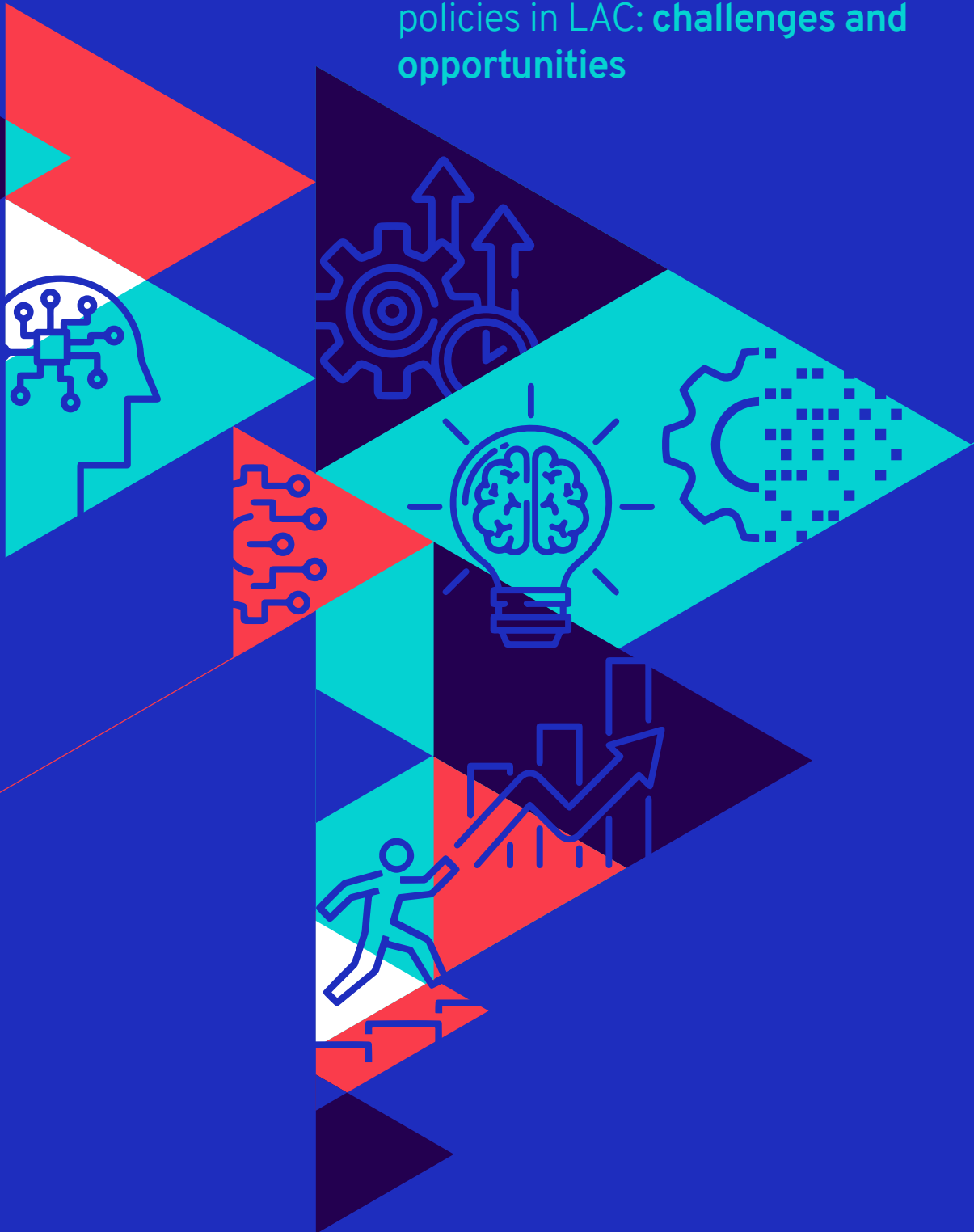




International
Labour
Organization

▶ Regional Productivity Report

Digital transition, technological
change and productive development
policies in LAC: **challenges and
opportunities**



▶ **Regional Productivity Report**

Digital transition, technological change and productive development policies in LAC:
challenges and opportunities

Copyright © International Labour Organization 2022

First printing 2022

Publications of the International Labour Office enjoy copyright under Protocol 2 of the Universal Copyright Convention. Nevertheless, short excerpts from them may be reproduced without authorization, on condition that the source is indicated. For rights of reproduction or translation, application should be made to ILO Publications (Rights and Licensing), International Labour Office, CH-1211 Geneva 22, Switzerland, or by email: rights@ilo.org. The International Labour Office welcomes such applications.

Libraries, institutions and other users registered with a reproduction rights organization may make copies in accordance with the licences issued to them for this purpose. Visit www.ifrro.org to find the reproduction rights organization in your country.

ILO

Digital transition, technological change and productive development policies in LAC: challenges and opportunities. Lima: ILO / Regional Office for Latin America and the Caribbean, 2022. 87 pp.

Labor productivity, digitization, sustainable companies, innovation, vocational training, Latin America.

ISBN: 978-92-2-037191-6 (pdf web version)

ILO cataloging data

ILO Cataloguing in Publication Data The designations employed in ILO publications, which are in conformity with United Nations practice, and the presentation of material therein do not imply the expression of any opinion whatsoever on the part of the International Labour Office concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers.

The responsibility for opinions expressed in signed articles, studies and other contributions rests solely with their authors, and publication does not constitute an endorsement by the International Labour Office of the opinions expressed in them.

Reference to names of firms and commercial products and processes does not imply their endorsement by the International Labour Office, and any failure to mention a particular firm, commercial product or process is not a sign of disapproval.

Information on ILO publications and digital products can be found at: www.ilo.org/publns.

► Table of Contents

Executive Summary	v
Acronyms	xiv
1. Introduction	1
2. Scope and structure of the report	4
3. Background and General Considerations	6
4. Labour productivity and TFP trajectories in Latin America and the Caribbean, 1990–2020	12
5. The explanatory factors of the region’s productivity trajectories and gaps	21
5.1. Size and competitive environment	26
5.2. Technology adoption and absorption capabilities	30
5.3. Job training, skills and competencies	33
5.4. Innovation	36
5.5. Management and organization of work	38
5.6. Institutional setting	42
6. Impact of digital transformation and technological change on post-pandemic productivity performance and projections in LAC	45
6.1. Primary sectors / exporters	47
6.2. Manufacturing industry	54
6.3. Service sector	57
6.4. Challenges and projections for the region	64
7. Final considerations for the design and implementation of policies to boost productivity and create decent employment	66
8. Bibliography	77

► List of Tables, Graphs and Figures

Graph 1. Comparative trajectory of the annual productivity growth rate, average LAC vs. average EMDE economies	6
Graph 2. LAC and China: evolution of per capita GDP in 2017 PPP dollars (US comparable)	8
Graph 3. Latin America and the Caribbean: Year-on-year variation. Labour Productivity (%), 1990 – 202	14
Graph 4. Relative evolution of Total Factor Productivity LAC, US and China (1980=100)	14
Graph 5. Latin America and the Caribbean: Year-on-year variation in Total Factor Productivity, 1990-2020	15

Graph 6. Comparative trajectories PL 2000–20: Latin America and the Caribbean (LAC) versus East Asia and the Pacific (EAP) (GDP in constant 2010 US dollars)	16
Graph 7. Comparative TFP trajectories 2000–20: Latin America and the Caribbean (LAC) versus East Asia and the Pacific (EAP), (GDP in constant 2010 US dollars)	16
Graph 8. Comparative trajectories PL 2000–20: Latin America and the Caribbean (LAC) versus Eastern Europe and Central Asia (EAC) (GDP in constant 2010 US dollars)	17
Graph 9. Comparative trajectories TFP 2000–20: Latin America and the Caribbean (LAC) versus Eastern Europe and Central Asia (EAC) (GDP in constant 2010 US dollars)	17
Graph 10. Average Labour Productivity Growth in LAC, by country	17
Cuadro 1. Productivity trajectory (PL and TFP 1990-2020), by LAC subregions	19
Figure 1. Productivity ecosystem	22
Figure 2. Relative internal productivity by company size (as a percentage relative to large companies). Latin America and the European Union, 2009 and 2016	23
Figure 3. Average productivity per hour of work (annual percentage variation and value in constant dollars, PPP)	24
Box 1. Relevant experience of the ILO in the region: the Executive Roundtables	29
Table 2. Preparedness for Transformation Index: score “Updating of educational content and investment in skills and competencies required for future jobs and markets.” Scale from 1 to 100. Economies	35
Box 2. Relevant experience of the ILO in the Region: SCORE Programme	41
Figure 4. Channels connecting technological change to aggregate productivity	46
Table 3. Main uses and applications of agtech	49
Table 3. The development of a cluster of knowledge-intensive service providers for the oil-gas sector in Trinidad and Tobago	54
Table 4. Technologies by technology generation and functional area	55
Table 5. Exports of knowledge-based services as a percentage of total services exports. US dollars per inhabitant (average 2017-19)	63
Table 6. Aspects affecting productivity, by type of company	68
Box 4. The Finishing School programme and other national initiatives for the development of digital skills	72
Table 7. Identification of good practices, initiatives and differentiated policies to facilitate the adoption of technologies and the digital transition, in order to boost productivity and decent employment	74

Executive Summary

At its 341st meeting (Geneva, March 2021), ILO's Governing Body presented its "Decent work and productivity" document, highlighting the need to address the various factors that affect employment from a systemic perspective, including productivity growth, and its catalytic effect on decent job creation, inclusive growth and shared prosperity.

Ample international evidence attests to the importance of creating trajectories of sustained productivity growth, and virtuous cycles of employment and economic growth, and thereby contributing to improving incomes and reducing poverty (Pagés 2010). International organizations including the OECD and the World Bank have pointed out that in recent decades the evolution of productivity has been one of the most troublesome aspects of the economic performance of Latin America and the Caribbean.

Region-wide labour productivity (LP) has been on a persisting downward trend compared with the rest of the world over the last forty years. While in 1980 the average labour wage in LAC was practically double that of the rest of the world, in 2018 it only reached about 90 per cent of the average for the reference global context (OECD 2020).¹ Even those LAC countries that have done relatively better at the regional level² show 1990-2020 productivity growth trajectories below the average of OECD economies and well below dynamic regions such as East Asia and the Pacific.

Taking a multifactorial perspective and based on the ecosystem approach proposed by the ILO Governing Body (2021), this report undertakes an analysis of the growth trajectories of labour productivity and total factor productivity (TFP) in LAC countries for 1990–2020. First, it presents the development of labour productivity and total factor productivity in LAC based on systematized evidence for 1990–2020. It further identifies patterns of productivity trajectories by groups of countries and comparative references with respect to extra-regional economies.

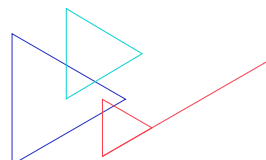
Second, it identifies and ranks factors explaining the persistent performance and productivity gaps throughout the region, based on a review of recent evidence-based literature. Next, it addresses the phenomenon of digital transformation and its current and projected impacts on the evolution of productivity over the next few years, considering the implications and effects of the COVID-19 pandemic on the processes of technological adoption and digital transition by local companies, as well as the prospects for the recovery, generation and adaptation of jobs in a future post-pandemic scenario.

Finally, preliminary considerations and recommendations are shared regarding initiatives and policies that contribute on the one hand to boosting productivity and, on the other, to narrowing current gaps between companies of different sizes, productive sectors and environmental conditions in the region's economies.

The imperative of increasing productivity in the region, as a necessary condition to advance towards greater shared prosperity hand in hand with more and better jobs, highlights the relevance and opportunity of advancing towards a better understanding of the central determinants of productivity growth in the medium term. The new global reality triggered by ongoing digital transformation, some impacts of which seem to have been amplified and

¹ Comparison based on data from The Conference Board, in constant 2018 US dollars.

² This group may include Bolivia, Chile, Colombia, Costa Rica, Panama, Paraguay, Peru, the Dominican Republic and Uruguay, based on ILOSTAT data for the annual rate of increase in labour productivity, measured by output and number of workers, in constant 2010 US dollars.



accelerated by the COVID-19 pandemic, only accentuates the urgent need to gain a systematic understanding of the factors that may soon affect the evolution of productivity and, on this basis, fosters instances of social dialogue needed to accompany and regulate the inevitable transitions this process entails

Thus, the main purpose of this report is **to serve as a non-exhaustive enabling input, based on systematized evidence, aimed at prompting an instance of social dialogue aimed at building consensus to implement and strengthen initiatives that contribute, on the one hand, to increase productivity across sectors, clusters and segments of companies throughout the region and, on the other, to bridge the subsisting gaps, with a view to fostering the consistent and sustainable creation of more and better jobs.**

The virtuous interplay of productivity and the capacity for sustainable economic growth over time clearly emerges when we examine the determinants of evolving total factor productivity (TFP) in economies frequently mentioned as successful models of recent transitions towards higher standards of income, prosperity and economic development (Hausmann, Rodrik and Velasco 2008; McMillan, Rodrik and Sepúlveda 2017).³

TFP measures the component of the level of activity that is not directly explained by how much work or capital is allocated to the production process, but by how these production factors are used. Thus, changes in TFP are due basically to three causes: first, intramural productivity gains, that is, within companies because of efforts to adopt technologies, innovations and/or organizational management practices; second, the net effect resulting from the irruption of new, more productive companies in the economy and the exit (closure) of less productive companies; and third, the aggregate effect of reallocating jobs and net investment flows from less competitive industries to more productive and competitive emerging or expanding ones.

Considering these causes, the stagnation of productivity in LAC (relative to other regions) is partly explained by significantly lower increases in intra-firm productivity than those seen in more dynamic economies such as in Asia and the Pacific, and in part by marked inefficiencies in the dynamics of resource reallocation from declining sectors, in terms of absorbing new jobs, towards more productive emerging sectors, unlike what has been observed in countries that have undergone significant productive transformation processes.

A key factor for the analysis of the low relative contribution of the intra-company component to the increase in productivity in the region is the high weight of micro and small subsistence companies and informal enterprises in the productive tissue, and particularly in employment,⁴ with marked productivity gaps with regard to segments of formalized, larger companies, managed professionally and possibly geared towards exports.

On the other hand, some of the main structural features that have determined inefficiencies in the inter-sectoral reallocation of resources in LAC include: (i) in countries such as Argentina, Brazil, Chile and Colombia, premature de-industrialization compared with economies with earlier and higher industrial development;⁵ (ii) low complexity of productive matrices;⁶ (iii) weak production diversification processes towards more complex activities from the point of view of knowledge and skills; and (iv) weak coordination and local integration in supply chains, with scant functional specialization.

³ Reference is usually made to the cases of Ireland, Finland and the so-called Asian tigers, that is, South Korea, Malaysia, Singapore, Thailand and, more recently, China and Vietnam.

⁴ MSMEs represent 99 per cent of the universe of companies and 67 per cent of employment in LAC (ECLAC)

⁵ Beylis et al. (2021, section 1) presents analyses for several regional countries, based on Rodrik's (2016) insights concerning developing economies.

⁶ According to the Economic Complexity Index*, based on the level of diversification and sophistication of exports. <https://atlas.cid.harvard.edu/>

To include the intra-company and intersectoral effects through the proposed ecosystem approach, six meso- and microeconomic dimensions are identified in this section, which, according to a review of recent literature, impacts medium- and long-term productivity trajectories, as well as the depth and persistence of gaps across companies. They are:

1. Size and competitive environment: High proportion of microenterprises and SMEs, with close to 50 per cent operating informally, with poor access to qualified human resources, enabling infrastructure, and managerial and technological capabilities. Insertion in global supply chains has been a relevant way of improving intra-company productivity for many companies in different countries. However, the relative predominance in the region of natural-resource intensive export sectors, and commodities and/or capital-intensive industries, does not favour the insertion of small companies, both because of limited investment capacity and because weak linkages created by many of these export activities. The post-pandemic global scenario also mandates the need to rethink global supply chains, opening possible processes of relocation and greater proximity of input suppliers, setting up spaces to explore regional cooperation agreements with potential implications in the region's economic geography and complexity (ECLAC 2020a).



2. Technology absorption and adoption: Unlike large companies and technological start-ups, which adopt more sophisticated and comprehensive forms of digitalization, technology adoption opportunities for SMEs mainly relate to access to and use of digital platforms that support digital communication, market platforms and electronic commerce. In line with global trends, services are supported by digital delivery channels, with which SMEs cannot only expand globally but, in many cases, emerge as privileged carriers of innovation and new technologies. More and more services can be stored, encrypted and marketed digitally, thus turning these companies into critical links in supply chains in industry, agriculture and mining-energy, with numerous linkages with other sectors and great potential to improve aggregate productivity.

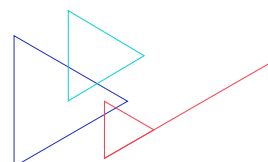


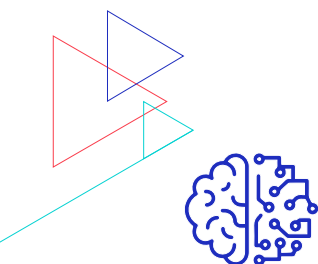
3. Training, skills and labour competencies: According to the OECD (2001), human capital is “the set of knowledge, skills, competencies and attributes of individuals that facilitate the creation of personal, social and economic well-being”. As countries move towards new sources of growth, they need to understand the types of skills necessary for the new productive and labour scenarios to adapt their education and training systems. The development of skills and competencies of human talent is a fundamental pillar to move towards greater productive development. Technological breakthroughs, wherever they occur, generally displace specific tasks that are likely to be automated, but it fails to cover the broad spectrum of tasks that involve human activity in its entirety. Digitalization tends to favour the emergence of complementary tasks that reinforce labour polarization to a certain extent, where technology breaks into manual and cognitive-routine activities and tasks with greater force, opening a wide spectrum of non-routine tasks performed by people, a phenomenon known as complementary adaptation (Beylis et al. 2021).



Accelerating digitalization exerts particular pressure on skill building to undertake new widespread routines. According to data available for Chile, Ecuador, Peru and Mexico (PIAAC⁷), there is a significant gap with respect to the OECD average in terms of the percentage of adults with high capacities to solve problems in digital environments. Strategies to overcome the challenges of insertion and job security involve adapting skills already available in the labour market. Commitments to job reconversion or re-skilling become extremely important in the face of the structural transformations that have taken place in recent years and that have been accentuated by the global health crisis. Specialization or up-skilling, on the other hand, is necessary to improve labour inclusion,

7 PIAAC: Programme for the International Assessment of Adult Competencies.





narrow gender gaps and promote investment in non-traditional sectors that require high qualifications with specific skills.

4. Innovation: Building on pioneering contributions in this area,⁸ an extensive base of empirical studies has been built up for various productive sectors and countries, which provide robust evidence about the positive impact of innovation on the performance of companies and its value as a relevant driver for productivity. Grazzi and Pietrobelli (2016) compile various studies that confirm the virtuous relationship between R&D effort, innovation and productivity in companies. There is also recent evidence, both outside and inside LAC, that confirms the favourable impact of process and product innovation on job creation (Vivarelli 2013; Crespi and Tacsir 2011).

Studies between countries on homologous microdata reach consistent results, favouring the hypothesis that those companies capable of incorporating technological improvements present differentiated innovative behaviours compared with their peers and, based on the innovations developed, report growing labour productivity. Crespi, Tacsir and Vargas (2016), based on microdata from WBES⁹ 2010 for a sample of 4,376 industrial firms with five or more employees, in 17 countries throughout Latin America and the Caribbean, point to robust evidence of linkages between companies' innovative efforts and outcomes, and higher productivity. On average, the LP of innovative companies is 50 per cent higher compared with companies that do not innovate. For the Caribbean, similar metrics point to an even greater difference, as high as 63 per cent.

It follows that the potential impact on productivity, from promoting business innovation in Latin America, should be very high in relative terms, but at the same time it reinforces the importance of improving the work environment to foster development and capacity building at company level, especially among small and medium-sized companies. For example, Grazzi and Jung (2016) provide consistent evidence that access to broadband connectivity is a source of increased productivity among SMEs in Latin America and the Caribbean.

In natural resources-based production chains, where many countries in the region have comparative advantages, there is incipient progress towards more knowledge-intensive chain links (for example, biotechnology and sophisticated related services). Although many primary chains in Latin America show a handsome rate of adoption of modern technology, world-class local innovative capacities are still an exception in the regional landscape (for example, oil, forestry and ethanol industry in Brazil or the seed sector in Argentina and Brazil). Countries such as Canada, Norway and New Zealand have exploited the opportunities for innovation open in natural-resource-based chains much more intensely than has LAC (López 2014).



5. Work organization: Abundant literature, including many case studies, is available on the impact of business management and organizational culture on intramural productivity. In their exhaustive study of a sample of 11,000 companies in 34 countries and panel data from 2004 to 2014, Bloom, Sadun and Reenen (2017) test their theoretical model, that considers business management as a factor that partially explains the evolution of TFP similarly to technology. Just as the differences in management can explain a large part of the differences in productivity between countries, the results of the study show that close to 30 per cent of the differences in productivity between the group of the 10 per cent least productive companies and the group of the 10 per cent more productive companies within a given country can be explained from differences attributable to business management.

⁸ Such as the concept of creative destruction (J. Schumpeter, 1934), the evolutionary approach to the firm (Nelson and Winter, 1982; Kline and Rosenberg, 1986) and the vision of national innovation systems (Lundvall and Freeman, 1992).

