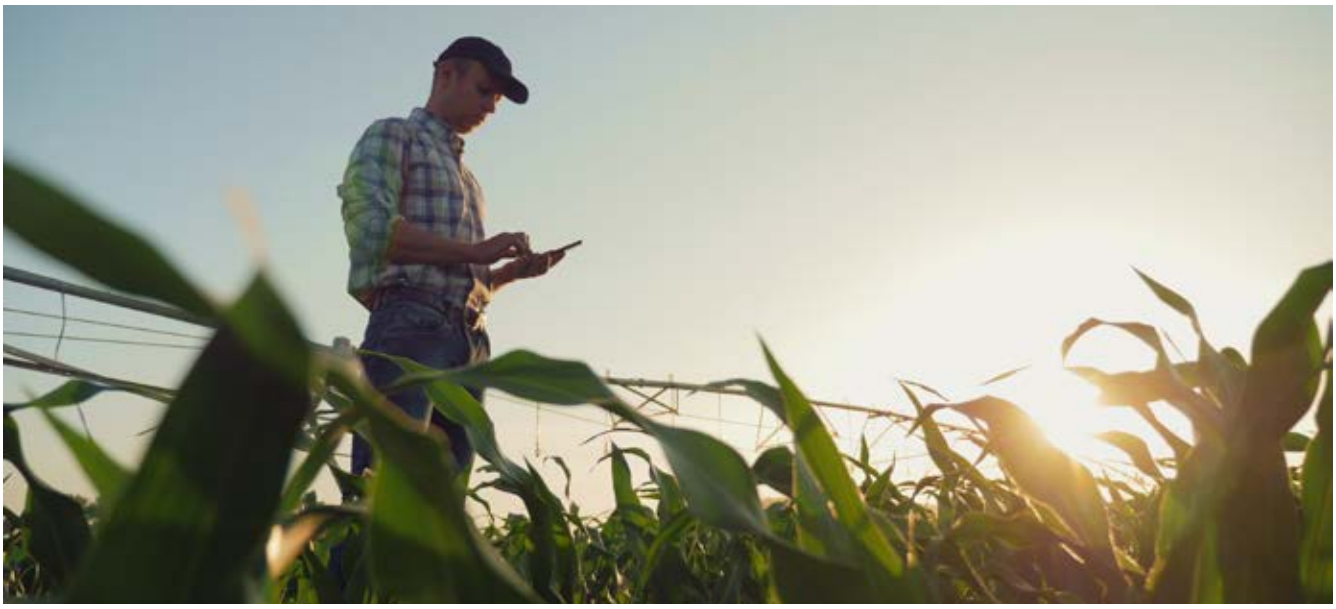
- To help companies develop medium- and long-term digital investment plans.
- To advise policy makers in the design and targeting of their interventions and public investments.
- To stimulate the willingness to adopt digital technologies, provide practical examples of technology development and inform managers about gains derived from digitization.

In the extractive industries sector, the maximization of digitalization benefits needs to be oriented towards a social perspective. Carbon Trust (forthcoming) finds additional proposals to promote digitalization in extractive companies in the Andean Region:

- To promote digitalization that reinforces transparency and traceability in the extractive industries sector.
- To strengthen the connection between academia and industry by creating new technology training and pilot centers.
- To promote the productive coverage of broadband services and the secondary use of spectrum in favor of extractive activities.
- To maintain adequate follow-up and advice to large companies because their digitization decisions are often replicated by smaller companies.
- To promote the use of digital technologies that allow a better understanding of existing resources[23], the optimization of materials and equipment through the use of real-time information and the prevention of accidents and failures through automation.

Companies in the Andean Region could benefit from increased digital adoption. In Colombia, Gallego *et al.* (forthcoming) found a positive effect of ICT adoption on the productivity of manufacturing firms, especially on large, exporting and ICT-intensive firms. Similarly, in Peru, Garcia (forthcoming) found that the productivity of manufacturing firms improves with greater R&D investment and with ICT modalities that favor the linkages of companies with their customers, suppliers and their own workers. However, the author warns that ICTs based on the use of web pages or virtual advertising are associated with a lower level of productivity.

23 Greater understanding of existing resources would be achieved through digital technologies that maximize the probability of finding new deposits and, consequently, reduce efforts in these stages, achieving greater effectiveness of operations.



Finally, boosting agricultural productivity requires the implementation of smart farming and the collection and use of farmer data through digital tools. According to Loukos and Arathoon (2021), in two years, smart farming tools have increased production between 50% and 80% for agricultural interventions in Latin America. However, their use is still low due to the high costs of device[24] implementation and continuous connectivity[25]. For this reason, they recommend digitizing data collection and use on agricultural producers, as this would allow building a more detailed production and financial history, which could be useful for seeking financing. This, combined with digital sourcing solutions and e-commerce services, would make greater financial inclusion and access to markets more likely. Finally, it is necessary to promote the productive coverage of broadband services in agricultural activities.

24 Sensors and drones are examples of some of this equipment.

25 For example, sensors work with mobile data, so an adequate quality of connectivity is required in rural areas.

7

INCLUSION

7. CREATING A MORE INCLUSIVE ENVIRONMENT IN THE SECTORS STUDIED

7.1 The Region Has High Levels of Inequality

The Andean countries present high inequality levels, which have worsened with the pandemic. As Busso and Messina (2020) describe, Latin America and the Caribbean (LAC) is one of the most unequal Regions in the world in terms of income. The countries in the Region with the lowest income inequality show greater inequality than the most unequal countries in developed economies. Even when the Region is compared with similarly developed countries in the world, average inequality (measured as the average Gini coefficient for the countries in the Region) is higher. This situation affects the Andean countries; despite progress made between 2002 and 2018[1], the Gini index remains high. The pandemic brought a setback in this progress. The Gini coefficient increased for all of the countries in the Andean Region (Acevedo *et al.*, 2022).

Historically, growth has contributed to reducing poverty in the Region, yet not inequality. Between 2000 and 2017, the population in poverty conditions[2] went from 50% to 27%[3], while the middle class (including both the consolidated and vulnerable middle classes)[4] went from 41% to 72%. In this sense, in the Andean countries, the expansion of the middle class was mainly associated with a real increase in labor income (de la Cruz *et al.*, 2020). Therefore, it is clear that a growth strategy for the Region will have an impact on poverty reduction. However, as we highlighted earlier, despite these important achievements with respect to poverty, progress in inequality has been limited. Therefore, it is necessary to accompany this strategy with an inclusion strategy, especially if a productive realignment of the Region is going to generate winners and losers.

Income inequality leads to access gaps in health care, education, employment and the legal system. Thus, inequality is a multidimensional problem that not only impacts different areas of people's lives, but it has a differential effect on certain population groups, depending on their gender, race and ethnicity. However, labor markets have a fundamental role to play in reducing the gaps. As Busso and Messina (2020) document, over the last two decades, wages have been key to reducing income inequality among households in the Region, since 73% of total household income comes from labor.

Several factors explain wage inequality, particularly misallocation and large wage differences between companies. Productivity differences

Inequality is a multidimensional problem; however, labor markets have a fundamental role to play in narrowing the gaps.