⁹ <https://atlas.cid.harvard.edu/>

One of the most obvious effects of the pandemic has been the generalization of teleworking, in practically all those tasks where face-to-face work is not essential. As an example, in services, especially those based on knowledge, the remote work modality was implemented more widely than in goods-producing industries. Recent studies identify two potentially relevant long-term negative effects of teleworking from a productivity perspective: first, the lack of face-to-face interactions could lead to the loss of fertile ground for creative ideas and the innovation process; and second, the loss of social connections and the opportunity to exchange ideas informally could lead to a loss of social capital in organizations.

6. Institutional context: Four areas of institutional action with potential impact on productivity are identified:



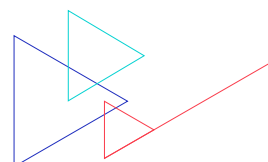
a. Regulatory scope: includes the legal-legislative, tax, territorial, consumer protection, mediation and dispute resolution facets, relevant to all economic activity. The rule of law, the suitability and qualification of its representatives, independence and transparency, as well as regulatory consistency over time stand out as relevant elements that favour productive development in this area.

b. Labour scope: includes labour institutions, including national training, job training and qualification systems that play a central role in the evolution of productivity, as already indicated in point 3 above. A second point of interest in labour institutions is the minimum wage as a reference indicator, especially relevant in countries with little or limited development of collective bargaining. From a comprehensive perspective of labour relations, the evidence shows that, to the extent that collective bargaining is an important redistributive factor of profits and favourable working conditions, it can also contribute indirectly to boosting intra-firm productivity. Of no less importance is the relevance of labour institutions in promoting respect for labour rights and social dialogue, understanding these as factors that contribute to create an adequate work environment as a necessary condition for improving productivity.

c. Provision of enabling infrastructure: this includes public and private institutions and companies that provide the basic and/or specific infrastructure necessary for the operation of companies: physical and transport infrastructure, digital connectivity, metrology, basic analytical services (laboratories) and others. To the extent that an economy's productive fabric becomes more complex and sophisticated, its requirements for higher level and quality of the enabling infrastructure also grow.

d. Productive promotion, technology transfer and promotion of innovation: this comprises a wide gamut of functions and policy instruments such as provision of or access to financial and non-financial services: technical assistance, support for supplier development, promotion of business associativity and networks; business mentoring services; entrepreneurial development; and incentives for public purchase. Frequently, these institutions primarily focus on counteracting the effects of market failures that hinder access to financing by companies or enterprises willing to innovate. These efforts result in benefits for society that transcend those that can be appropriated by innovative companies. They can also be aimed at generating learning among local firms, mainly SMEs, micro-enterprises and self-employed workers through technology transfer or extension models, that positively impact their productivity and sustainability.

A rapid process of transformation of economic and social life began all over the world in the middle of the last decade thanks to the massive dissemination of digital technologies. These new technological developments have transformed production processes and industrial organization in countless value chains worldwide in an increasingly perceptible way,, as well as future employability conditions, the competitive strategies of companies, labour relations and daily lives.



This phenomenon, known as digital transformation, generates unprecedented opportunities in different contexts and at different scales, through the reconfiguration of global supply chains and the consequent re-location of suppliers, the irruption of new knowledge and technology-based ventures and growing access to friendly digital solutions, that triggered widespread use of digital platforms, e-commerce channels, delivery systems, fintech applications and other like evolutions.

But digital transformation has found Latin America and the Caribbean (LAC) in a disadvantageous position due, firstly, to gradually declining productivity vis-à-vis the rest of emerging regions and the developed world in recent decades; and secondly, to the low technological absorption capacity together with the relatively low level of qualification of the labour force in most smaller companies, together with the high level of informality prevailing across the region (ILO 2021).

Although recent sample studies provide data pointing to a strong acceleration of digitalization and the use of certain technologies by companies in the region,¹⁰ the COVID-19 pandemic generated differentiated impacts between sectors and, therefore, between countries with dissimilar production structures. The additional costs associated with operating during the pandemic and the constraints that imposed could deepen pre-existing difficulties associated with low productivity, among other mechanisms, diverting scarce resources to adapt to the new conditions in the face of limited financing.

Available evidence indicates that, at a global level, the productivity gaps between economies by income level widened during COVID-19. Today, a worker in a high-income country produces in real terms (PPP) 17.7 times more per hour of work, on average, than a worker in a low-income country; 6.8 times more than one from a lower-middle income country and 3.4 times more than one from an upper-middle income country (ILO 2021).

To understand the extent of digital transformation in the region and its transition dynamics, we examine five representative sectors of the regional economy: primary-exporting agricultural and mining-energy sectors; manufacturing industry; conventional services; and knowledge-based services. The results, based on a review of secondary information sources, show lags in all the sectors examined, relative to other more developed regions, in the adoption rate of technologies associated with digital transformation in the LAC region, with marked differences between companies.

a. Agricultural Sector: recent studies report a low relative rate of adoption of precision technologies (agtech) across LAC countries. The reported causes are diverse: high acquisition and implementation costs, long investment return periods, lack of necessary infrastructure, for example, connectivity in fields, lack of institutions to support technological adoption, low levels of technological savvy and traditional visions of producers, uncertainty about the results of adoption and regulatory obstacles (use of data and adoption of standards).

b. Mining-energy sector: as the sector that provides the raw material for much of what is built and manufactured in modern economies, the mining industry plays a crucial role in the current global scenario. At the same time, it faces challenges that force it to seek innovative solutions: declining productivity in the face of a general decline in ore grades, the need to exploit more remote and complex deposits, volatility of input prices, environmental sustainability and social license requirements. Against this backdrop, the trends towards digitalization and technological change offer solutions to revitalize the sector. A survey on technology adoption, employment and international trade for

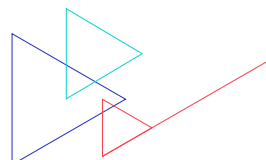
¹⁰ According to a global study by the World Bank from October 2020, 35 per cent of firms increased the use of platforms and 20 per cent invested in digital technologies, in both cases as a response to the pandemic. Basco and Lavina (IDB-INTAL 2021), in a more recent study on a sample of 500 companies from Argentina, Brazil, Chile, Colombia and Mexico, shows the pandemic doubled the use of various advanced digital technologies.

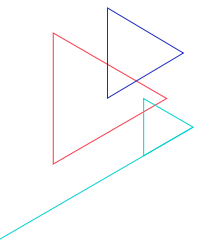
Argentina, Brazil, Chile, Colombia and Mexico shows that the percentage of mining companies that invest in research, development and innovation is significantly lower than the sample average.

- c. Manufacturing industry:** results of a recent study carried out on a sample of companies from Argentina, Brazil and Uruguay are presented to illustrate the regional lag of the digital transition in manufacturing: (i) the dissemination of advanced technologies is still marginal: 4 per cent in the items with the highest penetration vs. 15 per cent average in the US; (ii) most regional firms use backward technologies, preceding the so-called third- and fourth-generation technologies; (iii) few companies reported corrective actions to close the technological lag gap: less than 15 per cent of companies in Brazil and about 5 per cent in Argentina and Uruguay. Available evidence of this first stage of dissemination points leading to the expansion of heterogeneity within the industrial system reveals that change leaders are large, dynamic exporting companies.
- d. Traditional services:** historically associated with low-productivity activities, sectors such as commerce, financial services and passenger transport now have their digital counterparts in e-commerce, fintech and localized transport platforms such as Uber or Cabify. By developing and offering completely new financial products, fintech companies in LAC can play a key role in improving financial access and inclusion in the region, taking advantage of the high penetration of smart mobile devices. E-commerce was already on an upward trend but the COVID-19 pandemic ramped it up. Consumers, producers and merchants found a relatively accessible solution for their transactions that enabled them to sustain operations that would otherwise have been impeded by the restrictions to access traditional commercial channels.
- e. Knowledge-based services (KBS):** these are characterized by: (i) being labour intensive, with a bias towards employing medium-high and highly qualified personnel; (ii) innovation activities based more on intangibles (human capital, use of software and databases, organizational management, brand value) than adding machinery; and (iii) low entry and exit barriers in most sectors due to relatively low investment requirements in physical capital (Nayyar et al. 2021). In addition to the possibilities created by technology, economic and market factors also drive the growth of the KBS sectors. Emerging countries have been gaining ground in international KBS trade. The region has also attracted investment from multinationals in areas such as computer software and services, business process outsourcing (BPO) and audio-visuals. The competitive advantages of Latin America in these sectors are essentially due to its relatively qualified labour force at competitive costs and time zone, coupled with incentive regimes in various countries. Likewise, the region has been the origin of a number of successful BPO software and services export firms that have gone global. Despite this, the region has lost relative weight in KBS markets. Its share of global exports fell from 12 to 8 per cent between 2005 and 2019. Nonetheless, some small nations, such as Costa Rica and Uruguay, still show very good export performance.

Preliminary considerations for the design and adaptation of policies and initiatives to boost productivity

For years it has been recognized that *“creating conditions to improve productivity growth rates is a central objective of the region’s sustainable development strategy”* (Moreno 2014). The persistence – and deepening – of productivity gaps, relative to other more developed regions or economies, as well as within the region, between countries, economic sectors and productive units, points to the relevance of advancing in the design and implementation of productive development policies and promotion of productivity across the region.





In view of the high disparity of conditions by country, sector or value chain, size and type of company, it does not seem advisable to claim that the same policies may uniformly apply across all countries or business segments. Further, having sufficient institutional capacity to implement effective policies is as important as adaptation to the specific context of each country (Agosín and Fernández-Arias 2014).

To characterize this diversity, five categories of companies or productive units in the region are distinguished:

- i.** modern companies participating in international markets, with high productivity standards;
- ii.** large companies in primary/export sectors, sensitive to international price cycles, with the potential to increase their productivity and lead virtuous linkages with local suppliers;
- iii.** young companies and ventures or startups with high growth potential, based on knowledge or technology, that require conditions to scale productively;
- iv.** small and medium-sized companies that operate mainly in domestic markets with gaps in the adoption of technologies and basic management skills, which places them closer to survival dynamics and prevents or hinders them from improving their productivity; and
- v.** informal microenterprises and self-employed workers, the segment hardest hit by the economic impacts of the pandemic, without greater access to training and technology transfer channels.

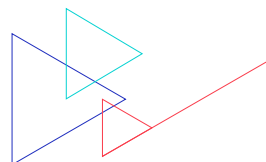
Strategic initiatives at different levels and productive segments must necessarily be accompanied by measures that also guarantee the economic, environmental and social sustainability of activities. It should not be forgotten that the companies included in categories (iv) and (v) of the above typology represent, in number of units, most of the business and entrepreneurial universe of the region.

It is crucial to actively accompany the objectives of an agenda of this nature with strategic goals in terms of labour inclusion and closing critical gender and territorial gaps, among other concerns. The relevant national and territorial institutions to promote and strengthen spaces for social dialogue can play a key role in adhering to the initiatives and policies proposed, as well as in resolving various types of coordination breakdowns. A necessary condition for success of this agenda is garnering political support and an effective mandate beyond the legitimate interests of its constituent parts (Guardiancich and Molina 2020).

For now, the post-pandemic scenario raises significant unpostponable needs regarding infrastructure, institutions and enabling capacities to take on the challenges, but at the same time take advantage of the opportunities afforded by the digital economy.

Acronyms

AI:	Artificial Intelligence
ASEAN:	Association of Southeast Asian Nations
CAF:	CAF – Development Bank of Latin America
ECLAC:	Economic Commission for Latin America and the Caribbean
EAP:	East Asia and the Pacific
ECA:	Eastern Europe and Central Asia
EMDE:	Emerging Markets and Developing Economies (Regions)
FDI:	Foreign Direct Investment
GDP:	Gross Domestic Product
IDB:	Inter-American Development Bank
ILO:	International Labour Office
INTAL:	Institute for the Integration of Latin America and the Caribbean (IDB)
IoT:	Internet of Things
ICT:	Information and Communications Technologies
KBS:	Knowledge Based Services
LAC:	Latin America and the Caribbean
LP:	Labour Productivity
OECD:	Organization for Economic Co-operation and Development
PPP:	Parity Purchasing Power
R+D:	Research and Development
SDG:	Sustainable Development Goals(UN)
TFP	Total Factor Productivity
UNCTAD:	UN Conference on Trade and Development



1. Introduction

At its 341st meeting (Geneva, March 2021), ILO's Governing Body submitted the document "Decent work and productivity" for the consideration of its members, with the objective of promoting debate to address the main factors hindering productivity growth, and their *catalytic effect on the creation of decent work, inclusive growth and shared prosperity*. This document recognizes that sustained (and sustainable) rising productivity is a key driver of economic growth, creating more and better jobs and developing sustainable companies.

International evidence clearly reveals that the countries frequently cited as successful models of recent transition to a higher standard of prosperity and economic development¹¹ travel paths of sustained labour productivity and TFP¹² growth over relatively long periods of time and, at the same time, engage in relevant processes to transform their productive structures (Hausmann, Rodrik and Velasco 2008; McMillan, Rodrik and Sepúlveda 2017).

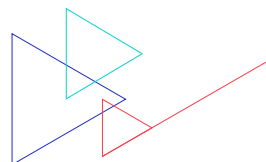
Arguably, productivity growth can be achieved in different ways. In simple terms, higher labour productivity can be achieved by producing a greater volume or value of output for the same number of hours worked, or by maintaining production and instead reducing the related hours worked. At the aggregate level, both options may combine. Countries that have achieved virtuous cycles of productivity and growth for extended periods of time show investment and innovation dynamics capable of generating jobs and wage increases, which in turn have an impact on greater aggregate demand (Manyika and Spence 2021).

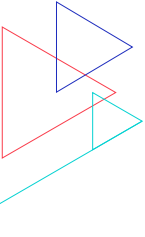
One of the most frequently mentioned causes to explain decades-long lagging productivity growth trajectories in the region's economies is their low capacity for technological adoption and innovation.¹³ A proxy indicator of said capacity is Total Factor Productivity (TFP) which measures the component of the level of activity that is not directly accounted for by how much work or capital (physical or human) is used in the production process, but rather by how these factors of production are used. Thus, one of the main sources of productivity growth in economies is the use of available new technologies that enhance the productive capacity of labour and capital, as well as their ability to innovate. Higher productivity is also the consequence of factor reallocation from lagging companies and/or sectors to others with higher productivity. The virtuous dynamics between productivity and economic expansion are clearly visible when examining the determinants of TFP in high-growth economies where changes in TFP respond, in general terms, to three causes: first, intramural productivity gains, within companies as a result of investment, innovation and/or organizational management efforts; second, the net effect resulting from the irruption of new, more productive companies in the economy and the closing (dissolution) of less productive companies; and third, the aggregate effect of reallocating jobs and net investment flows from less competitive industries to more productive and competitive emerging or expanding industries. The second and third

11 This is the case of Ireland, Finland and the so-called Asian tigers: South Korea, Malaysia, Singapore, Thailand and, more recently, China and Vietnam.

12 TFP: Total Factor Productivity is defined as the relationship between aggregate production and all the factors in the production process (commonly stated as labour and capital). In simple terms, if total production grows faster than net factor growth, TFP increases; if, on the other hand, total production grows more slowly than net factor growth, TFP decreases. TFP growth is frequently associated with factors that have a positive impact on the "performance" of factors, such as technology, knowledge, talent and innovation, although it can also respond to the reallocation of resources between sectors, or to changes in relative prices and the exchange rate.

13 A good synthesis of these arguments can be found in Pagés, C. (2010) in sections 2 (Daude, C. and E. Fernández-Arias. Aggregate Productivity: The Key to Unlocking Latin America's Development Potential) and 10 (Navarro, J.C., J.J. Llisterri, and P. Zúñiga. The Importance of Ideas: Innovation and Productivity in Latin America).





sources of TFP growth are intimately related to the productive transformation experienced by many of the most dynamic emerging economies in recent decades.

The ongoing global digital transformation impacts activities and production processes throughout multiple goods and services value chains, with diverse and widespread consequences, not exempt from mutual trade-offs. This process, of global scope and multiple expressions and offshoots, configures a complex scenario, often featuring divergent trends and posing important challenges, but also creates opportunities for companies and employment creation in the region. On the opportunities side, the main one is surely to take advantage of the mass spread of digital solutions that favour, on the one hand, the integration and upgrading of local companies as suppliers along supply chains linked to the most dynamic export and productive sectors. On the other, the massive irruption of new ventures principally engaged in delivering technology and knowledge-intensive specialized goods and services.

Massive access to such opportunities among smaller regional companies requires redoubling efforts to invest in creating enabling infrastructure and active public policies to improve access (connectivity) and adoption of digital tools, connection to web platform support, and training for local MSMEs to use digital technologies. The Covid-19 crisis may trigger a turning point in this regard, within the framework of the recovery of productive fabrics and employment, given the growing adoption of digital solutions and platforms, e-commerce channels, delivery systems, teleworking, and other practices catalysed and massively spread during this period.

The massive access to and adoption of digital technologies can decisively thrust greater economic inclusion and overall well-being. On the contrary, in this regard the greatest threat to the region is insufficient and lagging training and investment that may broaden existing divides in access and use of these technologies (OECD 2020).

Creating decent jobs linked to sustainable growth and greater productivity, embodied in the United Nations SDG No. 8, can guide efforts regarding productivity, decent employment, and shared prosperity in the region. The green reconversion of many productive and service activities, linked to extractive industries, with impacts in sensitive environments, or leaving significant carbon and/or water footprints, can also contribute to this SDG from new economic models, shared value, green job creation, and responsible and inclusive management practices.

The imperative need to increase productivity, as a necessary condition to move towards greater shared prosperity hand in hand with more and better jobs, highlights the relevance and opportunity of accomplishing a better understanding of its central determinants in the medium term (Astorga and Bertranou ILO 2017). The new global reality induced by the ongoing digital transformation, whose impacts seem to have been amplified and accelerated by the still ongoing global Covid-19 pandemic, only underscore the urgent need to systematically understand the factors that can contribute to sustained increases in productivity, and on that basis encourage social dialogue needed to accompany and regulate the inevitable transitions that this process entails.

2. Scope and structure of the report

Ample international evidence underscores the importance of journeying along trajectories of sustained productivity growth to generate virtuous cycles of employment and economic growth, and thereby contribute to improving incomes and reducing poverty (Pagés 2010). However, a review of the interpretive frameworks to gauge evolving productivity over time and its possible causalities, reveals wide divergences remain between currents of economic thought. The fact that measuring changes in total factor productivity may be linked to a “residual” component leads many economists to call it “the measure of our ignorance” (Panizza 2020)¹⁴. At any rate, although the increase in productivity in analytical terms may seem an abstract and interpretable concept, the international evidence shows its growth over time reflects the economy’s capacity to produce more through better input mixes, incorporate more appropriate technologies, adopt better business processes and models, and move towards new productive and service sectors with greater potential for growth and job creation.

The current debate and reflection on productivity in Latin America and the Caribbean evolves in a unique context, after the region’s aggregate GDP shrank by 6.8 per cent in 2020, significantly above the 3.3 per cent global GDP slide and the highest among developing regions, even above the region’s slump during the Great Depression. Already in the years before the Covid-19 pandemic crisis, the region’s economy was practically stagnant. In 2014-2019 period, the average annual economic growth in Latin America and the Caribbean was only 0.3 per cent, reflecting an adverse evolution of the average income per person (ECLAC 2021).

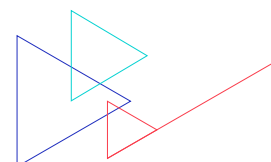
Nothing would anticipate the dynamics of low growth prior to the crisis will change. The structural problems that limited growth in the region before the pandemic have worsened and are expected to have a negative impact on the recovery of economic activity and labour markets beyond the upturn in growth in 2021 and 2022, basically as a “rebound” after the deep contraction of 2020. In terms of per capita income, “*the region continues on a path that leads to a lost decade*” (ECLAC 2021).

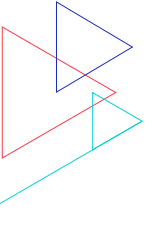
Lower external demand, a prolonged quarantines and lockdowns, short-term liquidity restrictions that turn into solvency problems for companies, generate supply shocks with significant repercussions on employment. The ILO has estimated the net loss of jobs between the fourth quarter of 2019 and the third quarter of 2021 at 4.5 million (ILO 2022).

The purpose of this report is to provide as a non-exhaustive tool, based on systematized evidence, to foster an instance of social dialogue aimed at building consensus to implement and strengthen initiatives that contribute, on the one hand, to boosting productivity growth in different sectors, clusters and segments of companies in the region, and on the other, narrow persistent gaps in this area, seeking to promote the creation of more and better jobs in a consistent and sustainable manner.

Specifically, the report aims to contribute directly to ILO Policy Outcome 4 for the biennium 2022-2023: *Sustainable enterprises as generators of employment and promoters of innovation and decent work; and indirectly to Results 3 -Economic, social, and environmental transition in favour*

¹⁴ The quote is included in the Dieppe prologue (2020, World Bank) and refers to the fact that TFP is calculated as the difference between the growth rate of production and the weighted rate of increase of productive factors.





of full, productive and freely chosen employment and decent work for all; and 5 -Skills and lifelong learning to facilitate transitions in the labour market and access to it.