1 With the exception of Venezuela.

2 Daily income less than USD5 (adjusted for purchasing power parity in 2011).

3 Excluding Venezuela.

4 Daily income between USD 5 and USD 61 (adjusted for purchasing power parity in 2011).

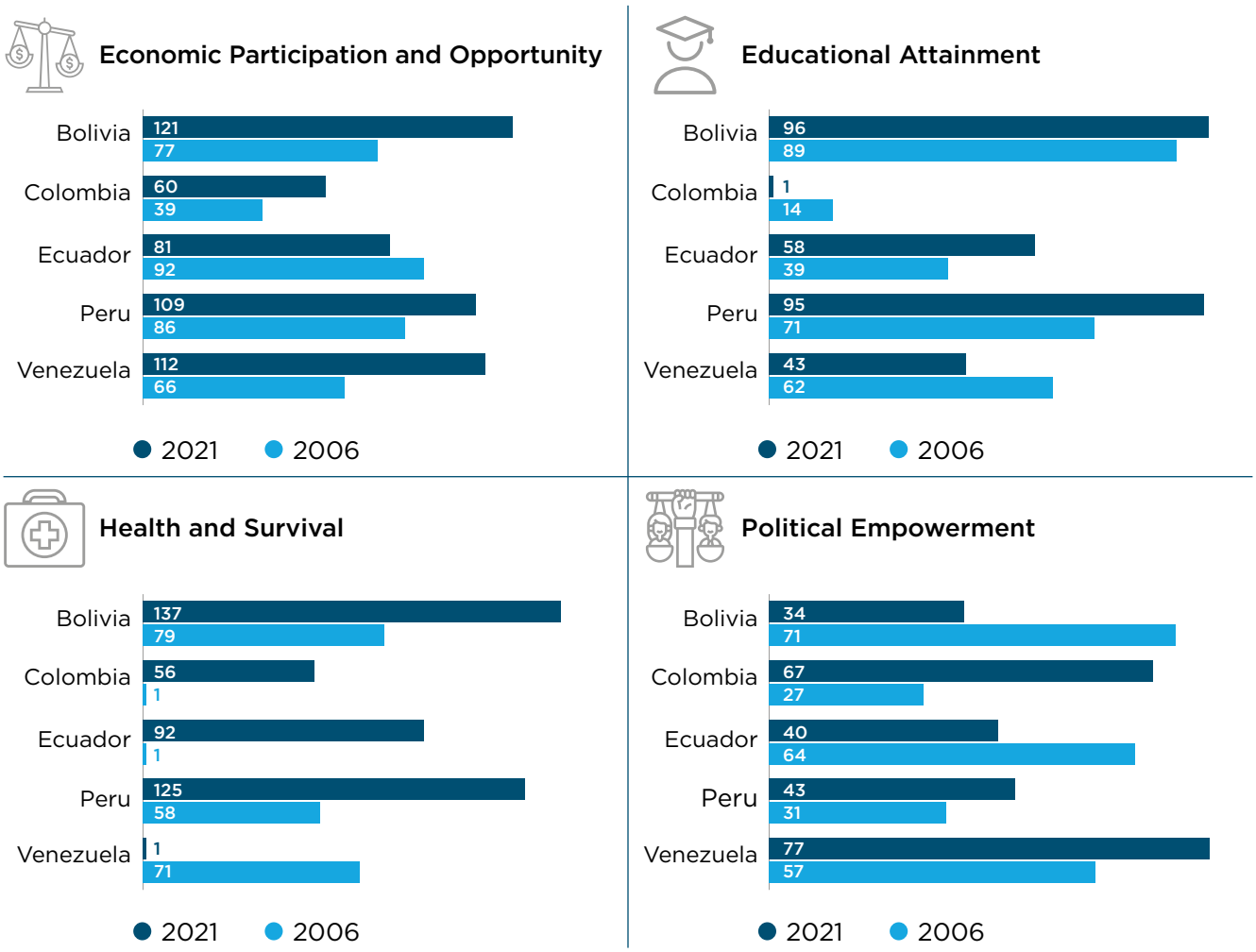
across companies in Latin America are high, even among those belonging to the same industry (Busso *et al.*, 2013). In addition, there are too many small and unproductive companies that capture a larger share of the resources in the economy than they would if the allocation of resources were optimal. As Ghezzi and Carpio (2022) argue, micro and small enterprises (MSEs) are the base of the business pyramid in the Region, constituting more than 99% of the business park, including sole proprietorships. The companies, due to their small scale of production and the sector in which they operate (mainly services and commerce), normally operate informally (business and/or labor) and pay lower wages than the formal sector.

Likewise, creating a more inclusive environment in the various economic sectors implies contemplating the broad demographic diversity that exists in the Andean Region. This includes characteristics such as race, age, sexual identity, disability and gender. It is essential to systematically implement strategies to reduce the risk of discrimination against these population groups in the different economic sectors. While this chapter centers on the issue of gender, we clarify that biases according to other demographic characteristics are equally important to address in the Region.

The inclusion of women in economic sectors is an issue that is related to social structures beyond beyong just the employment arena. Effective inclusion of women in the Region's economy must be addressed in a comprehensive manner, taking into account other key aspects such as education, health and political participation. According to the World Economic Forum's Gender Gap Index (2021), LAC has a gender gap of 28.9% in terms of economic participation, educational attainment, health and political empowerment. Taking into account the evolution of this index, which has been calculated since 2006, it is estimated that it will take the Region 68.9 years to bridge the gender gap.

The Andean Region follows the global trend by presenting the largest gender gaps in economic participation and political empowerment, well above gaps in health or education. Graph 7.1 shows the Andean Region's scenario for each of the dimensions of the gender gap index. Most of the cases in which a country worsens its global ranking in 2021 compared with 2006 reflect a comparatively slower progress in closing the gap with respect to the global speed and not necessarily a setback. Overall, the Andean Region has achieved a gender parity of 99.1% in education and 97.0% in health, while gender parity in terms of economic participation is only 64.5% and political empowerment is 27.9%.

Graph 7.1. The Global Gender Gap Index 2021 Rankings (for 156 countries)[5]



Source: Global Gender Gap Index (World Economic Forum).