In terms of functional results projected by the ILO for the biennium, the report seeks to contribute to Outcome A: Effective knowledge management for the promotion of decent work. The following section presents background and considerations related to the measurement and study of the growth trajectories of labour productivity and total factor productivity, considering the different interpretive approaches used in recent years to analyse the evolution of productivity in LAC countries. This section also introduces an explanatory overview of productivity performance and gaps in the region during the period under review, highlighted in recent international literature.

Section 4 provides a synthesis of the systematized evidence on the path followed by labour and total factor productivity in 1990-2020 across the region. Productivity trajectory patterns (PL and TFP) are characterized by countries or groups of countries during 1990-2020, and the evolution of productivity in the region is comparatively examined, with respect to benchmark external economies.

Section 5 presents an interpretive framework of the regional trajectory and the persistent productivity gaps between companies of different nature and size, considering six explanatory factors, included in the *Conclusions on Sustainable Companies* (ILO 2008)¹⁵ and consistent with the approach productivity scheme presented in ILO's "Decent work and productivity" (ILO Governing Body 2021). The dimensions analysed include (i) size and competitive environment; (ii) technology adoption and absorption capabilities; (iii) job training, skills and competencies; (iv) innovation; (v) work organization; and (vi) institutional context.

Section 6 provides considerations on the impact of digital transformation and related technological changes, on the performance of productivity in coming years, with a specific characterization of the technological transition scenario and projections for four relevant sectors for regional economies.

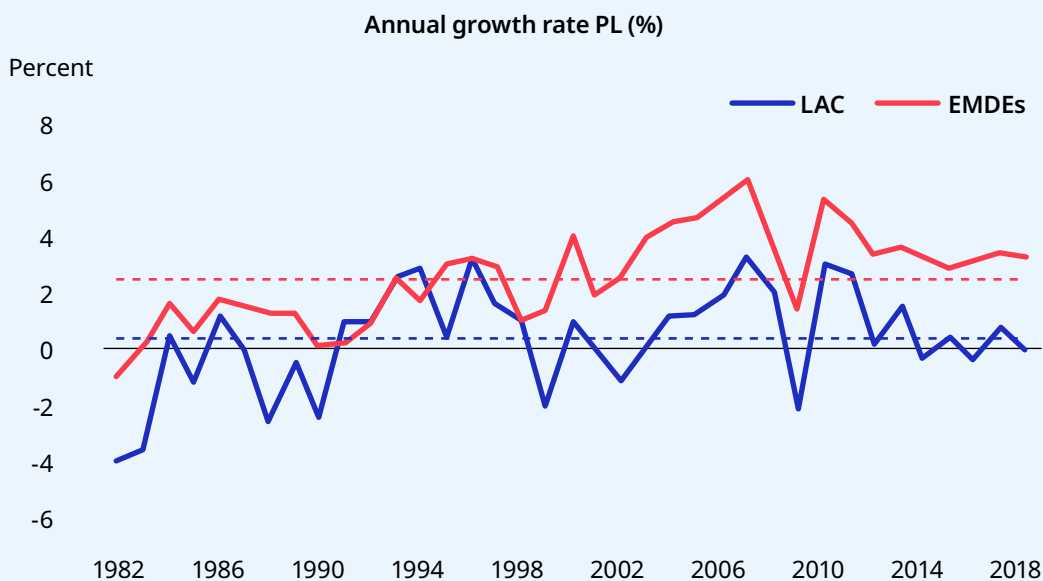
Finally, the last section of this report addresses the dimension of public policies and support institutions to accompany the digital transition and boost productivity within the framework of economic inclusion strategies and the generation of more and better jobs in the countries region of.

¹⁵ Institutional document based on the discussion held at the International Labour Conference, 2007.

3. Background and General Considerations

Most LAC economies, even before the Covid-19 pandemic health and economic crisis showed signs of stagnant labour and total factor productivity. In 2013-2018, labour productivity barely reached 0.4 per cent average annual growth, well below the average annual rate of 1.7 per cent recorded in the 2003–08 five-year period. This growth rate is the second lowest among the six EMDE regions globally in the period under consideration (World Bank 2020).¹⁶

► Graph 1. Comparative trajectory of the annual productivity growth rate, average LAC vs. average EMDE economies

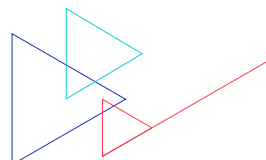


Source: Dieppe (2020). World Bank

The same source records a negative average annual total factor productivity (TFP) rate at the aggregate level for the region during 2013-2018; in contrast to the slight average growth registered in the five-year period prior to the global financial crisis of 2008-2009.¹⁷

¹⁶ EMDE (emerging markets and developing economies) Regions: (i) East Asia and the Pacific; (ii) Eastern Europe and Central Asia; (iii) Middle East and North Africa; (iv) Latin America and the Caribbean; (v) South Asia; and (vi) Sub-Saharan Africa.

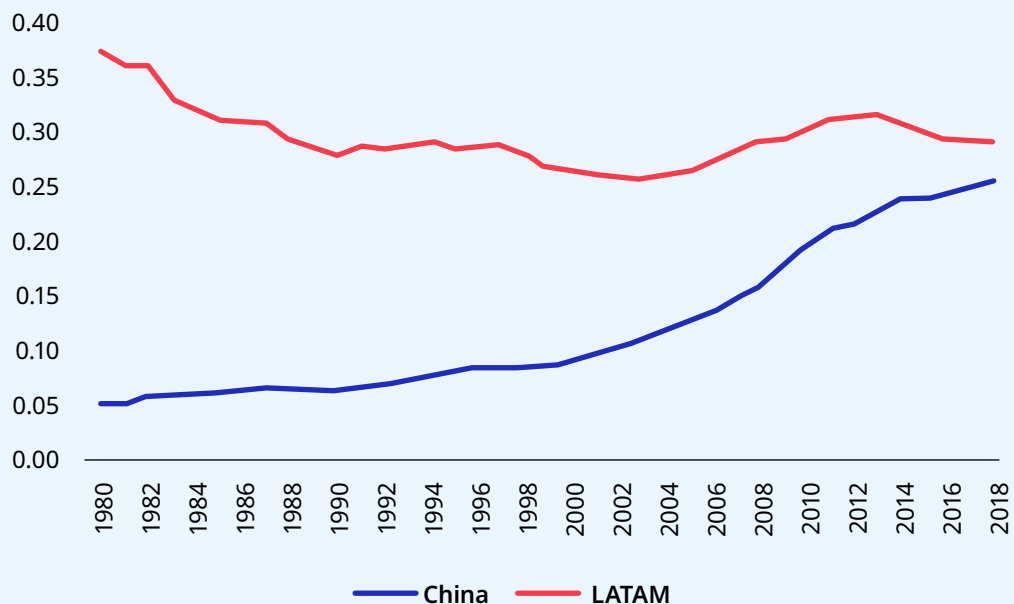
¹⁷ The average value of TFP growth at the aggregate level in 2013–18 is strongly influenced by the negative performance of Brazil, Argentina, Honduras and some Caribbean economies.



The insufficient productivity growth in Latin America and the Caribbean (LAC) is a persistent problem, clearly made evident when we examine the evolution of average income per person in the region in recent decades. Many of the regional economies have experienced some periods of rapid growth, especially due to cycles of high international natural resources and commodities prices, as well as favourable external financial conditions. However, from a broader perspective, the outlook is not very encouraging. The average economic performance of the region's countries in recent decades has been disappointing. During the same period, several countries in Asia and Europe, such as South Korea, Singapore, Spain and Ireland among others, have managed to significantly close their income gap with respect to the United States. It is recognized that the bulk of the persistent gap in per capita product in the region responds mainly to poor performance in terms of increased productivity (CAF 2018).

In 1980, the average GDP per inhabitant in LAC reached US\$11,962 (at constant PPP)¹⁸. At that time, the United States reached a GDP per inhabitant close to US\$32,100 (PPP), that is, the income of an average Latin American citizen was around 37 per cent of that of a US person, in real terms. Almost four decades later, in 2018, while the GDP per capita of the United States rose to US\$60,400, the LAC average rose to just over US\$17,500 (at PPP). In other words, the average income of a Latin American citizen fell to 29 per cent of a US counterpart. This pattern contrasts with that of several countries in Asia and the Pacific, which managed in the same period to narrow the gap in living standards in relation to advanced countries. In China, for example, GDP per capita represented 5 per cent of that of the United States in 1980 but reached 25 per cent in 2018 (Graph 1).

► Graph 2. LAC and China: evolution of per capita GDP in 2017 PPP dollars (US comparable)



Source: The Conference Board (considers alternative estimate to the official one for China)

¹⁸ PPP: Purchasing Power Parity

Remarkably, although there are differences within the region, this relative backwardness emerges as a stylized fact throughout the Latin American countries. There are, of course, successful cases of countries that have experienced marked economic growth in recent decades, such as the Dominican Republic, Panama, Bolivia, Peru, or Costa Rica. However, growth in these countries did not suffice to substantially bridge the gap in living standards vis-à-vis developed countries. This trend deepened as of 2020, since the pandemic has dealt a heavy blow to the region, which – as already indicated – has been one of the hardest hit in terms of GDP decline.

Although the heterogeneity between countries is a significant analytic consideration, wide productivity gaps persist throughout the region between micro, small, medium and large companies that show little or no progress towards convergence over time. In the region, on average, the 10 per cent largest companies are seven times as productive as the 10 per cent smallest companies, with no evidence that the gap will be bridged over time (Figal Garone et al., IDB-Invest 2020). One of the main causes of these profound differences is the low capacity for technological absorption in most smaller companies, especially in the more traditional productive sectors, due to multiple factors, including weak information channels and access to new technologies, as well as persisting gaps in skills and job skills suitable for their adoption.

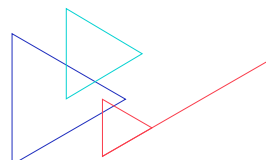
The low capacity for technological absorption and adoption by smaller companies is reflected in the difficulties and setbacks they currently face. Their difficulty in rising to the imminent challenge of their digital transition is probably the main cause of stagnating productivity in the region, since the main source of growth is still improved labour skills, technologies and processes within the productive units, better known as an intra-firm component of increased productivity.

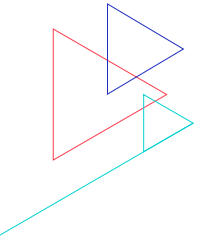
Additionally, from an intersectoral perspective, the region's countries are characterized by a very low contribution to productivity associated with the reallocation of resources from less productive declining activities to other emerging ones where productivity levels are higher. This accounts for sluggish diversification and productive transformation towards activities of greater sophistication, knowledge and technological content, in contrast to other developing economies that have made significant advances in development and prosperity during the last decades, especially Asia and the Pacific, Southeast Asia, as well as some Northern and Central European nations.

When comparing the productive transformation of Latin American economies with greater relative industrial development, such as Argentina, Mexico, Brazil and Chile, with developments in Asia and the Pacific and various developed countries, it emerges that trade liberalization prematurely induced LAC's deindustrialization,¹⁹ with two consequences in terms of productivity: a lower aggregate effect of the increase at the intra-company level of industrial productivity associated with exporting sectors, due to the loss of relative weight of the industrial sector earlier than that observed in more advanced economies; and negative intersectoral productivity performance as a result of jobs transfer from capital-intensive manufacturing sectors, mainly due to rationalization strategies and operational efficiency, to less productive ones, mainly low-productivity services (Beylis et al. World Bank 2021). Asian countries, for their part, increased their productivity more substantially as a result of the virtuous combination of increases in productivity within and between sectors, as part of their structural productive transformation processes.

In this context, it is imperative to think about the factors behind Latin America's backwardness, even in those LAC countries that have grown relatively the most. They are diverse, and their relative incidence varies according in each case, as will be seen throughout this report, but

¹⁹ In other words, the "hump" or inverted U-type curve is anticipated in the case of these countries, with the participation of the industrial sector declining before it has reached the weight equivalent to that of the top of the curve for the reference countries (Beylis et al. World Bank 2021)





one that is common to and predominant in all Latin American economies is the low relative capacity of the vast majority of micro and small companies to adopt new technologies widely throughout the productive fabric, as well as to take advantage of these technologies to innovate and generate new ideas and, on that basis, provide new or better products and services²⁰. Incorporating new technologies is crucial to enhance the productive capacity of existing human, natural and capital resources, and thus produce more and better. Innovating and generating ideas is a central input that allows the development of new products and services, the creation of new markets and the promotion of knowledge production and dissemination circuits whose externalities benefit the economy. An initial question then is *why, unlike other regions, technology adoption and innovation in LAC consistently appears as a weakness that contributes to explain the meagre increase in productivity in comparative terms, during at least the last four decades?*

A first explanatory hypothesis relates to the profile of primary-export productive specialization of most regional economies. Acemoglu, Aghion and Zilibotti (2006) and more recently Andreoni and Chang (2016) argue that most Latin American and Caribbean countries are characterized by patterns of productive specialization dominated by natural resource-intensive export industries, which usually operate capital-intensive processes with high returns, where Ricardian rents typical of the comparative advantages associated with the exploitation of such resources are a major driver. These surpluses are usually appropriated by state or private companies, which may concentrate power, and economic and political influence. Contrasting this pattern of specialization with that of the Asian and European economies that have experienced transitions of their productive matrixes towards industrial and service sectors of greater sophistication and relative economic complexity, it is worthwhile asking to what extent specialization based on rather static comparative advantages, such as the endowment of certain natural resources, limits and discourages Schumpeterian-type²¹ dynamics where the leading sectors are challenged by the innovations brought about by new entrepreneurs.

Although in economic development countries go through early phases of accumulation based on the exploitation of natural resources or labour-intensive large-scale industries, their progressive industrialization, and subsequent evolution towards patterns of greater economic complexity, requires supportive productive development policies, including meso- and microeconomic incentive frameworks, as well as policies to correct market and coordination failures, inherent to early-phase innovative projects. Lack of such policies would consequently tend to inhibit the reallocation of resources towards modern sectors with the risk of entering phases of stagnant productivity (Andreoni and Chang 2016).

The predominance of primary export sectors based on static comparative advantages together with the weak development of related goods and services, through the progressive emergence of specialized suppliers, is a differentiating feature in most of regional countries when compared with natural resource-rich countries where early policies encouraged the development of supply chains around these sectors.²² This in turn is a second hypothesis to understand why the intersectoral contribution to aggregate productivity shows negligible and even negative rates during the last decade across the region. On the one hand, high intersectoral productivity gaps persist, between 15 and 20 per cent between agriculture and

²⁰ Technological adoption is related to the integration, incorporation and intensification of the use of technologies in the production process. Background that supports this point can be found in Correa, Leiva and Stumpo (ECLAC 2020). MSMEs and structural heterogeneity in Latin America. Further references in section 5 of this report.

²¹ In reference to Joseph Schumpeter, an economist of Austrian origin, who in 1942 coined the term creative destruction, alluding to the process of revitalizing production and increasing productivity due to the emergence of new companies, which displace and replace less innovative ones.

²² By way of example, the cases of value chain growth around mining in Australia, oil in Norway, livestock and agriculture in New Zealand are worth mentioning. Joseph Ramos (Revista de la CEPAL 1998) discusses this topic with a variety of historical references.

services with respect to the industrial sector,²³ along with high and rising unemployment rates because of the global COVID-19 health crisis. On the other, the comparative advantages in natural resources and commodities-based export sectors may reach high productivity, but declining trajectories as a result of eroding static comparative advantages, externalities typical of exchange rate appreciation (Dutch disease effect), and the relatively limited radiative impact towards industrial and service activities that could potentially adapt their offer and insert themselves in their supply chains (McMillan, Rodrik and Verduzco-Gallo 2014).²⁴

A third structural factor that helps explain the meagre increase in productivity in the region is the high relative weight of the informal economy, which, just before the pandemic, accounted for approximately one third of GDP (World Bank 2019) and provided close to 36 million jobs, equivalent to 76.2 per cent of rural workers and 45.1 per cent of urban workers (ILO 2019). Latin America and the Caribbean as a region is second only to Sub-Saharan Africa in terms of informality globally. The informal sector replicates and accentuates the limitations of smaller formal companies and is also the most affected by the economic shock caused by the pandemic worldwide. ILO has estimated that, between the third quarter of 2020 and the third quarter of 2021, between 60 per cent and 80 per cent of net jobs created across the region were informal sector occupations (ILO 2022).

The disincentives to the formalization of productive activities are explained, to a large extent, by a weak perception of its benefits compared with its cost for micro-entrepreneurs and self-employed workers. This poses institutional and policy design challenges to encourage the formalization of companies. These policies should articulate coherent mechanisms and incentives, covering aspects such as financing, insertion in value chains, skills building, and business management, with the eventual support of recently massified digital platforms that tend to open access to payment and financial services schemes.²⁵ Another relevant factor to consider in the labour market is the gap in the participation of women compared with men, severely affected by the pandemic and its fallout, and that has cancelled a decade of advancement. Although as of the third quarter of 2020 employment and participation grew more strongly among women, it has not made up for the greater loss of employment and female labour supply during the first half of 2020. It is estimated that more than 4 million jobs need to be restored, to reach the female labour participation and unemployment rates of the first three quarters of 2019 (ILO 2022). Likewise, youth unemployment has not fallen back to pre-pandemic levels, which were already high.

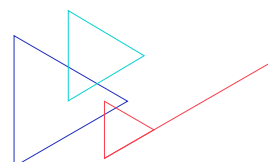
Even though the productivity of the region shows a relatively homogeneous pattern in recent decades in terms of the gap compared with advanced economies (CAF 2018),²⁶ differences between countries are significant when identifying and interpreting relative trajectories and their effects on employment and distribution of productivity increases in the respective national economies. This is evident when verifying the trajectories of those economies that have achieved higher rates of economic growth and productivity in recent years, such as Bolivia, Costa Rica, the Dominican Republic, Paraguay, Panama and Peru, with a significant

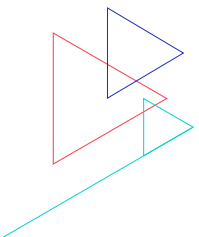
²³ Average productivity in agriculture and services. If the segments of traditional agriculture and low-skilled services are considered, the gap in relation to industrial productivity widens further.

²⁴ Dieppe (2020) presents the evolution of productivity for emerging economies, discriminating between net commodities importers and exporters. The analysis of comparative trajectories shows that between 1990 and 2018, annual productivity growth was always higher among net importers. Between 1990 and 2010, the difference between the average annual growth rates for both groups ranged between 2.5 and 5 percentage points, while between 2010 and 2018 it widened to a range of between 5 and 6 percentage points (Dieppe 2020, Fig. 1.1, p. 9)

²⁵ Section 7 expounds this point in greater depth.

²⁶ Institutions for Productivity. Towards a Better Business Environment (CAF, 2018) reveals that in 2010–14, the average TFP of ten Latin American economies is equivalent to 37 per cent of the TFP of the United States, in constant dollars at purchasing power parity. The Latin American countries included in the comparison are Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, Uruguay and Venezuela. The same report concludes that the incidence of the TFP gap on the per capita income gap of the group of Latin American countries with respect to the United States is on average 79 per cent, ranging between 63 per cent (Argentina) and 90 per cent (Ecuador).





contribution of positive flows of foreign direct investment (FDI), reduction of informality rate (until before the pandemic), urbanization, growing industrialization and institutional reforms as part of the possible factors that have affected recent performances although with varying relative importance in each case. The following sections will address the region's productivity trajectories from a comparative perspective, the main identifiable patterns at the level of country categories, the factors that have the greatest impact on observed performances, and the main gaps to be addressed, from a country-specific systemic perspective.

4. Labour productivity and TFP trajectories in Latin America and the Caribbean, 1990–2020

The review of the growth trajectories of aggregate labour productivity in the countries of the region during the last decades (1990-2020 period) makes it possible to distinguish, on the one hand, periods of greater or lesser trend growth, marked by the impact of the crises and, additionally, clearly distinguishable patterns between countries interpretive interest.

For purposes of inter-temporal comparability and at country level, the growth rate of labour productivity is calculated by comparing the inter-annual variations of real GDP in relation to the number of active workers in each country. The active worker data is recorded by the ILO on the basis of the total volume of the product (GDP) per work unit (number of people employed) in a given period of time, using constant 2005 US dollars and constant 2011 international PPP dollars to compare consumption potential and well-being between countries.

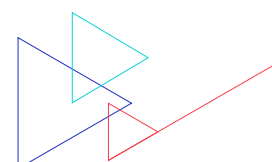
It is important to specify that, from the economic point of view, the real value of labour productivity is determined on the basis of actual hours worked. Thus, GDP per capita takes account of i) the fraction of the population in the labour force; ii) the fraction of the labour force that finds a job; iii) the hours worked by the average worker; and iv) productivity per hour worked. In other words, income depends on how many hours the average person spends working (both because they want to do so and effectively joins the labour force, and because they find a job) and with what productivity they do so (CAF 2018). In aggregate terms, at country level, the data on active workers (obtained from employment surveys and secondary statistical sources) is usually more easily available than that on hours worked, so for purposes of comparability at that level, the first indicator is used as a proxy variable for calculating labour productivity.

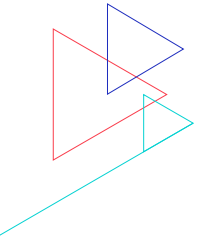
The aggregate productivity of an economy depends, on the one hand, on the productivity achieved by existing companies²⁷ and, on the other, on the way productive resources are allocated and distributed among these companies.²⁸ The analysis of the evolution of the productivity of a country in aggregate terms raises important interpretive challenges since it tends to merge very dissimilar performances across companies, as well as in terms of the distribution of productive resources (mainly work and investment) at the level of the productive units, and at its next higher level of aggregation, i.e. economic sectors or value chains.