The Andean Region presents important heterogeneities in the different gender gap subindexes. In the case of educational attainment, Colombia has reached total gender parity, as have ten other Latin American countries; while in the Region, Bolivia and Peru are lagging furthest behind and have not improved their rank with respect to 2006, despite having a parity of 98.1%. Health follows a similar pattern to education, where Bolivia ranks last among Latin American countries, even though it has a parity level of 96.2%. In the case of economic participation, heterogeneity in the Region is mainly driven by the share of women occupying high-level positions, which in the case of Colombia is the same as that of men, while in Bolivia only 29.2% of senior positions are held by women and this number is equivalent to 40% in Latin America. By contrast, Bolivia has the best performance in the Andean Region in terms of political empowerment, thanks to the presence of 46.9% of women in the Chamber of Deputies. Similarly, Peru

5 The numbers included in the graph refer to the relative position in the ranking for 156 countries, where countries in the first positions have the lowest gender gap. The Economic Participation and Opportunities Index includes the labor-force participation rate and wage equality for similar work, estimated earned income, percentage of senior positions, percentage of professional and technical workers. The Educational Attainment Index includes the literacy rate, percentage of enrolment in primary, secondary and tertiary education. The Health and Survival Index includes healthy life expectancy and sex ratio at birth. The Political Empowerment Index includes the share of women in parliament, in ministerial positions and years with female head of state in the past 50 years.

is among the countries with the highest number of ministerial positions held by women in Latin America, with more than 40% (World Economic Forum, 2021).

It is also worth highlighting those gaps resulting from the intersectionalities of gender with other vulnerability conditions such as poverty or ethnicity. For example, despite the high rate of gender parity in educational attainment in the Region, there are marked gender gaps within indigenous populations. An analysis of census data in Peru and Bolivia indicates that the fact of being a woman and belonging to an ethnic[6] group aggravates educational gender gaps in terms of literacy and educational attainment in both primary and secondary education (Taş *et al.*, 2014).

It is estimated that the health emergency caused by COVID-19 deepened some of the global gender gaps. Women were affected to a greater degree than men in labor participation. Even this difference persists when assessing different categories. Kugler *et al.* (2021) find that women lost their jobs at a higher rate than men in both young and adult groups; in both better and less educated groups; and in both groups with an urban and rural location. This is partly due to the overburden faced by women when they had to assume tasks and childcare activities, given the isolation measures that transferred to the family nucleus the caregiving provided by relatives, schools and childcare centers.

In LAC, Cucagna and Romero (2021) analyze a sample of thirteen countries (including Bolivia, Colombia, Ecuador and Peru) and estimate that, on average, at the start of the pandemic, women were 44% more likely to lose their jobs than men. This is related to the economic sectors in which women tend to be concentrated, since they are sectors that require face-to-face contact and were most affected by the distancing measures imposed as a result of the pandemic. In the case of these thirteen Latin American countries, 56% of the jobs lost were concentrated in the areas of personal services, commerce, education, and hotels and restaurants. It is estimated that the pandemic caused a delay of a decade in LAC: achieving an equitable labor market for men and women will no longer take 59 years to achieve, but 68.9 years (Aguerrevere *et al.*, 2021).

7.2 The Issues of Inequality in the Labor Market are a Cross-Cutting Problem Throughout the Economy

In the Region, labor demand has contributed to reduced inequality. As mentioned above, Busso and Messina (2020) find that the reduction in wage inequality was the main driver of inequality reduction. In Latin America, 73% of household income comes from the labor market and this percentage is higher in several Andean countries[7]. Although the authors acknowledge issues such as access to education and labor regulation, in wage inequality reduction they highlight the role of changes associated with the commodity boom that resulted in increased demand for unskilled workers. However, it is very likely that, in a scenario of productive transition, this will not be the case. Moreover, we are observing a global trend in the opposite direction, an increase in wage inequality (particularly in developed countries) due to skill-biased technical change and the replacement of workers by machines in routine jobs. Therefore, any productive strategy must seek greater inclusion, without neglecting the importance of strengthening the skills of the population.

6 Defined as such if the mother tongue is one of the minority languages in the country (Taş *et al.*, 2014).

7 De la Cruz *et al.* (2020).

In this sense, policies towards MSMEs have not been sufficiently accompanied by measures that take advantage of the potential of companies that have a greater capacity to expand, enter new markets and contribute to development. Inserting (and maintaining) themselves in dynamic value chains requires meeting certain (increasing) standards. Therefore, consolidated formalization –and economically more relevant than nominal or "legalistic" formalization¬– implies overcoming what Sabel and Ghezzi (2021) call "the quality hurdle"[8]. Therefore, formalization would require a transformation of the productive unit.