The evolution of productivity depends on multiple factors, both internal (markets, institutional environment, business strategies and behaviours, technological capabilities, human capital and so on) and external (trade and migratory flows, foreign direct investment, climate change, among others) which may have a direct or indirect impact, at the level of companies, economic

²⁷ Including those that start activities and excluding those that close and leave the economy during the period under study.

²⁸ Including the informal sector and self-employment.





sectors and the economy as a whole, on the performance of factors and their combination in the production process. In regards of labour productivity, various correction methods seek to identify more reliably the specific sectoral divergences and the nuances derived from the formation of human capital, among other considerations. Since TFP is determined as a residue associated with growth “not explained by net increases in capital and labour”, its evolution poses even greater analytical challenges.

When comparing aggregate trajectories of labour productivity and especially of TFP, it should be considered that the measurement of productivity growth is not the result of the simple addition of relatively homogeneous factors, nor does it respond to dynamics of intersectoral allocation of resources that are not necessarily equally efficient in every economy. The foregoing leads us to ascertain that, frequently, the high level of consensus regarding the relevance of boosting productivity as a fundamental pillar of a virtuous dynamic for growth, employment and income, is weakened when examining the main causal factors behind its evolution and interpret possible strengthening strategies and policies.

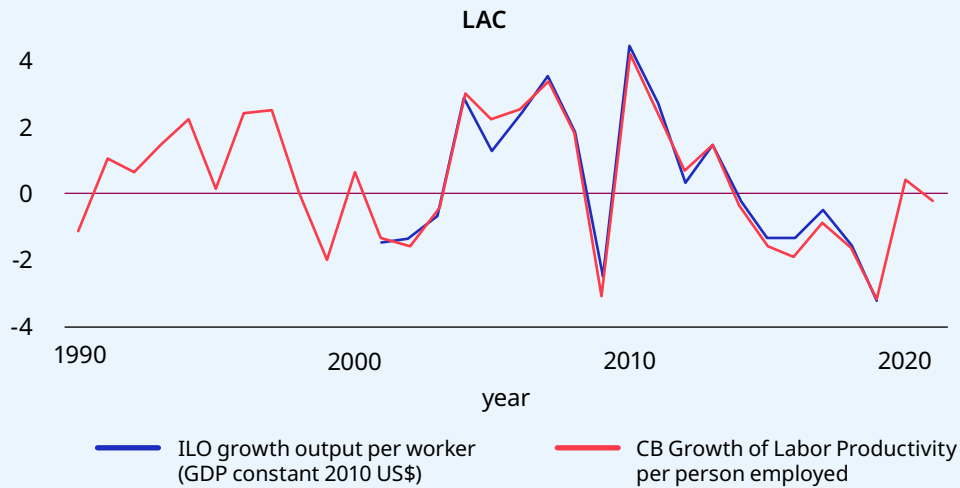
Productivity in most regional countries clearly stagnated already since before the COVID-19 crisis. For the 2013–2018 period, both labour productivity and TFP registered, at the regional aggregate level, negative average annual growth rates (Graphs 2 and 4, respectively). The performance of Latin America and the Caribbean in this period is the second lowest among the six EMDE²⁹ regions (World Bank 2020). A broader perspective shows a cyclical labour productivity trajectory in the region between 1990 and 2020, with periods of growth of no more than 5 or 6 years, highlighting the periods 2003–08 and 2010–13³⁰, alternating with relatively abrupt falls in 1998, 2001–03, 2008–09, and the most prolonged decline between 2014 and 2019. The TFP shows a similar trajectory with more marked decreases than the PL in those periods.

At an aggregate level, it can be seen how productivity growth cycles coincide with the so-called commodities super cycle between 2004 and 2013, interrupted by the global financial crisis of 2008-2009. After 2013, the downward trend in productivity transcends cyclical effects until it reaches the COVID-19 pandemic, the real magnitude of the impacts of which is still undetermined.

²⁹ EMDE (Emerging Markets and Developing Economies) regions: (i) Central Asia and Pacific; (ii) Eastern Europe and Central Asia; (iii) Middle East and North Africa; (iv) Latin America and the Caribbean; (v) South Asia; and (vi) Sub-Saharan Africa.

³⁰ This period coincides with the so-called super cycle of raw materials and commodities, strongly driven by the expansion of the Chinese economy.

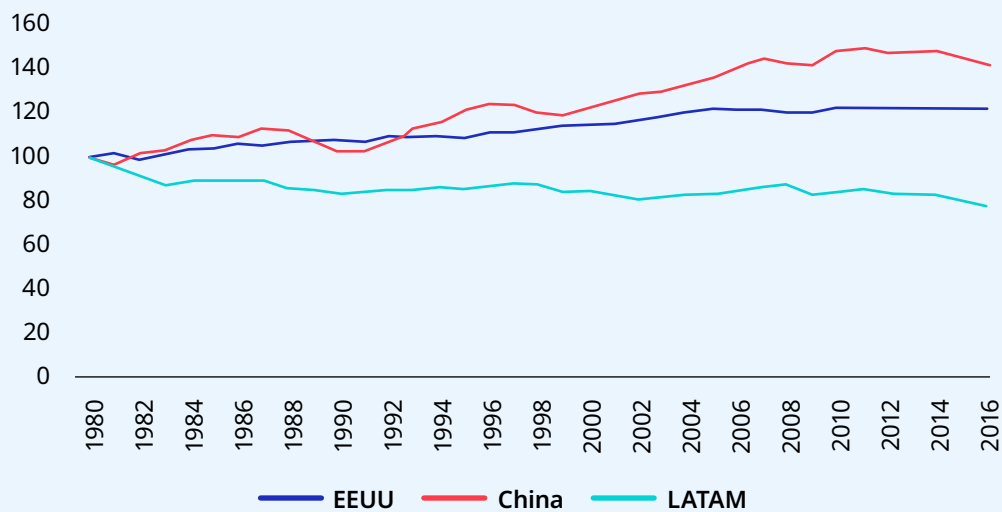
► **Graph 3. Latin America and the Caribbean: Year-on-year variation. Labour Productivity (%), 1990–2020**



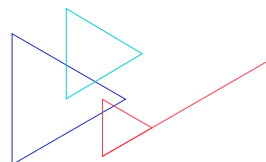
Sources: ILO (ILOSTAT) 2000–20 and The Conference Board (CB) 1990–2020

In terms of the evolution of TFP in the period studied, the difference between the United States and LAC is noteworthy. While in the former, TFP grew steadily since 1980, in the region it fell by almost 30 per cent. The comparison with economies of Asia and the Pacific is even more striking: in China, for example, TFP grew by 40 per cent over the same period.

► **Graph 4. Relative Evolution of Total Factor Productivity LAC, US and China (1980=100)**

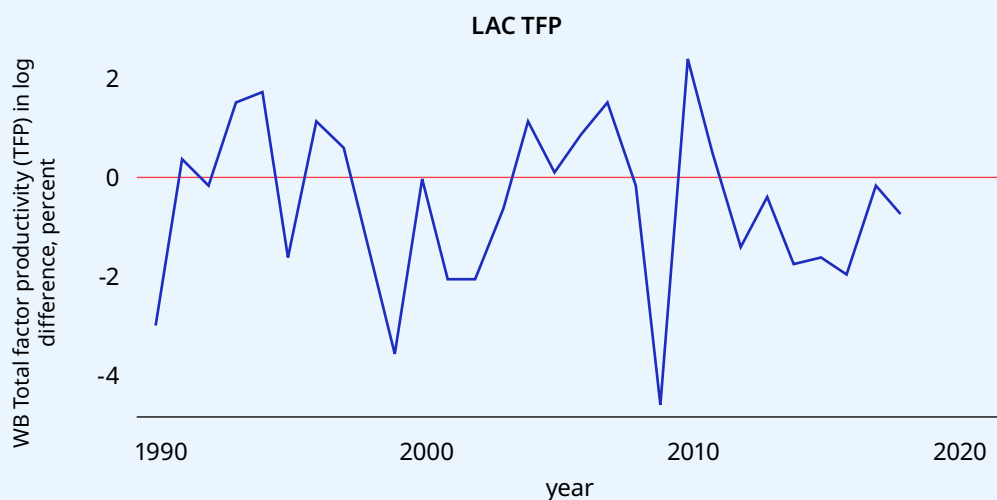


Source: The Conference Board. Consider alternative estimate for China



The regional aggregate TFP during the last three decades is marked by two abrupt falls corresponding to international financial shocks: the Asian crisis in 1998–99 and the subprime crisis of 2008–09, which had recessive impacts on most regional economies. After these adverse events, brief “rebounds” were followed by new falls of lesser magnitude (Graph 4). For the period following the most recent crisis, a sustained negative trajectory of the indicator is evident, starting in 2013 (World Bank 2021).

► **Graph 5. Latin America and the Caribbean: Year-on-year variation in Total Factor Productivity, 1990–2020**

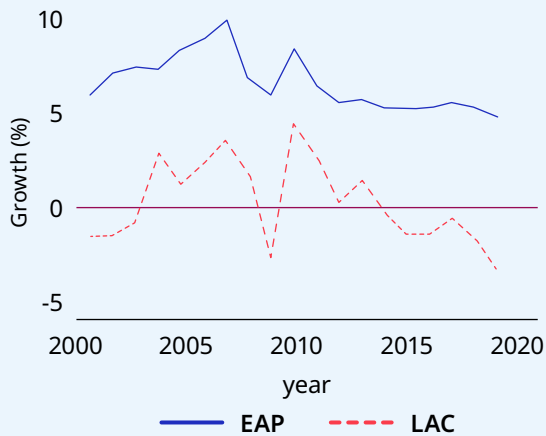


Source: World Bank (1990–2020)

As for the potential causes of the regional lag in the evolution of TFP, the limited scope of technological adoption and diffusion processes, the limited scope of technological adoption and diffusion processes, and scant diversification of production matrixes towards more complex sectors are worth mentioning. The decline of TFP in the region during the last four decades, and particularly since 2013, can be attributed to multiple explanatory factors while all interpretations are debatable, especially at this level of aggregation. An examination of its evolution compared with other developing regions can provide greater clarity and guide possible hypotheses.

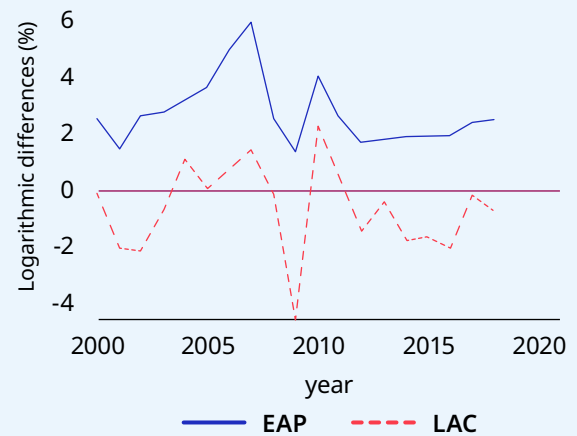
Comparing the performance of the region with that of the countries of East Asia and the Pacific (Graphs 6 and 7) reveals a consistent difference in the rate of growth of productivity, both labour and TFP for the entire period 1990–2020. Latin America and the Caribbean as a whole – and each of its larger economies – consistently lags during the period, both in the trajectory of LP and TFP, as a result of significantly lower increases in intra-firm productivity, and vulnerability to international environmental conditions – vis-à-vis Asian economies – together with a declining and outright negative average rate of intersectoral productivity during the last decade attributable to inefficiencies or obstacles to the reallocation of resources towards more productive sectors of the economy, typical of productive transformation processes (McMillan, Rodrik and Sepúlveda 2017).

► **Graph 6. Comparative trajectories PL 2000–20: Latin America and the Caribbean (LAC) versus East Asia and the Pacific (EAP) (GDP in constant 2010 US\$)**



Source: ILO (ILOSTAT 2000–20)

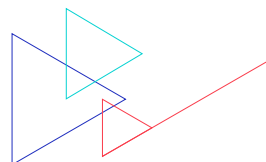
► **Graph 7. Comparative TFP trajectories 2000–20: Latin America and the Caribbean (LAC) versus East Asia and the Pacific (EAP), (GDP in constant 2010 US\$)**



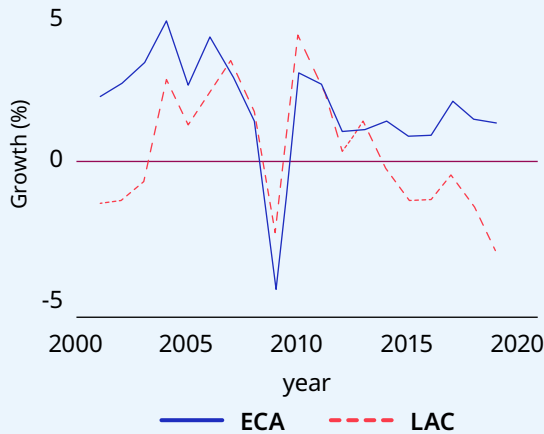
Source: World Bank (2000–20)

EAP includes: Brunei Darussalam, China, Fiji, Philippines, Micronesia F.S., Guam, Hong Kong SAR – China, Indonesia, Cambodia, Kiribati, South Korea, Laos, Macao SAR – China, Malaysia, Marshall Islands, Northern Mariana Islands, Mongolia, Myanmar, New Caledonia, Nauru, Palau, Papua – New Guinea, Democratic Republic of Korea (North), French Polynesia, Samoa, American Samoa, Singapore, Solomon Islands, Thailand, Taiwan – China, East Timor, Tonga, Tuvalu, Vietnam, Vanuatu.

The comparison with the group of countries of Eastern Europe and Central Asia (ECA region), for the same period, is presented in Graphs 8 and 9. It also reveals that the average annual growth rate of Latin America and the Caribbean has been consistently lower, except in specific years before and after the financial crisis of 2009, which led to very similar drops in aggregate productivity in both regions. Clearly, the ECA region does not achieve such a dynamic productivity trajectory as the East Asian and Pacific economies, but even so, its performance during this century is significantly better than in the LAC region.

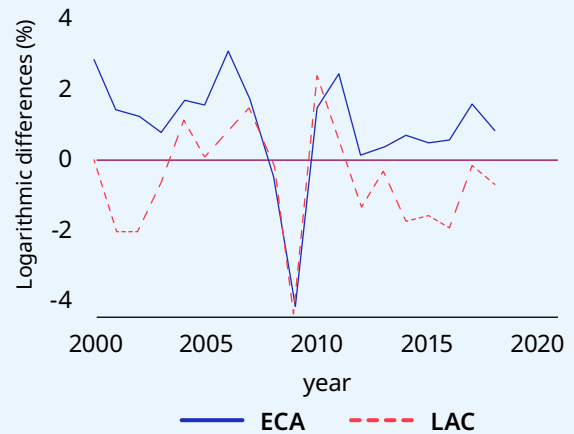


► **Graph 8. Comparative trajectories PL 2000–20: Latin America and the Caribbean (LAC) versus Eastern Europe and Central Asia (ECA) (GDP in constant 2010 US\$)**



Source: ILO (ILOSTAT 2000–20)

► **Graph 9. Comparative trajectories TFP 2000–20: Latin America and the Caribbean (LAC) versus Eastern Europe and Central Asia (ECA) (GDP in constant 2010 US\$)**

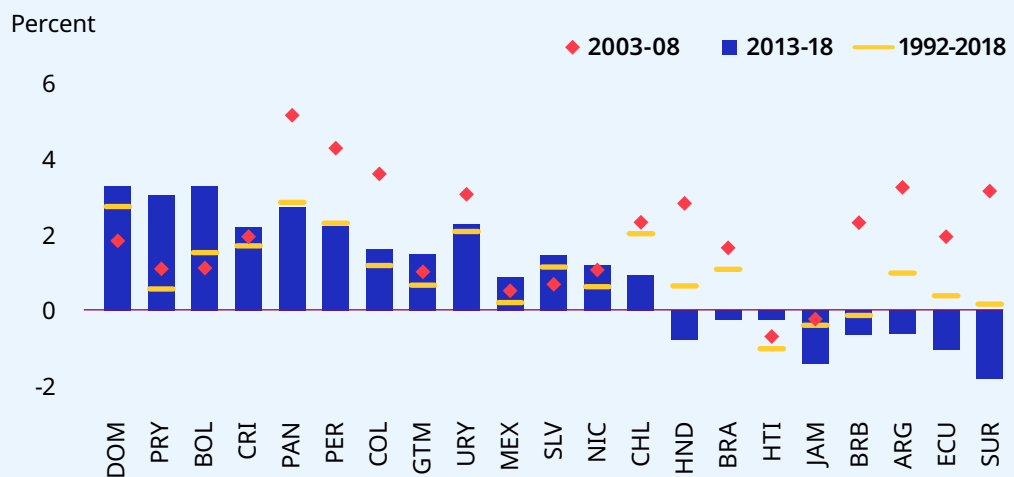


Source: World Bank (2000–20)

EAC includes Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Cyprus, Croatia, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Kosovo, Latvia, Lithuania, North Macedonia, Moldova, Montenegro, Poland, Slovakia, Slovenia, Czech Republic, Romania, Russia, Serbia, Tajikistan, Turkmenistan, Turkey, Ukraine, Uzbekistan.

For the period under study, labour productivity at the country level is quite heterogeneous. Graph 10 shows the average labour productivity growth rates for 21 countries in the region, between 1992 and 2018, and in particular for the sub-periods 2003–08 and 2013–18.

► **Graph 10. Average Labour Productivity Growth in LAC, by Country.**

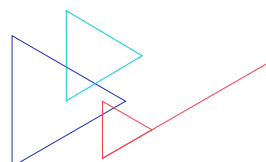


Source: Dieppe (2020 World Bank)

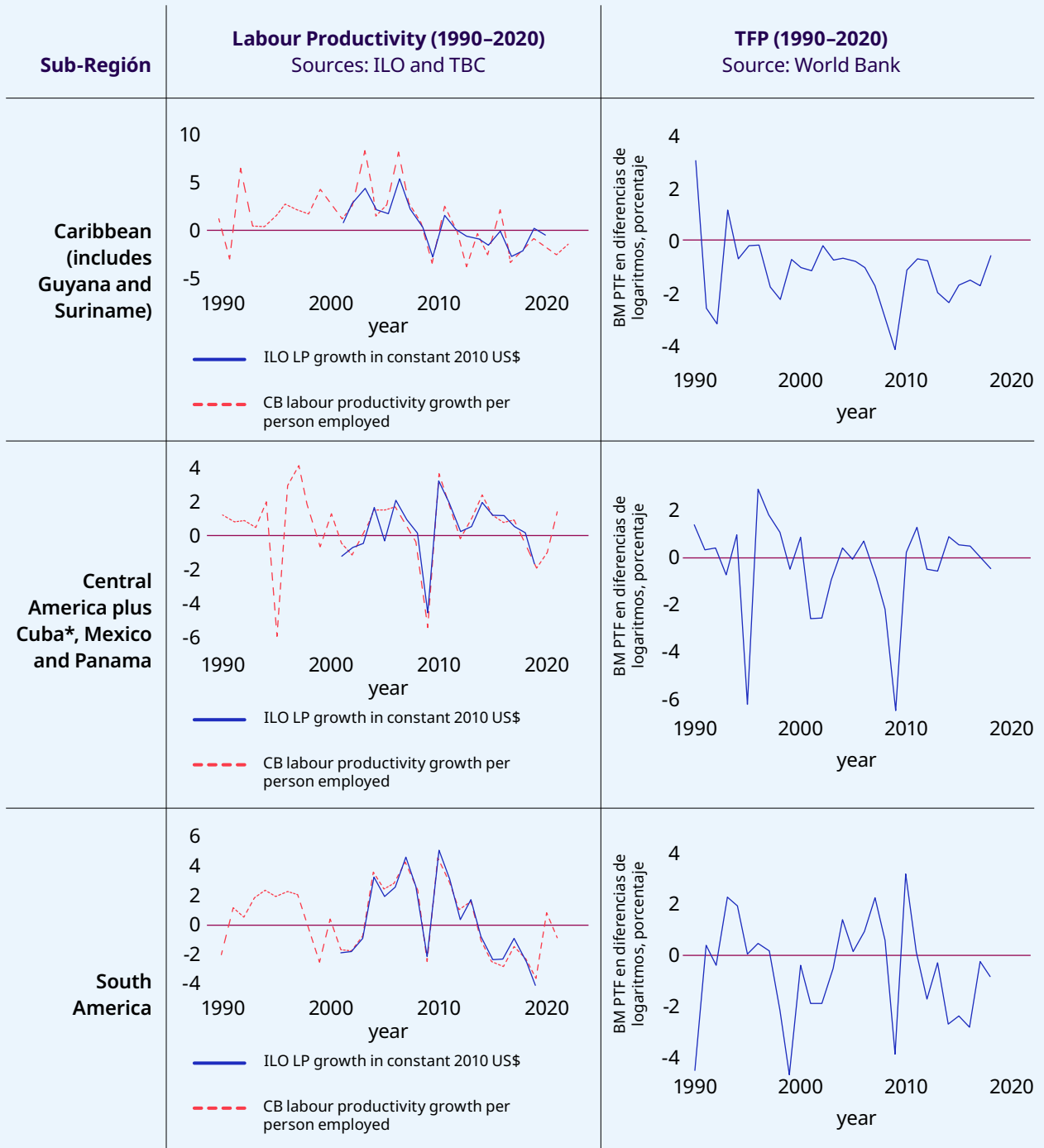
For the most recent subperiod, 8 of the 21 economies, including Argentina and Brazil, show negative average productivity growth. Considering the long period 1992-2018, only three economies in the region, all of them from the Caribbean, show an average annual decline, namely Haiti, Jamaica and Barbados. The best regional performances during the entire period correspond to the Dominican Republic, Panama, Peru, Uruguay, and Chile. During the most recent subperiod, the best performers are the Dominican Republic, Paraguay and Bolivia. The improvement in productivity in the Dominican case reflects a greater contribution through greater investment flows, especially foreign investment, and an increase in TFP. Bolivia and Paraguay have benefited from population migration to urban areas, and the lower relative weight of agriculture in employment in their respective economies. Between 2013 and 2018, four of the six best-performing economies (Bolivia, Panama, Peru and the Dominican Republic) benefited from a greater reduction in informality, a phenomenon that has probably been reversed since the pandemic (World Bank 2020).

The negative intersectoral component of productivity for most regional countries in recent years, in some cases is offset and in others, on the contrary, amplified by the component of productivity gains or losses within companies, plus the entry and exit of companies in the same sector with different productivity margins, depending on each case. For example, in Chile, the extraordinary increases in productivity achieved in the 1990s are accounted for almost exclusively by the entry and exit of firms as a result of the consolidation of the aggressive trade liberalization imposed since the end of the 1970s, a dynamic that weakened at the end of the first half of the 2000s, kicking off a cycle of falling TFP, mainly due to the performance of mining during most of the commodities super cycle. A different case is that of the Mexican economy, which in the 1990s and until the second half of the 2000s shows productivity gains close to zero, with a favourable intersectoral contribution and a negative contribution of a similar magnitude from the intra-firm and intra-sectoral effect. Argentina, meanwhile shifted from a positive contribution of both the balance between sectors and between companies in the pre-financial crisis period (2003–08) towards a negative contribution of both factors in the post-crisis period (2013–18).

A first general analysis from a sub-regional standpoint allows to identify differential performances for the period under study. The Caribbean subregion shows a sustained TFP downward trend in over the last two decades, markedly behind the Central America (including Mexico, Cuba and Panama) and South America subregions. Table 1 also clearly shows that the growth path of TFP is systematically lower than that of labour productivity in the three subregions. In South American economies, between 2003 and 2008, a transitory period of TFP growth above the regional average is later followed, between 2013 and 2019, by a systematic return to negative annual growth rates.



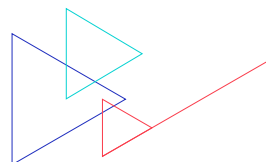
► Table 1. Productivity trajectory (PL and TFP 1990-2020), by LAC subregions



Sources: Labour Productivity (ILOSTAT, 2000-20 and The Conference Board, 1990-2020); TFP (World Bank, 1990-2020)

Labour productivity evolved positively between 2003 and 2008 in the three subregions, in particular South America and Caribbean, likely related to the so-called commodities super cycle during that period, and reflecting the export orientation of most of the economies of both subregions, with significant participation of the mining, energy and agricultural sectors, all increasingly intensive technology users.

The impact of the largest countries in the productivity cycles experienced by the region between 1990 and 2020 varies by period and productivity component under analysis. In South America, Argentina greatly influenced the depth of the fall in TFP at the end of the 1990s, beginning with the Asian crisis, but which continued in South America until 2003 (Baumann et al. 2018). In 2013–18, the growth of direct credit in Brazil, among other variables, contributed to the negative performance of the TFP in the South American subregion. For its part, Mexico had a considerable impact on the two historical falls in labour productivity in the Central American subregion, in the mid-1990s and later in 2009, when the indicator showed the worst regional performance, falling 6 per cent compared to the year previous.





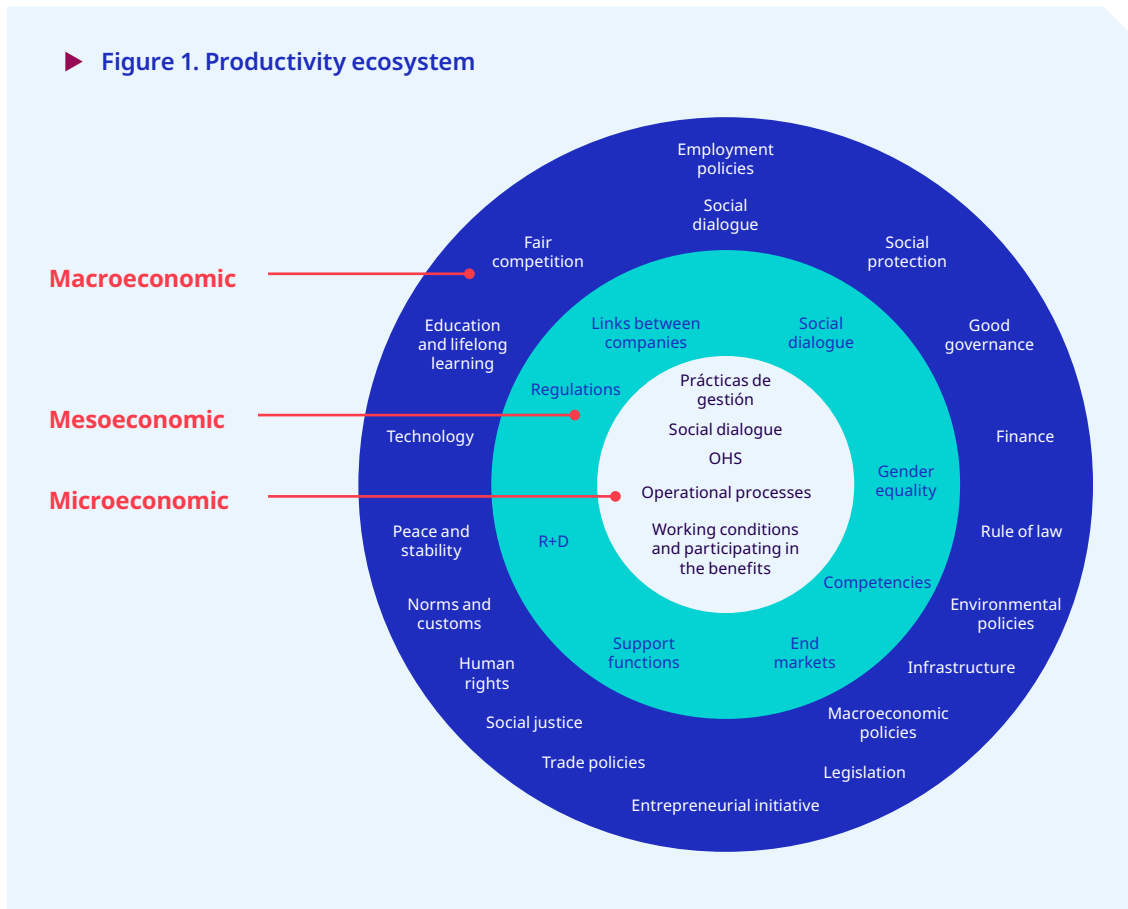
5. The explanatory factors of the region's productivity trajectories and gaps

The sustained increase in productivity in the region, as a necessary condition to achieve greater prosperity, highlights the relevance and opportunity of advancing towards a better understanding of its central determinants, but at the same time of the role that productive development policies and institutions and labour regulations can play in ensuring that the boost to productivity is sufficiently inclusive, in order to allow a progressive closing of the gaps between types and sizes of companies, and promote a virtuous employment dynamic. The new global reality induced by the ongoing digital transformation, whose impacts were accelerated by the global Covid-19 pandemic (Basco and Lavena IDB 2021), only stress the urgent need to understand systematically the factors that contribute to sustained productivity increases and, on that basis, encourage opening instances of social dialogue necessary to accompany and regulate the inevitable transitions that this process entails.

As outlined in the Centenary Declaration for the Future of Work (ILC 2019), social dialogue, including collective bargaining and tripartite cooperation, is an essential foundation of all ILO activities and contributes to the success of the policy-making and decision-making in its member states. The importance of tripartite social dialogue in the context of this report also lies in its incidence in enabling cross-learning channels between the private and public sectors; building consensus regarding the strategic elements to reduce persistent productivity gaps, such as formalization, continuous training and decent work; and promoting spaces for exchange and fruitful debate for an adequate design and implementation of productive development initiatives and policies with a systemic approach to the causes that affect or may boost the productivity of companies in the region.

ILO Governing Body's "Decent work and productivity", presented by the ILO Governing Body for the consideration of its members at its 341st session, held in Geneva in March 2021, acknowledges that sustained productivity increases are a key driver for economic growth, job creation and sustainable business development; and at the same time it posits a systemic approach to fully understand, on the one hand, its keys and growth dynamics and, on the other, the conditions or patterns of productivity increase leading to a better distribution of its benefits.

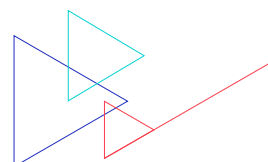
► Figure 1. Productivity ecosystem

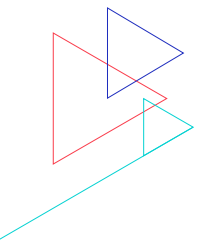


When adopting the productivity ecosystem approach, as can be seen in Figure 1, multiple factors are identified at the macro, meso- and microeconomic levels that affect the fundamentals and determinants of the evolution of productivity in each country. At the base of the meso- and microeconomic levels, we find a universe of productive units, companies and enterprises of very diverse nature, with a very unequal endowment of capacities, access to markets and the provision of both financial and non-financial services, as well as a wide spectrum of practices in fields such as work organization, management, training, investment and innovation.

The growing access to microdata at company level³¹ has recently provided a range of empirical evidence associated with meso- and microeconomic factors identified as impacting the productivity ecosystem (Figure 1). Figal Garone et al. (IDB/Invest 2020) cite numerous recent studies based on microdata, which show a positive correlation between the intra-company evolution of productivity and parameters such as: (i) profitability, expressed in net profits (Foster et al. 2008; Chandra et al. 2016); (ii) scale or size and growth rate (Balk 2001; Wagner 2002; Koellinger 2008; Harrison et al. 2013); (iii) survival rate, expressed in seniority ranges (Aw et al. 2001; Fariñas and Ruano 2005; Syverson 2011); (iv) export performance (Bernard et al. 2003; Bernard and Jensen 2004; Cassiman et al. 2010; Melitz and Redding 2015); and (v) attracting foreign direct investment (Kimura and Kiyota 2006; Arnold and Hussinger 2010; Borin and Mancini 2016). Practically all of these parameters correlate with deep differences between companies according to their nature and size, since the vast majority of micro and

31 For example, the Enterprise Surveys Portal of the World Bank currently collects microdata from more than 171 thousand companies, from 149 countries <https://www.enterprisesurveys.org/en/survey-datasets>

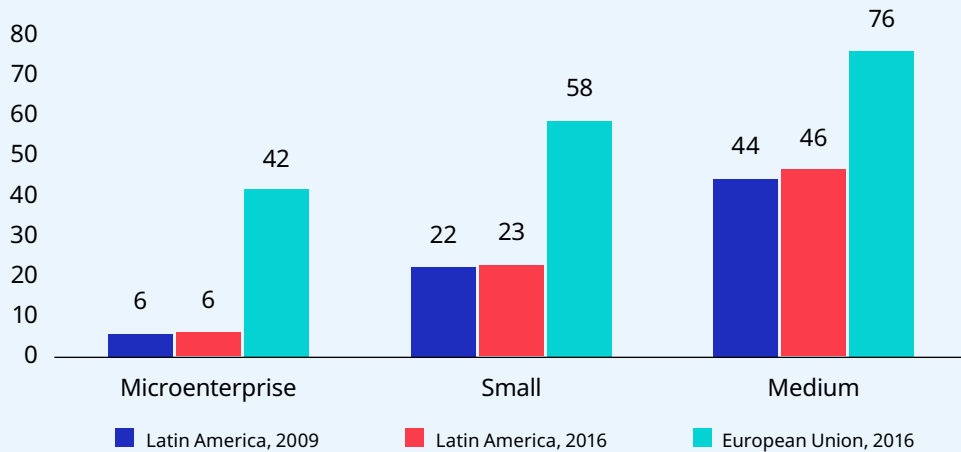




small traditional companies, as well as informal enterprises and self-employed workers, tend to show low levels in (i), (ii) and (iii), and clearly for factors (iv) and (v).

Section 4 of this report provides a vision of the recent productivity trajectories for the region, its subregions and by country, as well as in perspective compared with other regions and reference economies, but does not allow delving into the performance gaps between companies, according to their nature, size and economic sector, whose magnitude and persistence constitute one of the main explanatory aspects of the stagnation registered in aggregate productivity at the regional level. Beyond a relative lag compared to other regions, a phenomenon that characterizes Latin American economies is their high level of structural productivity heterogeneity. As shown in Figure 2, in 2016 in the region the labour productivity of a medium-sized company was, on average, less than half that of a large company. The gaps widen as the firms’ size gets smaller. Small companies show productivity that is barely 23 per cent of that of large ones, and in micro-enterprises it was only 6 per cent. The reduction of these gaps has been minimal in recent years (ECLAC 2020a).

► **Figure 2. Relative internal productivity by company size (as a percentage relative to large companies). Latin America and the European Union, 2009 and 2016**



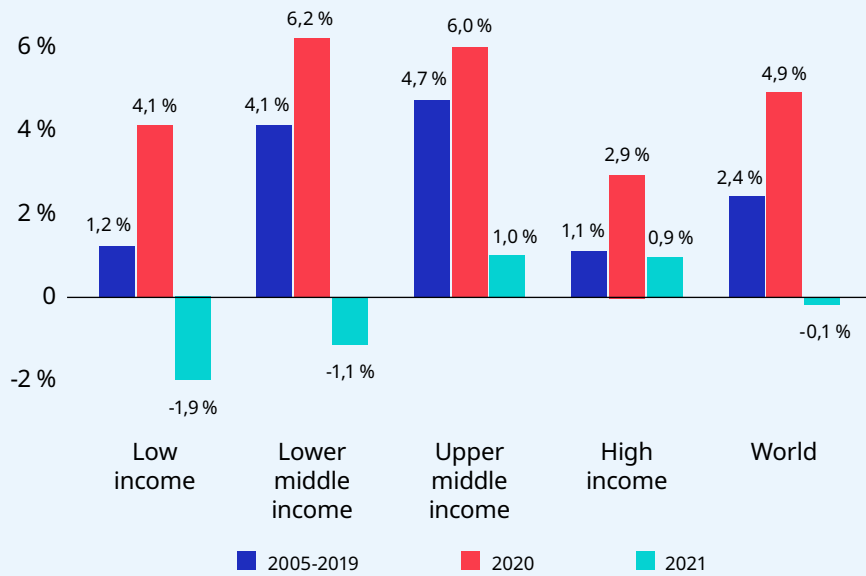
Source: Dini, Leiva and Stumpo (ECLAC 2020)

These gaps are much larger than in other regions. Figure 2 shows that in the European Union, the productivity of medium-sized companies was, on average, 76 per cent of that in large companies, a proportion that dropped to 42 per cent among micro-enterprises. Likewise, the evidence from some countries in the region suggests the existence of a “missing middle”, that is, a shortage of medium-sized companies, as a reflection of the difficulties of many small firms in reaching minimum efficient scales (OECD 2019).

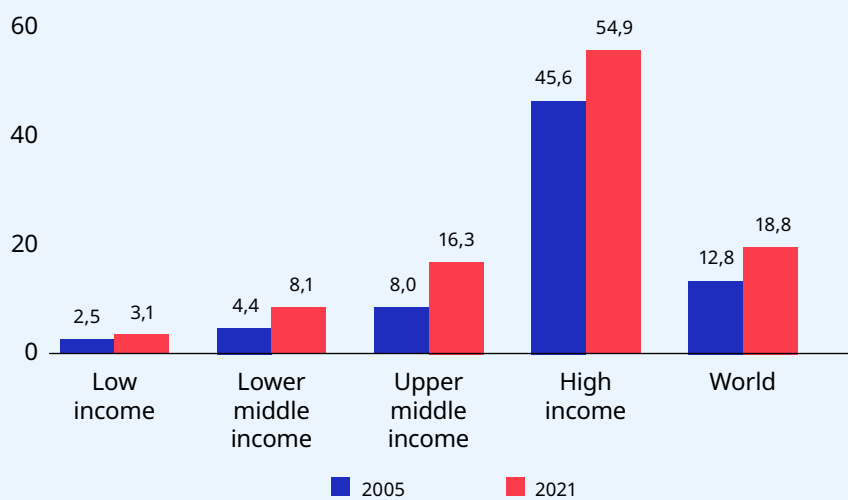
Additionally, in comparative terms and on a purchasing power parity (PPP) basis, globally as a result of the COVID-19 pandemic, the gaps in labour productivity between economies by income level not only have no diminished but rather widened (Figure 3). It is estimated that in 2021, a worker in a high-income country produced in real terms 17.7 times more per hour of work, on average, than a worker in a low-income country; 6.8 times more than one from a lower-middle income country, and 3.4 times more than one from an upper-middle income country (ILO 2021).

► **Figura 3. Productividad media por hora de trabajo (variación % anual y valor en dólares constantes, PPP)**

a) Annual percentage change

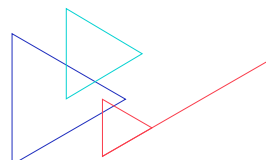


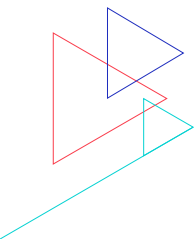
b) Change in constant dollars in terms of PPP



Note: Production in terms of purchasing power parity (PPP) takes into account price differences between countries.

Source: ILO (2021) based on ILO estimates, World Development Indicators (World Bank) and World Economic Outlook Database (October 2021)





In regards of possible hypotheses of causality, the evolution of intra-company productivity does allow elucidating relevant keys to better understand the growth trajectories of productivity at the aggregate level, since the latter corresponds to the consolidation of the performance of all companies, enterprises and productive units in the economy of a nation or territory. The study of the aggregate effect of intra-company productivity increases, that is, “producing more or better” in each productive unit, has allowed to systematize varied evidence for different countries and periods, in regards of its positive impact on income or GDP per capita.³²

Numerous studies have addressed productivity gaps not only between segments and business sectors, but within the same sector (Syverson 2011), and even between apparently similar companies (Gibbons and Henderson 2013).³³ Figal Garone et al. (IDB/Invest 2020) examine the differences in performance between apparently similar companies in Latin America and the Caribbean based on data from WBES,³⁴ and find significant differences between manufacturing companies: the 10 per cent of best performing companies reach a productivity almost seven times greater than those in the lowest sample decile. Syverson (2011) finds that among manufacturing companies in the United States, the top 10 per cent achieve labour productivity four times higher than those in the lowest decile.

Consequently, a key cause of the lag in productivity in the region is the persistence of large groups of companies with very low levels of productivity, especially SMEs and the informal economy. The study by Figal Garone et al. (2020) focuses on the intra-firm allocation of resources, on microdata from WBES and the Chilean National Manufacturing Survey to explain and interpret persistent productivity gaps between firms. The empirical evidence available is significant and establishes that to reduce such gaps, boosting productivity is critical.

Rodrik et al. (2015) and Beylis et al. (2021) identify the intersectoral reallocation of productive resources and its consequences in terms of a process of premature deindustrialization, and at the same time a weak process of productive diversification towards more complex activities from the point of view of knowledge and skills as a key explanatory factor to understand the persistent productivity gaps of the countries of the region with respect to advanced economies. For example, in 2018 there were only three Latin American nations among the top 50 economies in the ranking of economic complexity, which aims at measuring the level of sophistication of each country’s export baskets:³⁵ Mexico (19), Costa Rica (47) and Brazil (49). In Mexico and Costa Rica, meanwhile, a significant part of the most complex activities, particularly manufacturing, are based on sophisticated goods assembly processes, but with relatively low levels of local integration.

In order to include intra-firm and intersectoral effects through the proposed ecosystem approach, six meso- and microeconomic dimensions are identified in this section where economic, technological, and sociocultural considerations converge, affecting medium-term

32 Figal Garone et al. (IDB/INVEST 2020) cite numerous studies: with a focus on the effect on GDP per capita Acemoglu et al. (2006), Restuccia and Rogerson (2008) and Bartelsman et al. (2013); with a focus on wages Van Biesebroeck (2011), Bartelsman et al. (2015) and Konings and Vanormelingen (2015); and with a focus on employment Hall et al. (2008), Harrison et al. (2014) and Dachs and Peters (2014).