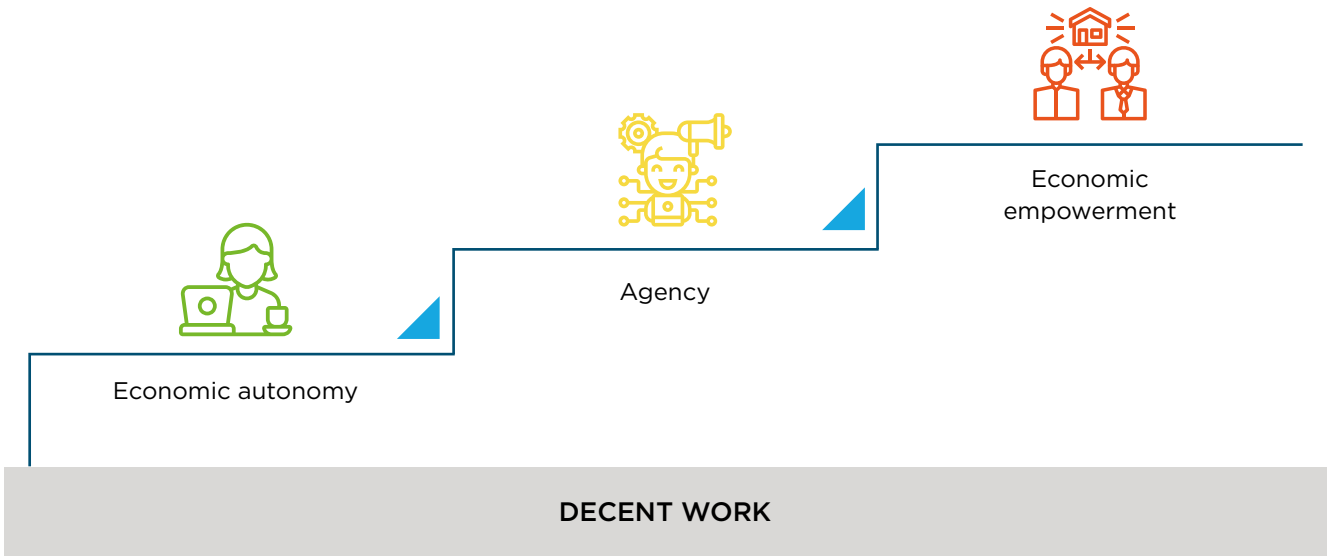
Overcoming the quality hurdle requires investment, whether in machinery and plant, process improvement, workplace conditions, or human capital. This, however, is often costly and risky (given the uncertainty of eventual success). There is usually no financing for such investments. In addition, there are many public goods that are absent (such as infrastructure, connectivity, etc.), which limits the profitability of making such investments. The balance of high costs and uncertain benefits makes it unprofitable for many companies to try to overcome the quality hurdle, despite having the potential to do so. Ghezzi and Peña (forthcoming) find that, for Colombia, between 8.4% and 13.4% of companies below the hurdle have the potential to overcome it. For Peru, the authors argue that 26% of agricultural companies below the threshold and 58% of manufacturing companies have the potential to overcome it.

Informality and low economic autonomy of women are present in the different sectors of the economy in the Andean Region. According to the ECLAC Gender Equality Observatory for Latin America and the Caribbean, economic autonomy is defined as "the capacity of women to generate income and personal financial resources through access to paid work under conditions of equality with men"[9]. Women's economic autonomy can be seen as the first step up the ladder through which women's participation in labor markets favors the development of women and those around them (see Graph 7.1). The second step in Graph 7.1 is agency, understood as a person's ability to master their own destiny by achieving their own goals and values. The third and final step is economic empowerment, which occurs when agency impacts the family and community environment. At the bottom of the ladder is decent work, defined by the International Labor Organization as productive employment in conditions of freedom, equity, security and human dignity (Levaggi, 2004). Therefore, the inclusion of women in the various sectors of the economy must take place in a coercion-free context, guaranteeing decent employment as a pillar for achieving women's autonomy, agency and economic empowerment.

8 The authors pose that the quality hurdle is a set of requirements to improve, stabilize and expand operations, which is achieved through the mastery of new disciplines and routines, in addition to the investment of additional resources. Overcoming the quality hurdle allows companies to integrate into the modern sectors and participate in the opportunities provided by the knowledge economy.

9 See https://oig.cepal.org/es/autonomias/autonomia-economica

Figure 7.1. Phases of Women's Development through their Inclusion in the Labor Market



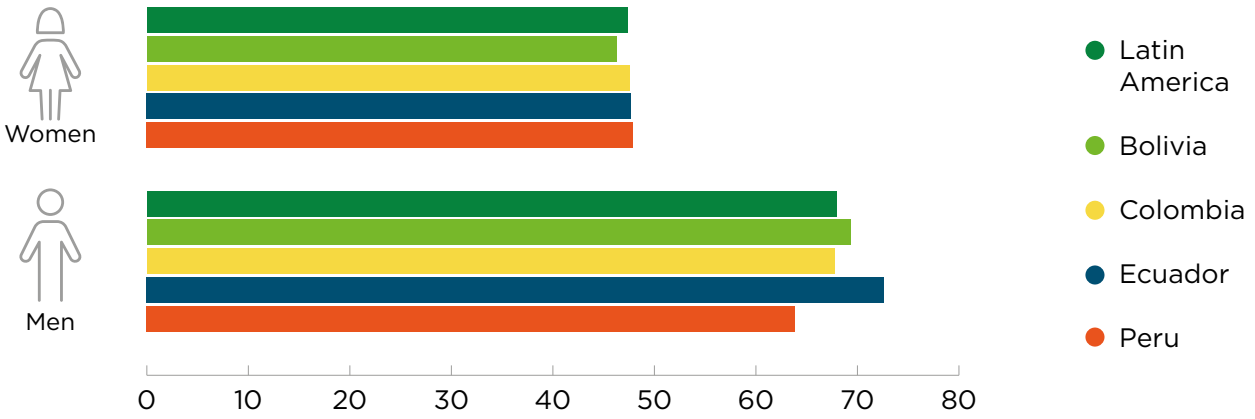
Source: Itriago (forthcoming publication).