33 SSEs: *seemingly similar enterprises*.

34 World Bank Enterprise Survey.

35 This index is based on Hausmann and Hidalgo (2011), who prepare an indicator reflecting the complexity and diversity of the products exported by each country. If the goods exported by a country are sold by few countries, it is assumed that they are more complex (because they require a large amount of specific knowledge). But it could happen that this low ubiquity responds not to the existence of differential capacities but to the availability of scarce natural resources. Then the authors complement the ubiquity index with the diversity index (if countries that produce less ubiquitous goods export many products, this more likely reflects the existence of capabilities and not “rare” raw materials). Thus, they correct the diversity and ubiquity indices through an iteration process, to obtain a measure of economic complexity at the national level. See <https://atlas.cid.harvard.edu/>.

productivity trajectories, and long term, as well as the depth and persistence of gaps between companies, including formal and informal enterprises, and self-employed workers. They are:

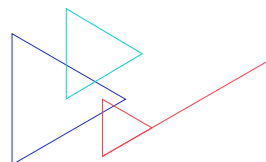
- 5.1. Size and competitive environment
- 5.2 Technology adoption and absorption capabilities
- 5.3 Job Training, Skills, and Competencies
- 5.4 Innovation
- 5.5 Management and organization of work
- 5.6 Institutional setting

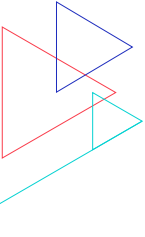
5.1. Size and competitive environment

A report by OECD (2019) points to two core factors underlying the poor productivity performance of Latin American SMEs. On the one hand, the export profile of most countries, where the predominance of natural resource- and commodity and/or capital-intensive industries, discourages the participation of small companies, both due to their limitations in making investments, and due to the few linkages many of these export-led activities actually create. Secondly, SMEs in the region show lags in terms of access to qualified human resources and availability of managerial and technological skills, recognizing that the level of dispersion in the availability of these skills in the segment is also high. Added to this are the negative impacts often derived from unstable macroeconomic and institutional contexts, gaps and lags in education systems, problems with regulatory frameworks (including tax, labour, trade policy and market entry and exit issues), difficulties in accessing financial and non-financial services such as technological information and coordination failures, often in the absence of effective policies to address them (Pagés 2010; Álvarez et al. 2018).

Large-scale production is often associated with lower unit costs, efficient production processes and consequently high levels of labour productivity. Large state-owned and private companies operate in the region in primary-export sectors with significant incomes associated with static comparative advantages and capital-intensive processes. However, their productivity trajectories strongly depend on the price cycles of raw materials and commodities and, additionally, they tend to be eroded since in the medium term such surpluses affect their own cost structures. In sectors based on non-renewable natural resources such as mining or conventional energy, incomes are often eroded through the progressive decline of ore grade or hydrocarbon reserves. Another factor that may influence this same trend may be the entry of new competitors in earlier development stages enjoying cost advantages. Yet Ricardian rents are often so significant in these industries that their total factor productivity can decline markedly over long periods and still permit wide operating margins. Depending on the competitive pressure they face in their destination markets (mostly global), these companies can invest in expansion projects and cutting-edge technology, while managing talent and attracting and retaining highly-skilled workers.

In moderately competitive markets, companies focus on optimizing production processes. In the absence of competitive pressure in certain sectors, favourable price cycles and rather inelastic demand, companies tend to relax their objectives of efficiency, performance and optimization of productive factors in favour of sub-optimal production strategies and practices. Lack of or low competition in the product market may be attributed to different reasons, including: regulatory and market barriers restricting the entry of new firms; non-tradable services sectors to supply the local market (transportation, telecommunications); primary-extractive sectors where profit rates revolve around comparative advantages and rights to exploit natural resources (mining, energy).





In the latter case, productivity losses are exacerbated at times when international prices rise, driven by an external demand shock, as occurred in Chile during the 2003–13 period known as the copper super-cycle, when metal prices reached historic levels as a result of China's growing demand for commodities. Although a significant improvement in growth, tax revenue and employment was observed in that period, the boom was offset by a dramatic decline in the sector's TFP, which fell on average by close to 9 per cent per year (Lagos 2013; CNP 2017).

Much of the explanation for this phenomenon lies in the fact that in order to respond to growing external demand, the sector uses inputs inefficiently, impacting the quality of the extractive process and the grade of the extracted ore. In other words, volume was prioritized over efficiency, and this had a negative impact on the productivity of a sector which, due to its significant participation in the country's productive structure, ends up affecting aggregate productivity. This negative impact of the commodities super-cycle was also recorded in Peru, another important trading partner of China in the region, where sector productivity significantly slipped in 2006 and took a decade to recover (Céspedes et al. 2016).

It is to be expected, then, that the current cycle of rising international prices, as demand recovers from the COVID-19 pandemic, will once again put pressure on the productivity of the extractive sector. Therefore, incorporating technology and improving management are especially urgent in natural resource-based companies to counteract their high exposure to exogenous factors such as the volatility of international prices, soil erosion, water scarcity and falling ore grades, among others.

Although greater competition in product markets can directly induce improvements in productivity as a criterion for entry and survival, this effect may be channelled indirectly through changes in the organizational structure through enhanced business management strategies and practices, as discussed later in this section.

Differences in productivity are largely explained by the intensity of capital companies can use (Leung, Meh and Terajima 2008). This not only exacerbates gaps between small and large companies in the same country, but also differences in aggregate productivity between sectors and LAC countries compared to more productive economies such as the US. Trade flows in the region show a low share of inputs for productive purposes (capital goods) in imports, which reaches only 15 per cent compared to the remaining 85 per cent that is distributed between intermediate (55 per cent) and final consumption (30 per cent) goods. This situation is aggravated when considering that only 12 per cent of imports are destined for the services sector, which is usually an important channel for external access and internal provision of productive inputs in the region (CAF 2018).

This is consistent with the evidence of low economic complexity in most regional economies. The largest companies in the region, except, in part, those established in Argentina, Brazil and Mexico, have traditionally opted for a mainly international supply of services and intermediate inputs, to the detriment of technical knowledge, specialized services and installed local capacities, unlike what happens in other advanced economies with a high endowment of natural resources, such as Canada, Australia or Norway (Katz 2000 and 2007).

The COVID-19 pandemic has severely affected the least productive companies and the lowest paid jobs. Among other negative impacts, the productivity gap between high-income and low-income economies has widened, estimating that in 2021 the average value of the hourly production of a worker in a high-income country, adjusted by PPP, is 17.7 times higher than that of a worker in a low-income country, and 6.8 times higher than that of one in a lower-middle income country (ILO 2021b).

The post-pandemic global scenario also imposes the need to rethink global supply chains, opening the possibility of launching processes of relocation and rapprochement of input suppliers, opening spaces to explore regional cooperation agreements with potential implications in geography. and economic complexity of the region (ECLAC 2020a). This is

also presented as an opportunity to diversify the sources of risk distributed throughout the global production chains, advance in the construction of a physical and digital infrastructure adequate to the challenge and enable a commitment to productive and sustainable cooperation between the countries of the region.

Additionally, as discussed in section 6 of this report, the pandemic has catalysed the digital transition of many companies globally and in the region in various areas of the supply chains of goods and services. This development could have a positive impact on trade flows through more efficient distribution and international coordination processes and lower transaction costs (Basco and Lavena 2021). Taking full advantage of this opportunity critically depends on overcoming the traditional access difficulties and capacity deficits of a large part of the regional SMEs in regards of technology, precisely the second dimension to be addressed for an agenda focused on productivity and decent work in the region.

► Box 1. Relevant experience of the ILO in the region: the Executive Roundtables

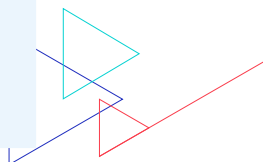
The Executive Roundtables (ERs) are an ILO methodological initiative focused on solving coordination problems to promote productive development with decent work. They arise from a critical view of public policies on productivity circumscribed to the pillars of human capital, infrastructure, innovation and institutional setting, incorporating as a priority critical coordination problems specific to sectors and value chains. These coordination failures can be verified between the public and private sectors, between public actors, as well as between the different parties that make up the productive chains of a particular industry.

ERs recognize the relevance of the local context and the dynamics of interaction between stakeholders for the viability and sustainability of productive development. In addition, they acknowledge the complex and challenging international scenario marked by important technological evolutions, and international trade flows that require demanding regulations and quality standards. Faced with this, the ERs propose a working methodology that operationalizes the tripartite social dialogue between representatives of government, industry and labour, to identify critical knots, visualize strategies and foster collaborative efforts to bring about sustainable solutions.

ER governance establishes, on the one hand, an operational body made up of public entities, representatives of employers and collaborators, representatives of civil society such as NGOs and universities, and a coordination team (dedicated team or DT). On the other hand, a high-level body brings together authorities and representatives of the central government that expands the decision-making margin and provides ER with political capacity, along with facilitating the eventual allocation of resources.

Another methodological innovation of ERs rests on their operational recursiveness that translates into work sessions focused on medium-term objectives and preliminary solutions from the beginning (sessions to determine “premises”) to initiate a process of practical learning based on the findings that effective dialogue and collaboration application of proposals can gradually provide. This is a phase of diagnosis and application of interdependent solutions, emphasizing the partial and preliminary nature of any diagnosis.

In this way, ERs converge on multilevel solutions that can be implemented from the territorial level (Territorial Executive Roundtables –TERs) to the national level (Sectoral Executive Roundtables –SERs) with the respective entities involved. This setup triggers joint learning to identify “bottlenecks” that prevent or make it difficult for value chains to achieve their greatest potential. Among the multiple possible objectives of ERs are reducing bureaucracy, filling



regulatory gaps, adapting regulations to sectors' conditions, supporting certification processes and adapting international standards, creating new and better incentives for innovation, designing business promotion programmes, promote the just transition in productive sectors and value chains, and others.

Throughout the region, the ILO has to date advised and collaborated with national counterparts in the implementation of ER programmes in various agricultural production chains and receptive tourism in Costa Rica, Ecuador, El Salvador and Peru.

5.2. Technology adoption and absorption capabilities

Traditionally, the adoption of technologies, through the acquisition of equipment and various forms of technology transfer, has played a determining role in the growth of both total factor and labour productivity. For much of the 20th century, the manufacturing industry was the main vehicle of technological progress in LAC. This characteristic has been changing in the recent few decades, with the evolution of the most advanced economies towards post-industrial production structures, in which some service subsectors —such as telecommunications, finance and logistics— break into the market with greater supporting technologies and labour skills productivity and intensity, increasingly endowed with characteristics inducing technological development and progress that were previously considered exclusive to manufacturing (Beylis et al. 2020).

In recent years, the rapid advances in digital technologies and their widespread use in multiple activities, accelerated by the COVID-19 health crisis, have favoured innovation in business and marketing models in service sectors that are no longer limited by market size. More and more services can be digitally stored, encrypted and easily marketed (Ghani and Kharas 2010). Many of these services are becoming central links for industrial, agricultural, and mining-energy-based value chains, with numerous forward linkages with other sectors and enormous potential to improve aggregate productivity. The phenomenon has been called the “servification” of manufacturing and industrial supply chains (Beylis et al. 2021). With this, the traditional sectoral approach to the analysis and formulation of productive development strategies becomes increasingly inadequate, giving way to a value chain approach, much more aligned with the potential incentives for change and the adoption of new technologies by SMEs, micro-enterprises and even self-employed workers.

By examining the dynamics of technology adoption, with a focus on the macro trends of digitalization and automation, it is possible to identify indicators of a nature that help measure the challenge that all the countries of the region face in this area. One of the data sources available in this regard is the so-called Network Readiness Index (NRI).³⁶ In its latest edition, this ranking includes 121 countries. According to the global NRI index, the best ranked Latin American nation is Uruguay (47), followed by Chile (50) and Costa Rica (54). At the other end, El Salvador, Guatemala, and Honduras rank below 90 (there is no data for Nicaragua). If we focus on the “access to technologies” pillar of said ranking, which measures access and coverage of Internet services and mobile device prices, the top 10 NRI nations have an average of 87; for South America, the respective figure is 57, in Central America 45 and in Mexico 61. As a comparison, the Eastern European countries that are members of the EU reach an average of 80 and the ASEAN nations, 65.

³⁶ <https://networkreadinessindex.org/nri-2020-analysis/>

A second pillar, more related to advanced technologies, includes variables associated with availability, investments and public purchases in advanced/emerging technologies, patent applications in ICT areas, use of robots and software expenses. For the first ten nations of the NRI ranking, the average in said pillar reaches 73. In South America the average is 22 and in Central America 27 (the same value as in Mexico). The average for Eastern European nations members of the EU is 32 and for ASEAN 40.³⁷

CAF-the Development Bank of Latin America- has set up an Observatory of the Digital Ecosystem of Latin America and the Caribbean. According to the Digital Ecosystem Development Index calculated by said Observatory, Latin America and the Caribbean show similar progress to Asia and the Pacific (the indices are around 50 in both cases). However, the region is behind Western Europe (71), North America (81), Eastern Europe (53), and the Middle East and North Africa (56). Perhaps the most worrying consideration is that the growth rate of the index in Latin America and the Caribbean between 2004 and 2018, although sufficient to reduce the gap with the advanced world, is the lowest among the EMDE regions (Telecom Advisory Services LLC 2020).

The evident changes in technological behaviour observed during the COVID-19 pandemic, related to the digitalization and diffusion of industry 4.0 technologies (Basco and Lavena 2021), must in any case be understood from a multidimensional standpoint, because of changes in the demand for goods and services, logistical, financial elements and operating and business models. The foregoing gives rise to various potential adoption trajectories, which will probably be influenced to the extent that the ongoing transformations related to teleworking, e-commerce and digitalization show their real effect on labour and residual productivity.

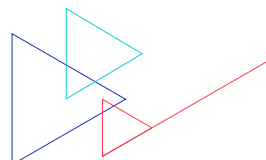
As regards small and medium-sized companies, development towards increasing digitalization depends largely on the enabling local infrastructure, their insertion in markets or value chains, and their access to services and/or transfer platforms to achieve greater and earlier technological incorporation (ILO-KAS 2021). Exponential increase was evidenced in 2020 of the annual rate of internet adoption by companies in Colombia and Mexico (800 per cent), and to a lesser degree in Chile and Brazil (360 per cent), as well as the emergence of electronic commerce sites in Mexico and Brazil (400 per cent) (ECLAC 2020a). As for industry 4.0 technologies, the greatest increase in penetration rate was in cloud computing in countries such as Argentina, Chile and Mexico with increases close to 28 per cent (Basco and Lavena 2021).

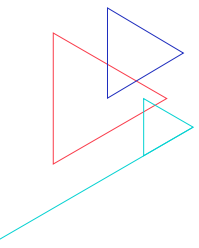
When explaining the inconveniences that hinder or delay adoption of technology by companies, Basco and Lavena (2021) observe that the size of the companies is a relevant factor. For smaller companies – fewer than 50 employees – access to financing is one of the main reasons given by those 64 per cent who mention difficulties in adopting technology. Among larger companies – more than 200 employees – implementation time is identified as the main drawback, although to a lesser extent than small companies, given that in this case only 40 per cent indicate having faced technology adoption hindrances.

Predictably, the patterns of adoption of digital technologies by SMEs are highly heterogeneous (Gallego and Gutiérrez 2015). In addition to the traditional obstacles related to gaps in basic capabilities (human resources, managerial and organizational skills), there is an investment threshold in complementary assets to permit taking advantage of new technologies. In addition, SMEs often face a higher relative risk in terms of cybersecurity and privacy due to a lack of information, resources, and training in the matter (OECD 2019d).

Considering the massive and varied universe of SMEs in the region, the analysis of the conditioning factors that these companies face in adopting and absorbing technology

³⁷ The member countries of ASEAN (Association of Southeast Asian Nations) are Indonesia, the Philippines, Malaysia, Singapore, Thailand, Vietnam, Brunei Darussalam, Cambodia, Laos and Myanmar.





deserves special attention. Unlike large companies and technology start-ups that can bet on more complex and sophisticated forms of automation related to industry 4.0 (sensorization, IoT,³⁸ artificial intelligence, machine learning, cloud computing, additive manufacturing), the technological opportunities for SMEs are mostly related to the access and use of digital platforms. Thus, firstly, the transversal opportunities associated with digital communication media, access to market information, insertion in market platforms and implementation of electronic commerce strategies are widely documented areas that stand out as elements affecting productive improvement, as do, digital financial services, which enlarge access to credit, which has a direct effect on the entry, maturation, scaling and survival of companies (McKenzie and Woodruff 2017).

Incentives for formalization are also identified based on the digitalization of the accounting, management and planning phases, especially of micro and small companies that operate informally. In this regard, the experience of state subsidies for micro and small companies that incorporate digital payment systems in Uruguay can be highlighted (ILO-KAS 2021).

In a more specific segment are specialized services and knowledge-based SMEs, where digital technologies are a core capability at the foundation of their corporate business model, as also happens in terms of the potential to create green seal digital ventures that take advantage of opportunities and rise to the challenges represented by climate change and the objectives of productive and energy transformation.

However, in many cases, the potential advantages associated with greater digitalization end up being wasted or underutilized. The reasons vary according to the size, sector, trajectory, or other characteristics of the involved companies. As already mentioned, on a smaller scale, access barriers related to scant skills for digitalization, lack of flexibility in management models, weak available digital infrastructure, risk aversion, low technology adoption and gender gaps tend to prevail. It can also be seen that the smaller the size of the companies, the lower their ability to access and sustainably insert themselves in global value chains and digital markets (ILO-KAS 2021).

A differentiated phenomenon that has emerged with great force at a global level is that of digital platforms (also called “collaborative” business models). Worldwide, the number of web-based and location-based platforms (such as cab hailing and delivery services) grew from 142 in 2010 to 777 in 2020 (ILO 2021a). Web-based platforms tripled, while passenger transport (cab hailing) and delivery platforms multiplied almost tenfold over the same period.

Digital platforms usually operate under “collaborative” business models, offering multiple types of subscriptions and/or plans segmented by customer types. And in addition to charging a customer service commission, according to their plan or segment, they charge a commission to the provider, which is usually higher than the client’s, for services provided. For example, the Upwork platform generated 62 per cent of its revenue from commissions to service providers versus 38 per cent from commissions to their clients. The platform bases its commissions on search and contact algorithms between suppliers and customers, as well as on customer support processes and service performance management, with customer and supplier satisfaction evaluations.

Additionally, these platforms offer two types of labour relations: one of them is when the workers are hired directly by the platform, establishing an employee-employer relationship, and the second is when the person works on their own, being mediated by a digital platform, establishing a self-employed supplier relationship, without labour dependence on the platform. In general, the first modality is much less massive than the second, for example, the PeoplePerHour temporary work intermediation platform registered in 2020 about 50

³⁸ IoT: Internet of Things

employees and intermediated temporary jobs for 2.4 million technicians and freelance professionals with different qualifications (ILO 2021a).

Most self-employed workers who operate as providers of digital platforms lack adequate social protection. There is still a large gap in pension, health and accident insurance, which determines a high level of job insecurity. This problem, in most of the countries of the region, is accentuated by the weak or insufficient current regulation on the operation of this type of platform. Regulatory deficiencies contribute to the fact that in many countries across the region a significant proportion of the people who work through these platforms are migrant population (ILO 2021a). In contrast, it should be noted that a recent study for the Chilean case identifies that a significant proportion of self-employed workers who work as providers of these platforms value the flexibility and independence associated with not having a fixed employment relationship with them (Morris 2021).

5.3. Job Training, Skills, and Competencies

The selection, retention and training of persons occupies a central place in the strategic analysis of economic and social development. The OECD countries have recognized, especially since in recent decades, the need for an educated and continuously trained population. Thus, as countries strive to find new sources of growth to ensure a robust and sustainable future, they are also trying to understand the kinds of skills needed for innovation and the best ways to build them (OECD 2011a).

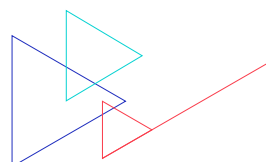
The concept of human capital is closely linked to the concept of abilities or skills. The OECD (2001) defines human capital as *"the set of knowledge, skills, competencies and attributes of individuals that facilitate the creation of personal, social and economic well-being."*

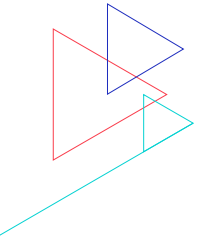
Addressing the issue of human capital formation, development, attraction and retention requires understanding how this capital interacts with the various conditions and determining and enabling factors to contribute to the improvement of productivity in each territorial context, characterized by its specificities, characteristics and peculiarities. Country-specific and international literature, and recently applied practical orientation programmes have firmly established key concepts on these topics.

No rigorous and widely accepted definition has been established of skills and abilities, which in many cases allude to the variable combination of skills that are derived from an educational process, training and acquisition of practical experience. In any case, there is great variability in the way of defining the concept depending on countries, cultures and specific contexts where the subject is addressed, such as the school, the company or society (Toner 2011; Innovation Union Scoreboard EC 2014).

Labour productivity derives largely from an efficient structure of incentives that range from the "hygienic" (wages, equipment, working hours, command structure) to the psychosocial (work environment, organizational culture, labour treatment). This last component gains importance as companies grow in size and organizational complexity.

The development of skills and competencies of human talent is a fundamental pillar to move towards greater productive development. Technological irruption, where it occurs, generally displaces specific tasks that are likely to be automated but fails to cover the broad spectrum of tasks that involve human activity in its entirety. Therefore, the demand for skills in the current and future scenario is not exclusively technical, but also socio-emotional and in basic care, areas from where people can hardly be displaced (Basco and Lavena 2021). Automation entails the potential emergence of complementary tasks that reinforce a process of certain labour polarization, where technology breaks into manual and cognitive-routine activities and tasks with greater force, opening a wide spectrum of non-routine tasks performed by people, which is known as complementary adaptation (Beylis et al. 2021).





The acceleration of technological incorporation and digitalization puts special pressure on the building of skills required to deal with the new widespread routines. According to data available for four countries in the region (Chile, Ecuador, Peru, and Mexico) that are part of the PIAAC,³⁹ there is evidence of a significant gap with respect to the OECD average in terms of the percentage of adults who show high levels of achievement in problem solving in digital environments. These differences become more marked, in general, with lower educational level and at older ages (Martínez et al. 2020). Less than half of the Latin Americans who participated in this evaluation had used a computer or had sufficient experience to use computers to perform basic professional tasks. Further, less than 10 per cent of workers in the region use ICTs for more advanced tasks – for example, programming – a percentage consisting to a greater extent of individuals with higher educational credentials. While a third of workers in Latin America use ICTs regularly in their work, in Europe this percentage rises to more than 50 per cent (OECD 2020).

Meanwhile, another recent investigation on a sample of 500 companies from five Latin American countries reveals that the assessment of process, systemic and complex problem-solving skills, understood as soft skills, has been strengthened compared to technical skills and those associated with STEM⁴⁰, typical of the current techno-economic paradigm (Basco and Lavena 2021).⁴¹

In this context of profound technological transformations, with significant impacts on employability and in the face of a set of emerging labour skills that are expected to be highly required in the near future, the preparation of the countries, in terms of their educational, training and development of labour competencies, acquires great relevance. In the Global Competitiveness 2020 report, an assessment is presented for 37 countries about their “readiness for transformation.”⁴² In the evaluation, which includes four LAC economies (Argentina, Brazil, Chile, and Mexico), eleven priority areas for transformation are considered, including public institutions, infrastructure, market competition, innovation with social impact, labour laws and protection workers, among others. One of the eleven areas evaluated is the “updating of educational content and investment in skills and competencies required for future jobs and markets.” On a scale of 0 to 100 points, the best evaluated country is Finland; the average score of the sample of 37 countries is 55.3; and the four Latin American countries are below this average (Table 2). Thus, the comparative parameters for four of the main regional economies provide a warning signal for the region, which faces significant lags and gaps to be resolved in areas such as the rate of basic and secondary schooling, coverage of higher technical and professional education, updating of curricula, consolidation of national development systems and certification of labour skills, among others.

³⁹ Programme for the International Assessment of Adult Competencies

⁴⁰ STEM: *science, technology, engineering and mathematics*

⁴¹ Includes companies from Argentina, Brazil, Chile, Colombia and Mexico.

⁴² The Global Competitiveness Report Special Edition 2020. Section 5. Assessing Countries' Transformation Readiness

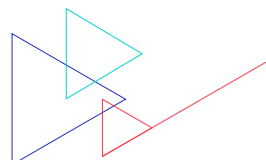
► **Table 2. Preparedness for Transformation Index: score in the category “Updating of educational content and investment in skills and competencies required for future jobs and markets.” Scale from 1 to 100; 37 economies.**

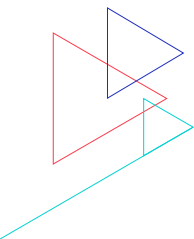
Rank	Economy	Score
1.	Finland	75.3
2.	Netherlands	71.8
3.	Denmark	71.5
4.	Switzerland	70.8
5.	Sweden	69.4
6.	USA	68.2
10.	Canada	65.3
20.	Chile	52.1
26.	Argentina	46.9
30.	Mexico	43.3
36.	Brazil	39.5
	Score (simple average) sample	55.3

Source: Transformation Readiness, Global Competitiveness Report, (WEF 2020)

Regarding the flows of human capital in the region, it is observed that the exodus of people with tertiary education are significant in the Caribbean (43 per cent) compared to those of the subregions of Central America (17 per cent) and South America (5 per cent). This “brain drain” is positively related to the significant participation of remittances in the Caribbean and Central American countries, in their respective national accounts. What is worrying about the situation in some Caribbean countries and Venezuela is that their emigration rate of the population with tertiary education is above 60 per cent. The evidence supports the fact that talent elites tend to seek environments that are friendlier to entrepreneurship and professional development, which triggers migratory flows that affect the endowment of human capital in lower-income countries and intensifies the unequal distribution of knowledge (Solimano 2010). This reinforces the fact that human capital formation policies must be articulated in a broader framework of development policies that contemplate entrepreneurship facilities, scaling up and access to markets.

Strategies to overcome the challenges of insertion and job security involve adapting skills available in the labour market. Commitments to job reconversion or re-skilling become extremely important in the face of the structural transformations that have taken place in recent years and that have been accentuated by the global health crisis. Specialization or up-skilling, on the other hand, is necessary to improve labour inclusion, reduce gender gaps and promote investment in non-traditional sectors that require high qualifications with specific skills.





In this regard, noteworthy are knowledge-based ventures that seek to respond to this type of need, creating value through innovative educational strategies. This is the case of the Latin American start-ups Crehana and Laboratoria, where the former promotes an innovative learning model for the development of skills for the digital and creative industry with an impact in different countries across the region. The second promotes the strengthening of technical skills in women who did not have access to higher education, qualifying them as web page designers and developers, among other skills.

5.4. Innovation

Ample literature is available on the incidence and effects of innovation on the performance and productivity of companies. Following the pioneering contributions of Schumpeter (1934), the firm-level evolutionary approaches developed by Nelson and Winter (1982) and Kline and Rosenberg (1986), and the vision of national innovation systems originally put forward by Lundvall in 1992, an extensive base of empirical studies has been built on different sectoral and national contexts, which confirm that innovation has a positive impact on the performance of companies, and constitutes a relevant driver for productivity. Lundvall et al. (2009) mention that the main reason for implementing public policies to promote business innovation by governments is their consideration as a key factor for the growth of total factor productivity (TFP) and, consequently, to economic growth (Astudillo and Briozzo 2017).

More recently, Grazzi and Pietrobelli (2016) highlight multiple studies that confirm a virtuous relationship at company level between research and development (R&D) effort, innovation, productivity and per capita income as the foundation of national trajectories for economic growth sustained over time. Likewise, there is international and region-wide evidence pointing to the positive impact of innovation in processes and products on job creation (Vivarelli 2013; Crespi and Tacsir 2011).

LAC lags in terms of efforts and results of innovation activities. A useful and widely used (if imperfect) results-based indicator is the number of patents that LAC nationals register with the obtain from the United States Patent and Trademark Office (USPTO). The participation of LAC was always marginal in this indicator, and in the long term it shows a small rise from 0.1 per cent in the first five years of the 70s to 0.25 per cent in 2015-19 (on the total number of patents granted. Brazil and Mexico account for 75 per cent of the region's total. Meanwhile, the participation of China and India and of the so-called "Asian tigers"⁴³ in the 1970s was almost nil, while in the last five years mentioned above it rose to almost 5 per cent and 10 per cent, respectively. The comparison against the number of inhabitants reaches under 1.5 patents per million (yearly) in our region, against almost 7 in China and India and more than 460 among the Asian tigers.

In terms of efforts, the average expenditure on R&D relative to GDP in Latin America and the Caribbean rose from 0.25 per cent to 0.34 per cent between the beginning of the 2000s and the end of the last decade. Only Brazil spends more than 1 per cent and three other countries are around 0.5 per cent, namely Argentina, Mexico and Uruguay.⁴⁴ This evolution contrasts with that of the Eastern European nations that are European Union members, which went from 0.7 per cent to more than 1 per cent on average, during the same period; and also even with those of a group of Asian countries with rapid recent growth⁴⁵ which, on a simple average, went from devoting 0.2 per cent to almost 0.7 per cent of GDP to R&D (as a reference, the average for the OECD is 2.5 per cent in 2017).

⁴³ Korea, Hong Kong, Singapore and China-Taiwan.

⁴⁴ UNESCO data.

⁴⁵ Philippines, Indonesia, Malaysia, Thailand, Vietnam.

Not only is the level of spending low in the region, but the proportion executed by the business sector is also low, around 30 per cent, against 56 per cent in Eastern Europe and 46 per cent in the Asian countries. In China and Korea, businesses' share of R&D spending is around 80 per cent, while in Singapore it reaches 60 per cent (UNESCO data).

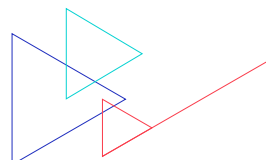
Even in natural resources chains, where the South American countries have clear comparative advantages, generally no progress is made towards the most knowledge-intensive stages, except in a few cases, mostly linked to Brazilian companies, where corporations originating in the LAC region have achieved dominant positions on a global scale. Although many primary chains in Latin America show a good rate of adoption of modern technologies, the presence of world-class local innovative capacities is still an exception in the regional panorama. Examples in this sense are the oil, forestry and ethanol industry in Brazil or the seed sector in Argentina and Brazil, where it is also shown, through indicators of patents and R&D expenses, that developed nations with abundant resources natural resources, such as Canada, Norway and New Zealand, have exploited much more intensely the opportunities for innovation open in the chains around natural resources, vis-à-vis Latin America (López 2017).

The empirical studies carried out in many countries, with a focus on various sectors and types of companies during the last 25 years, tend to confirm that innovation generates a positive impact on the productivity of companies. However, the available evidence also accounts for a high variability in said correlation, depending on the capacities, interactions and behaviours of each company, as well as its economic, competitive and sociocultural context (Barañano 2007).

Innovation is generally a process that results from individual decisions and behaviours at company level. Therefore, microeconomic analysis is highly relevant to understanding the correlation between innovation and productivity on a macro scale. Traditionally, comparative exercises to establish the relationship between innovation and productivity in companies in different countries of the region were hampered by rather heterogeneous information bases and microdata sources. In contrast, recent studies between countries on comparable microdata have reached more consistent results, supporting the hypothesis that those companies capable of incorporating technological improvements show differential innovative behaviours with respect to their peers and, based on the innovations developed, manage to grow labour productivity. From a micro perspective, the skills related to mastery, management and technology learning seem key to inducing innovative behaviours resulting from the acquisition of machinery and equipment and collaborative interaction with other companies, external advisors, and technology providers. We may thus understand why the empirical evidence based on microdata helps to confirm that the productivity gaps between companies are wider in emerging economies than in advanced economies, and the region is not an exception in this regard.

Crespi and Zúñiga (2012) find that, while for a typical country of the European Union the productivity gap between an innovative manufacturing company is 20 per cent greater than its similar non-innovative peer, for a typical country of Latin America⁴⁶ the gap can widen to close to 70 per cent. In a more recent exercise, Crespi, Tacsir, and Vargas (2016) again econometrically validate innovation as one of the factors most correlated with the difference in performance at firm level. Based on micro data from WBES 2010 for a sample of 4,376 industrial firms with 5 or more employees, in 17 LAC countries, they present robust evidence between the innovative effort, its results and companies' productivity. The study concludes that, on average, the labour productivity of innovative companies is 50 per cent higher than that of companies that do not innovate. In the case of the Caribbean, a similar measurement shows an even greater difference, of 63 per cent. At the same time, they validate wide gaps in innovative performance between companies, based on their different management and technological absorption capacities, as well as the level of training and preparation of their employees. Although such

⁴⁶ The study included data from companies in Argentina, Chile, Colombia, Costa Rica, Panama and Uruguay.



conditions have an adverse effect more frequently on smaller companies, they acknowledge certain companies in this segment also operate within in value chains with high technological intensity and their adaptability and flexibility, given their smaller relative size, are strengths for adopting innovative behaviours with a favourable impact on their productivity.

The foregoing suggests that the potential impact on productivity from promoting business innovation in Latin America should be very high in relative terms, but at the same time it shows the importance of extending and transferring capabilities at the level of companies, especially small and medium-sized ones, so that they can adopt innovative behaviours. It should be kept in mind that firm level process and product innovations are not readily detectable in aggregate productivity statistics, in particular because their impacts evolve over time as they occur, spread, improve and generate increasing spillovers of knowledge. This apparent paradox refers us back to Robert Solow's dictum in 1987: "ICTs are everywhere except in aggregate productivity statistics." Brynjolfsson, Rock, and Syverson (2019), among other authors, draw on the history of past technological revolutions to argue that implementation lags matter. Both ICTs and electricity took decades to diffuse into the economy as a whole, and thus increase aggregate productivity. In the meantime, first movers – whether by innovating, adapting or increasing use – gain ground in terms of productivity.

Another important characteristic worth pointing out is that, unlike what happened in dynamic economies of Asia and the Pacific,⁴⁷ in Latin America the innovative performance of companies correlates less strongly with their direct R&D investment. This evidence is consistent with the greater propensity of innovative Latin American companies to develop incremental innovations further from the technological frontier (Acemoglu et al. 2006), and much more linked to the improvement of processes from the acquisition of equipment, and the adoption and adaptation of technologies.

Finally, it is also necessary to highlight how certain enabling factors in the business environment affect innovative performance, to the extent that their greater or lesser availability determines the possibilities of developing technological absorption capabilities. Grazi and Jung (2016) present robust evidence that access to broadband connectivity is a source of increased productivity among SMEs in Latin America and the Caribbean.

5.5. Management and organization of work

There is an extensive literature that addresses the importance of work management and organization aspects in the productive performance of companies. The evidence indicates that both business management and organizational culture exert a considerable impact on intramural productivity by permanently influencing, explicitly and/or tacitly, its operation. Along with access to financing and human capital, organizational culture is recognized as one of the main determinants of technology adoption in Latin America (Grazzi, Pietrobelli, and Szirmai 2016; Basco and Lavena 2021).

Bloom, Sadun and van Reenen (2017) carry out an exhaustive study on a sample of 11,000 companies in 34 countries and panel data from 2004 to 2014 to test their theoretical model, which comprehends business management as a factor that partially explains the evolution of TFP in a similar way as technology does. This approach goes beyond perspectives that understand business management as an optimal design under certain conditions of the economic, socio-political and environmental environment. The big difference between "management as a technology" (MAT) and "management by design" models is that in the former there are no reasons to assume that one form of management is better than another in the aggregate. In addition, the MAT model consistently reinforces some of the ideas previously exposed in this report, which relate the competitive environment of companies to

⁴⁷ Based on evidence provided for South Korea, Malaysia, China and China-Taiwan (Crespi, Tacsir and Vargas 2016)

the best business management practices, positively influencing the profitability and survival of companies.

The results of the aforementioned study show that, in countries with high levels of aggregate productivity and less internal market friction, such as the United States, there is evidence of less dispersion of TFP among the companies examined, compared to countries such as Brazil, where average TFP is lower and its dispersion is larger. Just as differences in management can explain a large part of the differences in productivity between countries, the results of the study show that nearly 30 per cent of the differences in productivity between the 10 per cent least productive companies and the 10 per cent most productive companies more productive within a country can be explained from differences in business management.

In general terms, business management incorporates at least three general dimensions: management monitoring, strategic design, and incentive policies (Bloom et al. 2012). Organizational culture, for its part, allows us to characterize the intangible aspects that foster or erode the technological and innovative performance of a company, such as the structure of the workforce, organizational strategy, alliances with other companies and universities, and the internal organization of the firm. Schein's definition (1985) understands organizational culture as *"repeated solutions to problems of external adaptation and internal integration through the reinforcement of good practices and the reduction of anxiety and risk"*. Teece (1995), in simpler terms, understands it as *"a system of informal rules that says how people should behave most of the time"*.

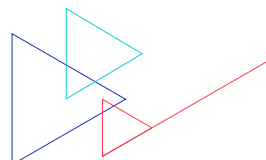
In line with these definitions, the success factors associated to business management may embrace everything from fluid internal and external communication channels, attention to current and potential customers as a source of learning and market adaptation, to explicit support from management for efforts technological innovation and the availability of highly qualified human capital committed to R&D. All this within the framework of a flexible organizational structure where innovative skills are distributed and permeate the entire business environment and are not compartmentalized in specific and isolated areas (Barañano 2007).

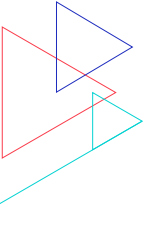
The evidence indicates that both business management and organizational culture have a considerable impact on intramural productivity. Along with access to credit and skills, organizational culture is noted as one of the main determinants of technology adoption in Latin America (Basco and Lavena 2021). Additionally, it is known that micro and small businesses, informal enterprises and self-employment, which represent about 70 per cent of employment in the region,⁴⁸ generally lack the skills or knowledge for professional and flexible organizational management.

A particularly relevant phenomenon from the perspective of the management and organization of work, to prevent overcrowding in the context of the COVID-19 pandemic, has been the implementation of teleworking and all its hybrid variants of organization and arrangement of working hours, which impacted the organizational culture that must now be adequately addressed from a broader perspective of its direct and indirect benefits and costs.

Among the main projected implications of remote work, its possible impacts on productivity seem particularly relevant. They will show their true magnitude once the transitional variables related to learning to the use digital platforms and tools consolidate, adequate protocols for management of time and telematic resources are set forth, teleworking locations and positions take firm ground, regulations and laws for labour security and protection are put in place, and, finally, the incentive structures to this new modality settle in. In parallel, the massification of teleworking has revealed the need to adapt specific regulations and standards

48 They represent 90 per cent of employment in lower-middle income countries and 56 per cent in upper-middle income countries (ILO, 2021)





for this modality, in matters such as the right to disconnect, its impact on family life and the role of social dialogue to address unforeseen issues that may affect working conditions, and consequently productivity.

That said, it is important to point out that, although teleworking is expected to continue where it has been implemented and be combined with hybrid face-to-face modalities, it is also confirmed that its implementation is not applicable on the same scale in all sectors. As an example, in services, especially those based on knowledge, the remote work modality was implemented more massively than in the goods industry. Nonetheless, the most widespread modality in at least five Latin American countries (Brazil, Argentina, Mexico, Colombia and Chile) during the pandemic has been face-to-face with flexible hours (Basco and Lavena 2021).

Savona (2020) suggests two potentially relevant long-term negative effects of telecommuting from a productivity perspective. First, the lack of face-to-face interactions could lead to the loss of fertile ground for creative and novel ideas, which are really the basis of innovation. Second, the loss of social connections and the opportunity to exchange ideas informally could lead to a loss of social capital, as existing capital is eroded and new is not formed. Both may be real costs and would be expected to grow quietly but steadily over time. These costs would weigh on the other side of the scale when evaluating the desirability of working from home and, therefore, must be considered in any long-term balance of benefits versus costs, since they cast reasonable doubt on the view that telecommuting leads to the promised land of higher productivity and greater well-being (Haldane 2020).

► Box 2. Relevant experience of the ILO in the Region: SCORE Programme

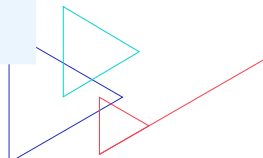
The main objective of the SCORE (Sustainable, Competitive and Responsible) programme of the ILO is to provide training and technical assistance to small and medium-sized enterprises for the implementation of sustainable business management systems that advance towards improving their productivity, and working conditions. Its methodology consists of five modules:

- 1. Cooperation in the workplace:** The basis of business success. It seeks to improve cooperation between managers and workers with a focus on achieving shared business goals.
- 2. Quality:** Management of continuous improvement. It seeks to improve business performance through an appropriate knowledge of customers, developing a culture based on the quality of products and services.
- 3. Productivity through cleaner production.** It seeks to increase energy efficiency, cost reduction and waste treatment to increase productivity.
- 4. Administration of human resources for cooperation and business success.** It seeks to develop human resource management strategies with a view to increasing the quality and productivity of companies.
- 5. Safety and health at work: A platform for productivity.** It seeks to reduce and eliminate health and safety risks present in the workplace, translating into better management of accident rates, risks, expenses and productivity in the company.

In short, the programme intervenes management systems in SMEs through the transfer of technical skills, the promotion of bipartite dialogue, the strengthening of skills and the collection of diagnostic inputs. It is guided by comprehensive and transversal guidelines that seek to: (i) improve the working environment and conditions; (ii) improve productivity by reducing time and process inefficiencies; and (iii) promote a culture of competitiveness and business quality.

Experience in LAC countries

In 2009, the SCORE programme began its first phase of implementation in seven countries around the world, with Colombia as the only one in Latin America. Later, in 2014, in a second phase of implementation, Peru and Bolivia were incorporated. The Colombian case is perhaps one of the most emblematic, as it has a diversified sectoral participation that began in the flower and textile sectors, and today encompasses agriculture, agribusiness, the mining-extractive chain, transport and tourism, among others. As at January 2018, 167 companies and a total of 1,194 workers had participated in the initiative with high levels of satisfaction in areas such as human resource management (reduction of accidents, absenteeism and turnover) and technical resources (reduction of costs, supplies and energy). In Peru, the programme is present in agribusiness, construction, manufacturing, and metalworking companies, among other industries. In 2020, an evaluation of the intervention was carried out that included 52 companies; the results show that a high proportion associated improvements in labour productivity with it. Finally, in Bolivia, the programme began its implementation in the manufacturing sector and has recently been extended to the agro-export sector. As of 2020, 89 companies have been formed and 1,182 business visits for technical assistance have been made.



5.6. Institutional setting

Institutions, whether de jure or de facto (formal or informal), can affect the productive performance of companies in many ways, directly and indirectly. The labour, tax, financial and productive regimes vary according to the political and legal, national and local contexts, and also according to the social and cultural codes specific to each environment. In turn, the legal and juridical frameworks interact with specific programmes, policies and instruments that can preferably be oriented towards correcting market failures such as information asymmetries or uncertainty typical of the early stages of a venture; to the prevention or mitigation of externalities such as environmental impacts; to diverse coordination problems, or to the reduction of technological, infrastructure or gender gaps, among other problems, whose resolution or mitigation can contribute to the increase in the productivity of companies, either individually or collectively.