In this chapter we focus on the analysis of the first step: economic autonomy. As mentioned earlier, women in the Andean Region have low economic autonomy. While the percentage of women who do not earn an income and do not exclusively study exceeds 20%, for men the lack of income affects around 10%. In the case of Colombia and Bolivia, the gap between men and women who do not earn an income is greater in rural areas than in urban areas, while in Ecuador and Peru there are no differences according to geographic area. Likewise, poverty and extreme poverty affect women more than men, especially in urban areas (Itriago, forthcoming).

Women in the Andean Region lag behind men in the Better Jobs Index (BJI) and this pattern follows the same trend throughout Latin America (see Figure 7.2). The BJI is an indicator developed by the Inter-American Development Bank[10] that measures employment conditions, taking into account both quantity and quality, by measuring labor force participation, employment, formality and living wage. Likewise, in the case of women entrepreneurs in Latin America, the sales volumes of businesses owned by women is lower than those owned by men (Cirera and Qasim, 2014).

10 See https://mejorestrabajos.iadb.org/

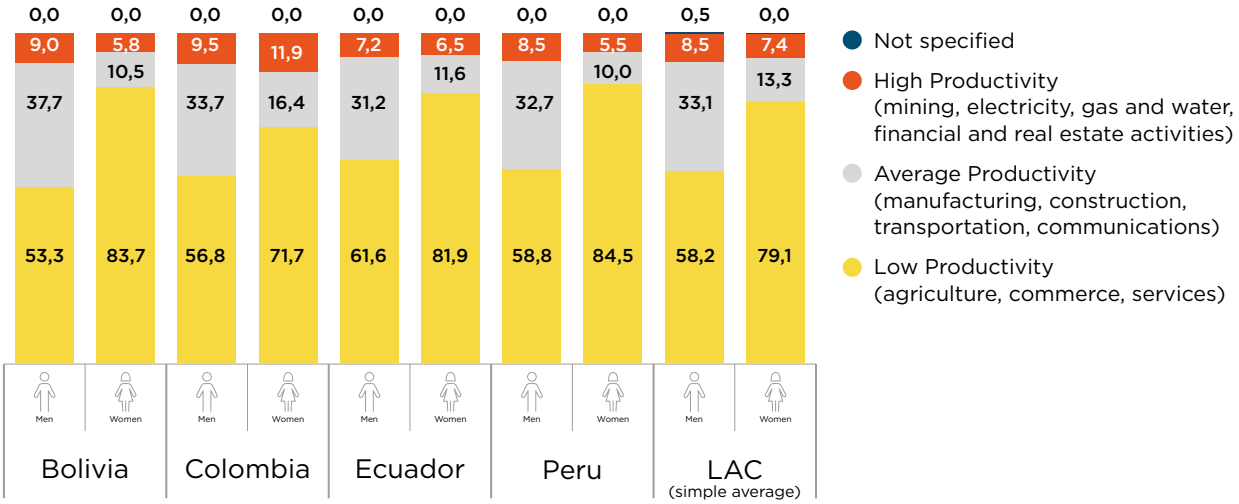
Graph 7.2. IDB Better Jobs Index, by Gender (2018)



Source: Itriago (forthcoming).

Women tend to be concentrated in micro- and small- sized enterprises in less profitable and low-productivity economic sectors (see Graph 7.3), which is an obstacle for reducing gender-based economic inequalities. In this study, Itriago (forthcoming) also highlights that in the Andean countries, the difference between the percentage of male and female wage earners averages 15 percentage points. Similarly, the percentage of men working as employers is almost double that of women. Likewise, women's participation is low in STEM[11] areas (Bello, 2020).

Graph 7.3. Employed Population by Gender and Economic Sector Productivity (2019)



Source: Adapted from Itriago (de próxima publicación).

11 Science, technology, engineering and mathematics.

Table 7.1 shows that, in Ecuador and Colombia, the percentage of women who have graduated in the areas of technology and engineering is significantly lower than that of men. On the other hand, women in Ecuador, Colombia and Peru are overrepresented in the area of health and wellness.

Table 7.1. Percentage of Female University Graduates by Field of Study

Subject Area	Ecuador (2016)	Colombia (2018)	Peru (2017)
STEM			
Natural Sciences, Mathematics and Statistics	47,9	54,2	46,0
Information and Communication Technologies	36,8	23,3	49,6
Engineering, Manufacturing and Construction	20,7	34,6	47,5
Other Areas			
Agriculture, Forestry, Fishing and Veterinary Services	35,0	44,7	40,6
Services	45,4	42,8	39,7
Arts and Humanities	48,8	50,6	58,1
Social Sciences, Journalism and Information	64,5	69,0	51,5
Business Studies, Administration and Law	59,7	62,7	58,0
Health and Wellness	71,3	72,1	78,8

Source: Adapted from Bello (2020).

Note: Purple indicates that the number of women exceeds the number of men, yellow indicates that parity between men and women has been reached (up to 5 percentage points below or above 50% is considered as parity), and green indicates a higher number of men. The number in parenthesis under each country refers to the year of the data.

When analyzing the economic autonomy of women by sector in the Andean Region, it is found that it is also low for the extractive industries, agriculture and tourism sectors. Itriago's study (forthcoming) identifies the following features for the agricultural sector: first, women living in rural areas in Andean countries tend to have lower literacy rates than in urban areas, experience high rates of gender-based violence, and between 33% and 46% of them do not feel secure with respect to possible displacement or dispossession of their land. In the case of Colombia, women, on average, have smaller agricultural production units than men. In the case of Ecuador, the gaps in total work hours (paid and unpaid) between men and women are greater in rural areas than in urban areas.

The gendered division of tasks in the agricultural sector perpetuates unpaid female labor in Latin America (Staritz and Reis, 2013), where women focus on unpaid productive activities, such as taking care of reproductive responsibilities and helping at harvest time. Thus, men concentrate power when it comes to negotiating contracts and making decisions about the use of household income.

The extractive industries sector has a low levels of female participation globally and in the case of the Andean Region, the participation rate is even lower. While Australia and Canada have 15% and 17% female participation in the mining sector, respectively (Fernandez-Stark *et al.*, 2019), in Peru it is 7% (Ministry of Energy and Mines of Peru, 2020) and in Colombia it is 9% (National Mining Agency of Colombia, 2022). One of the reasons attributed to low female participation in the sector is the lack of professional and technical training. Many of the jobs available in the sector require the worker to be absent from home for long periods of time, which is more difficult for women due to their role in the household. According to interviews conducted by the Carbon Trust (forthcoming) with people linked to various institutions

associated with the extractive industry[12], patriarchal perceptions in Bolivia have prevented women from preparing themselves to climb to higher positions in this male-dominated sector.

Céspedes-Báez *et al.* (2022) analyze gender discrimination and violence in the context of informal mining. According to the study, women in Colombia face barriers to entering formal mining which leads to their increased participation in subsistence and small-scale mining, where working conditions are far from optimal. Some of the data they present are as follows: in 2020, 71% of women were working informally in the mining sector, compared with 47% of men. In September 2020, only 8% of direct employment positions generated by mining were occupied by women.

Accommodation and food services activities have an overrepresentation of women in the Andean Region. In Bolivia, the number of women working in this sector is approximately three times the number of men, and in Colombia, twice the number of men (Itriago, forthcoming). In addition, jobs in the tourism sector tend to be seasonal, informal and low-paying (ECLAC, 2021). This is because the global trend is for women working in this sector to be assigned to low- and middle- skilled jobs, such as cleaning, laundry, cooking and as receptionists while they are underrepresented in tour guide, management or business ownership roles (Staritz and Reis, 2013).

7.3 Inclusive Policies Require Multidimensional Solutions

Given the persistent high levels of informality among MSMEs, it is important to recognize that informality is multidimensional and therefore requires treatment on several fronts. In their study, Ghezzi and Carpio (forthcoming) emphasize achieving formalization through a productive transformation of economic units by means of productive development. For this reason, productive development policies for formalization should combine two main types of policies. First, there are pull policies, which serve to increase productivity and generate good employment by modern companies (usually medium and large). Second, there are push policies, which serve for the productive transformation of MSMEs with potential. These policies are complementary. However, it should be noted that there is no universal handbook on public policies that should be implemented in order to make the leap in quality. The answers will be specific to each context and value chain.

Pull policies will be identified with a collaboration and co-creation process. These policies seek to solve coordination problems. An example of this type of policy in the Andean Region is the Executive Roundtables (ER) launched in Peru in 2015. The ERs are a methodology for the promotion of productive development that seek to solve the coordination failures between different public and private actors and, in this way, operationalize cooperation for the improvement of productivity and the creation of more

12 Including public institutions, local associations, academic organizations and companies.

and better jobs. In this sense, the ERs identify (and seek to eliminate) the bottlenecks that are affecting productivity and the capacity to generate good jobs for a sector or a value chain or network.

Push policies will normally involve accompaniment. To this end, it is important to focus on small-scale producers, to have as a central objective their participation in dynamic chains, to identify relevant actors (to clear the quality hurdle) and to generate an action plan. In this sense, the most important thing is not to precisely identify the enterprises with potential, but rather the existing value chains.

Fostering more diverse and inclusive sectors of the economy is not only more equitable and fairer, but it is also more profitable. According to a study by the McKinsey Global Institute (2015) by 2025 USD 12 trillion, or 11%, could be added to global GDP in a scenario where all countries reach the gender parity rate of the best performing country in the Region. In the case of LAC, Cuberes and Teigner (2016) estimate that gender gaps in the labor market generate a loss of 17.3% in GDP. Diversity in the work environment can also increase productivity, organizational performance and the attraction of better talent.

The extractive industries sector can benefit from incorporating digital tools into its operations to promote more inclusive environments. The use of remote monitoring technologies facilitates the inclusion of women in the industry by creating working conditions[13] that can attract more women to join the sector. However, the use of technology is not enough to overcome some barriers faced by women. The Carbon Trust study (forthcoming) cites the examples of Cumbre del Sajana, a company that promotes social and sustainable development in the extractive industry in Bolivia. Strategies such as adapting training courses to be delivered through mobile messaging applications or disseminating information to women to participate in STEM training or events, seek to combat the barriers faced by women in the extractive industries sector. Unfortunately, such strategies have failed to achieve their expected impact. This is an example of how inclusion strategies can fall short if they do not go deeper into understanding the barriers that women may be facing when it comes to benefiting from a program.

Strategies focused on reducing gender participation gaps in the labor market must be accompanied by attention placed on structural factors. Equal participation in the labor market implies guaranteeing access to equal employment under the same conditions, equal opportunities for growth and promotion towards higher-value activities. Strategies are insufficient if they are not accompanied by other ones aimed at structural factors, such as access to productive resources, work at home, care of children and the elderly, social norms and stereotypes (Fernandez-Stark, 2021). In the case of women entrepreneurs, Cirera and Qasim (2014) suggest complementing educational programs on corporate practices with mentoring, networking and specific content for women.

It is important to encourage data collection and research to make a detailed diagnosis of the barriers faced by women in specific sectors and in the presence of intersectionalities with other social disadvantages. In this regard, Itriago (forthcoming) recommends promoting initiatives that address gender gaps and territorial gaps in unison, through the promotion of clusters[14] (socio-productive ecosystems) in social exclusion areas. This proposal is consistent with the aforementioned focus on productive development and seeks, among other objectives, to strengthen the associative fabric of women and their capacity to access productive resources, such as financial services and channels for marketing goods and services. On the basis of an analytical framework of determinants of women's economic autonomy in the Andean Region, Itriago (forthcoming) raises a series of principles with actions targeted at other determinants of the low economic autonomy of women in the Andean Region (some of which have

13 With lower physical demands and lower accident risks, compared with conditions where presence inside a mine is required.

14 For a discussion on cluster development as an industrial policy to promote innovation and productivity, see Monge-González (2018).

been mentioned previously). Thus, she proposes four guiding principles for designing initiatives to promote women's economic autonomy: i) a detailed analysis of the context, identifying structural factors that impede women's economic autonomy, ii) support during the process, with special emphasis on overcoming historical discrimination and exclusion, iii) identification and management of gender differentiated impacts, iv) incorporation of explicit elements to counteract stereotypes and prejudices.

As for the actions focused on improving women's economic autonomy in the Andean Region, this author proposes focusing on the following areas: (i) access to key resources (e.g. technical education that equips women with technical and certifiable skills and competencies for their entry into sectors that offer real opportunities for decent and productive employment; (ii) institutional frameworks with a gender perspective (development of normative and regulatory frameworks on labor and productive development with a gender perspective and without gender bias); (iii) actions on corporate and public sector labor practices (e.g. development of initiatives to address unconscious gender biases, particularly in the selection, hiring and career development of women in both public and private sector companies; (iv) strengthening of institutional capacities for productive development and gender equity (with emphasis on the subnational level), such as for example, capacity for articulated intersectoral, interinstitutional and multi-sectoral work in favor of gender equity (in line with the Executive Roundtables mentioned above).

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