The diverse institutional spectrum, with potential impact on the productivity of companies, allows the configuration of very diverse institutional arrangements, specific to each sectoral and/or territorial context, which in turn highlights the difficulty of establishing diagnoses or general recommendations for the region. Although a detailed and in-depth analysis of this dimension is beyond the scope of this report, an initial general categorization of relevant and necessary institutions and policies for productive development and productivity allows us to distinguish the following areas of action:

► **Regulatory scope:** include includes the legal-legislative, tax, territorial, consumer protection, mediation and dispute resolution, relevant to all economic activity. Institutional attributes such as the rule of law, the suitability and qualification of its representatives, independence and transparency, as well as the consistency of its action over time stand out as relevant elements in this area to favour productive development (Cornick, Stein and Fernández-Arias 2014).

At high level are the regulations governing the creation, through formalization, and the formal closure of companies, through bankruptcy procedures. Regarding the formalization of companies, regulatory barriers to entry have a significant impact on the willingness of informal enterprises to remain so. However, measures that reduce the time and costs of formalization impact the evolution of productivity in the informal sector, as well as the provision of information to carry out the necessary procedures (Figal Garone et al. 2020). This undoubtedly composes the challenge considering the significant proportion of informal enterprises in LAC countries.

As for bankruptcy or closure of companies, the institutional design faces the challenge of properly balancing the tripartite compensation of creditors, workers and government through efficient and fair recovery rates and insolvency resolution processes, but it is also expected that procedures and associated measures will not discourage the propensity to undertake and promote an adequate and responsible evaluation of risk in undertakings. Pursuing these objectives, a reform was carried out in Brazil in 2005 (CAF 2018).

► **Labour:** includes the so-called labour institutions, as well as those of the national training systems, training for work and qualifications (labour skills). A first point of interest in labour institutions is the minimum wage as a reference indicator. Although the incidence of the minimum wage on productivity is rather controversial, positive effects are recognized that could derive from the Stiglitz-Shapiro effect, related to efficiency wages that are above the market equilibrium price. In addition, in countries with little or limited development of collective bargaining, the minimum wage plays a relevant role in ensuring decent working conditions, as promoted by ILO⁴⁹ standards C 26 and C 13149. From a comprehensive perspective of labour relations, the evidence shows that, to the extent that collective

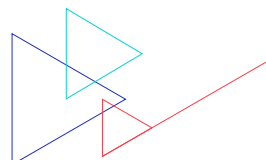
⁴⁹ Collective bargaining is low or limited in most countries in the region, with the exception of Argentina, Brazil and Uruguay.

bargaining is an important redistributive factor of profits and favourable working conditions, it can also contribute indirectly to boosting intra-firm productivity. Of no less importance is the impact of labour institutions in promoting respect for labour rights and social dialogue, understanding that they are factors that contribute to an adequate work environment, as a necessary condition for improving productivity. From a more comprehensive perspective of labour relations, the evidence shows a low direct incidence between unionization and productivity (Figal Garone et al. 2020). However, to the extent that collective bargaining constitutes an important redistributive factor of profits and favourable working conditions, it is possible that it constitutes an indirect source of boosting intra-firm productivity, through the pressure it exerts on loyalty strategies and motivational charts of the organization, among other aspects. By far the most influential components of labour institutions and their boost on productivity are those linked to skill building, job training and the national qualifications system. Likewise, the role of labour institutions in building and energising spaces for tripartite social dialogue, which, as has already been pointed out in previous sections, is a fundamental piece of any productivity ecosystem.

- **Scope of enabling infrastructure:** includes the set of public and private institutions and companies that provide the basic and/or specific infrastructure necessary for the operation of companies: physical and transport infrastructure, digital connectivity, metrology, basic analytical services (laboratories), among others. To the extent that an economy advances in terms of the complexity and sophistication of its productive fabric, the requirements in terms of the level and quality of the enabling infrastructure are greater. For this reason, this institutional sphere acquires greater relevance and visibility in economic revitalization strategies based on attracting investment and localizing companies with certain technological profiles or productive specialization of goods or services (Guimón et al. 2017).
- **Scope of productive development, technology transfer and innovation promotion:** includes a wide range of functions and policy instruments such as provision or access to financial and non-financial services: technical assistance, support for the development of suppliers, promotion of business associations and networks; business mentoring services; entrepreneurial development; and incentives for public purchase. In general, they focus on SMEs and micro-enterprises, and may identify other foci of attention, such as gender criteria, territorial integration or overcoming poverty.

In terms of technology transfer and promotion of innovation, these institutions are usually primarily aimed at counteracting the effects of market failures that hinder access to financing by companies or enterprises that seek to develop innovations, under the premise of generating benefits for the society that transcend those that can be appropriated by innovative companies. They can also be aimed at generating learning among local firms, mainly SMEs, micro-enterprises and self-employed workers through technology transfer or extension models, seeking to positively impact their productivity and sustainability and, in the medium term, stimulate capacities to modify their innovation-related behaviours (Rivas 2014)

The relevant meso-economic environment for productive development is defined, on the one hand, by the capabilities and institutional supply in the areas indicated and, on the other, by the so-called predominant governance models. Rogers (2020) argues that governance refers to the effective authority for a field of activity, so its scope is much broader than that of "government" since, unlike the latter, it refers to the interaction of multiple entities, of a diverse nature and without a single hierarchical relationship between them. The international literature recognizes that these models are complex and evolve over time, depending on the requirements and demands of the socio-productive system itself on which to influence and depending on changes in the local and external environment, in order to improve its adaptability and functionality to the trends, challenges and opportunities that such changes entail.





6. Impact of digital transformation and technological change on post-pandemic productivity performance and projections in LAC

A rapid transformation of economic and social life in recent years has gone hand in hand with a massive diffusion of digital technologies, evidenced in the proliferation of electronic devices and systems that generate, store or process data. According to the United Nations Technology and Innovation Report, the global market size associated with the top twelve “frontier technologies” is estimated to grow from US\$350 billion in 2018 to US\$3.2 trillion in 2025 (UNCTAD 2021).⁵⁰

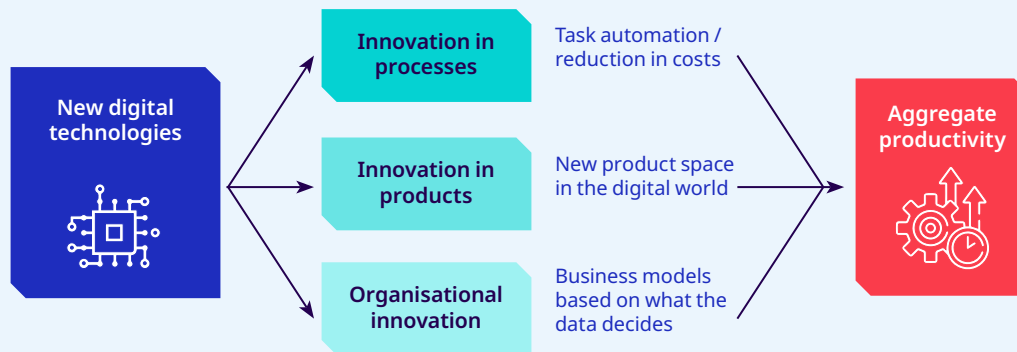
Digital technologies activate various changes in production processes. A first channel of change corresponds to “automation”, which gives the possibility of doing the same as before, but at lower costs. A second channel is the creation of new products and services from the “datafication” of practically everything, from entertainment platforms to collaboration applications. Knowledge-based services are a good example of this type of innovation. Lastly, a third channel activated by new technologies is that of organizational innovation, by linking decision-making processes to patterns that emerge from the data, as opposed to the organizational models of the past, which were based on hierarchical levels of decision.

A first group of effects of these technological changes is at the level of productivity, as illustrated in Figure 4, and also on the ways of organizing production and trade in the different value chains. A second group points to the labour area, including qualifications, forms of hiring and working arrangements (for example, telecommuting).

As a whole, these impacts imply the need for adaptations, both by companies and workers. That is why, in much of the world, initiatives are emerging to facilitate the digital transition through, for example, reforms in education and training of the workforce, as well as assistance and financing for companies.

⁵⁰ Based on a detailed projection for twelve leading frontier technologies: artificial intelligence, internet of things (IoT), big data, blockchain, 5G, additive manufacturing (3D), robotics, drones, gene editing, nanotechnology and solar photovoltaic generation.

► **Figure 4. Channels connecting technological change to increased productivity**



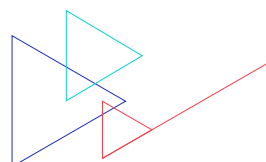
Source: López, Albreu y Ballesty, 2021.

No dominant technology accounts for these changes; rather, as The National Academies of Sciences, Engineering and Medicine (NASEM) highlights in a recent report, it is a confluence of mutually reinforcing new technologies creating a scenario of digital transformation. The datafication of tasks and processes, and its application to decision-making using digital technologies, is completely redefining the spaces of processes and products, as well as the requirements for skills and competencies. The phenomenon is not yet fully reflected in the statistics, even those of the countries that are leading the change, but the differential impact in terms of productivity of the companies that are readapting their tasks and incorporating new technologies is significant.

The challenge of the digital transition finds Latin America and the Caribbean (LAC) at a disadvantage firstly, because of the progressive decline of productivity vis-à-vis other emerging regions and the developed world in recent decades (see section 4); and, secondly, because the productivity gaps by type and size of company, examined in section 5, tend to be more pronounced than in other regions due to LAC's low capacity for technological absorption and the relatively low level of qualification of the labour force in most of the smaller companies, together with the high level of informality prevailing across the region (ILO 2021).

The COVID-19 pandemic generated differential impacts across sectors and, therefore, between countries with different productive structures. Some examples of the most vulnerable sectors due to their high physical proximity and low compatibility with teleworking are domestic services, construction, and commerce. According to a World Bank survey involving 60 countries (12 of which are Latin American) the hotel, education, gastronomy and transportation services sectors were hardest hit in terms of activity and job losses (World Bank 2021).

Nevertheless, the COVID-19 crisis significantly boosted digital transformation. The data shows the strong acceleration of digitalization and the use of certain technologies. A global study by the World Bank from October 2020 reveals that 35 per cent of firms increased their use of platforms and 20 per cent invested in digital technologies, in both cases as a response to the pandemic. Basco and Lavena (IDB-INTAL 2021) in a more recent study on a sample of 500



companies from Argentina, Brazil, Chile, Colombia, and Mexico, found that the use of different advanced digital technologies doubled due to the pandemic. CAF (2020b) and OECD (2020) report teleworking, teleconferences and internet traffic increased exponentially, in addition to a greater use of digital platforms and e-commerce to facilitate commercial and financial activities.

The reports also focus on a differential effect by company size: the largest firms led the process whereas, for many small and medium-sized companies, the need to digitize made visible the obstacles and restrictions they face when it comes to digital transformation; thus, there was a tendency for pre-existing gaps to deepen.

Such multiple and profound technological changes highlight that probably the most significant weakness of LAC countries, comparatively, is the struggle to close gaps between countries, productive sectors, sizes and types of companies that, even if they progress along this path, do so at different speeds. To understand to what extent digital transformation is taking place in the region and what its main implications and projections are in terms of transition and evolution scenarios, the progress and dynamics of the digital transition in five representative sectors of the regional economy are examined below: primary-export agricultural and mining-energy sectors; manufacturing industry; conventional services and knowledge-based services.

6.1. Primary sectors / exporters

i. Digital transition in the agro-productive sector

The agricultural sector continues to be significant for many regional economies. The weight of agriculture in the regional GDP is close to 6 per cent, but in some nations, such as Paraguay, Guatemala, Honduras, and Bolivia, it exceeds 10 per cent.⁵¹ The influence of the sector is even greater if we consider export data. According to information provided by UNCTAD, the weight of agricultural goods⁵² in total LAC exports is around 20 per cent, but in several nations, it far exceeds that level, including, for example, Argentina, Brazil, Guatemala, Honduras, Paraguay and Uruguay. In turn, the region is a major global player in international markets, such as the Mercosur countries, in soybeans, beef and corn. Argentina also ranks sixth in the list of wheat exporters (FAO data for 2019).

Agriculture also has significant weight in employment. Although it has declined in recent decades, agriculture currently accounts for 14.2 per cent of jobs in LAC (SIALC/ILO data for 2020). In countries such as Paraguay, Peru, Nicaragua, Honduras, Ecuador and Bolivia, this *figure* exceeds 20 per cent, reflecting productive structures with a strong weight of micro-producers and family farming.

The agricultural sector, traditionally considered to be of low technological dynamism, has in recent decades undergone an intense process of incorporating new technologies. In addition to those derived from biotechnology (for example, genetically modified seeds), the case of precision agriculture, defined by the USDA⁵³ as an agronomic management strategy that uses large databases of farming sites to manage and optimize precise and economical inputs and production techniques, stands out. The incorporation of a set of complementary technological and digital tools allows to improve productive yields, while also reducing the need for productive inputs, thus saving costs, gaining operational flexibility and generating lower environmental impacts (Lachman and López 2018).

⁵¹ World Bank data.

⁵² Including derivatives: categories 0, 22 and 4 of the Standard International Trade Classification.

⁵³ United States Department of Agriculture

However, the application of digital technologies to the agricultural value chain goes beyond the field production stage. The concept of “agtech” refers to a set of knowledge-intensive services, generally provided through digital technologies, which are applied to the various stages of the chain, including the phases of industrialization, logistics, financing and marketing (Lachman et al. 2021).

In general terms, three groups of technology providers associated with these new techno-productive paradigms can be distinguished (see Lachman and López 2018). The first is oriented towards robotics and cyber-physical systems: it develops equipment that is implemented in agricultural machinery. Such equipment includes, for example, satellite flaggers, yield monitors, planting monitors, autopilots, automatic cut-offs, spray metering, and variable metering for seeding and fertilization.

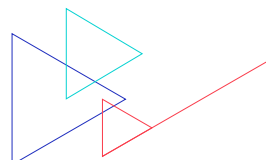
A second group is made up of companies that generally base their services on a process that exploits large amounts of data captured through aerial and satellite imaging, and data from sensors and/or weather stations, which are processed using computational algorithms (data analytics). The main applications of these services are production “by environment”, crop monitoring, and operational controls. In the case of production by environment, we are talking about services that allow production practices to be adapted to each “micro-environment” defined, in the case of agriculture, by certain environmental conditions, soil characteristics, geographic and climatic features that affect yields. The monitoring and operational controls correspond to sensorized systems with the support of drones and satellite images that allow the systematic monitoring of the evolution of production, contributing, for example, to the early detection of weeds, pests or diseases, as well as identifying or even forecasting the evolution of yields (Lachman and López 2018).

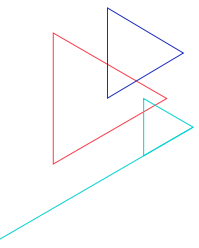
Finally, the third group of companies offers various services for the downstream links in the agricultural value chains. Table 3 summarizes the main applications of the services provided by the abovementioned companies of groups 2 and 3.

► **Table 3. Main uses and applications of agtech**

Micro-environment and segmentation	Crop and/or livestock monitoring	Control of tasks and production processes	Other applications in the chain
Variable planting density	Monitoring of agricultural yields	Control of field tasks (sowing, fertilization and so on)	Logistics
Variable fertilization	Monitoring of conversion rate in cattle (weight gained/ kg of feed consumed)		Traceability
Selective herbicide application	Early detection of pests and/or resistant weeds	Prescribed task tracking	Smart contracts
Segmented animal feeding plans	Early cattle disease detection	Control of "good practices"	Crowdfunding

Source: Lachman and López (2018).





Despite the limited availability of statistics for a reliable comparison of adoption rates of precision agriculture practices across countries, available data allows us to describe the initial scenario on the subject. Nowak (2021) reviews the available evidence on the spread of precision agriculture in developed countries, concluding that in 2016 between 70 and 80 per cent of farmers in those countries used yield monitoring guidance systems, and around 60 per cent used automatic section controls, 33 per cent had adopted soil mapping and variable fertilizer dosing technologies, and only 20 per cent of them also included variable seed dosing. Adoption rates were higher in Canada and the US than in the European countries included in the study.

For a comparative perspective, the 2018 National Agricultural Census of Argentina asked producers about the adoption of some precision agriculture practices. Only 4 per cent of respondents answered affirmatively. However, the figures are somewhat higher in the provinces where cereal and oilseed agriculture are more extensive such as Córdoba and Santa Fe (13 per cent) and Buenos Aires (7 per cent). Although the data is not strictly comparable due to the diverse methodologies used, the contrast between Argentina and the US is eloquent in terms of the level of adoption of agtech technologies. Information from ECLAC (2021) points in the same direction, and suggests that in the cases of Brazil and Colombia the levels of adoption are even lower than in Argentina, even though its adoption has been growing steadily in recent years in both countries (Villarroel et al. 2020). Nowak (2021) summarizes some arguments that explain the still low rate of adoption of some agtech technologies.

On the one hand, the size of farms can be a limiting factor, since these technologies are more useful in larger fields (where there is greater variability between micro-environments), while larger producers are more likely to invest in their acquisition. Other studies add that in general, small-scale agriculture is much more crops diversified, while many precision agriculture technologies are focused on the most important commercial crops that predominate on larger farms. On the other, the author distinguishes between technologies where knowledge is incorporated into the equipment and those that are “information intensive”, which require greater involvement by producers and greater investment in complementary generation tools and data processing.

Other studies, meanwhile, identify various characteristics of producers and plots that may influence their decision to adopt precision agriculture technologies, including age, years of education and farming experience, level of production specialization, use of computers, support from agronomic consultants and the level of indebtedness, among others (Lowenberg-DeBoer and Erickson 2019). Expectations on the returns of adopting new technologies also exert an influence, given their acquisition and implementation costs (Fusco et al. 2020). In developing countries, however, some factors such as cheap land and labour can hinder the spread of precision agriculture.

Given the importance of the agricultural sector in most of the region's economies, it should not come as a surprise that a significant number of companies provide precision agriculture equipment and services. A study by Vitón et al. (2019) found more than 450 ventures of this type, of which 51 per cent came from Brazil, followed by Argentina (23 per cent), and then Chile, Colombia and Uruguay. The greater weight of Argentina and Brazil is linked both to the size of both economies and their respective agricultural sectors, as well as to the vitality of their entrepreneurial support ecosystems (accelerators, incubators, venture capital funds) and the strength of their public institutions' support for agriculture's technological development (see Bisang et al. 2021, forthcoming; and OECD 2020). The adoption of agtech technologies implies a change in the demand for skills in the agricultural sector in the countries of the region, tending in the future to generate strong increases in productivity in highly technological agro-productive areas, as well as in related agro-export services, which shorten the gap with respect to other sectors, which would paradoxically tend to deepen the intra-sectoral gap, especially with respect to the segments of most vulnerable and smaller producers.

An interesting work to refer to, due to its model of agtech technology transfer to medium and small farming segments, is that carried out by the NGO Precision Development (PxD), whose management model is based on the delivery of personalized digital information and services that increase agricultural productivity and sustainability. They operate primarily with small farmers by sending information to their mobile phones (SMS or multimedia) adjusted to their requirements and related to crop optimization, pesticide management, use of inputs, weather reports and so on. The programme has among its founders Michael Kremer (Nobel Prize in Economics in 2019) and although it concentrates a large part of its activities in African and Asian countries, in 2020 a first foray was made in LAC, specifically in Colombia.⁵⁴

ii. Adoption of digital technologies in mining

Gradually but steadily, mining is transforming globally to meet rising demand from growing emerging economies and metallic minerals intensive sectors, such as renewables and technological devices. Latin America and the Caribbean is a privileged region to meet these needs. It has close to 70 per cent of the world's lithium reserves, 35 per cent of copper and silver, and 20 per cent of conventional oil reserves. In addition, it has considerable reserves of unconventional oil and gas, and significant deposits of a variety of minerals essential for productive activities (Sánchez 2018).

The sector is relevant to many economies in the region. It represents 4 per cent of the added value of Latin America and 6.5 per cent of the Caribbean, but with great differences between countries: it accounts for more than 10 per cent of activity in Guyana (15 per cent), Trinidad and Tobago (13 per cent), Bolivia (12 per cent), Chile (10 per cent), and Peru (10 per cent) and has a share of between 4 per cent and 7 per cent in Suriname, Colombia, Ecuador, Mexico and Argentina.⁵⁵ In countries such as Peru and Chile, foreign direct investment in metallic mining accounted for between 30 per cent and 40 per cent of investments in 2017. Moreover, mining creates 23 per cent of Latin American exports (CEPAL 2020c) and a significant proportion of taxes accruing to national and local governments.

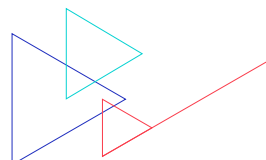
As a supplier for much of what is built and manufactured in modern economies, the mining industry plays a crucial role in global growth. At the same time, it must seek innovative solutions to remain as a change driver, such as tackling falling productivity in the face of a general decline in ore grades, developing more remote and complex deposits, volatility in the prices of inputs and goods, and the mandate to minimize its environmental footprint and assure guarantee occupational health and safety.

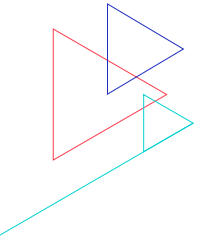
In this framework, the trends towards digitalization and technological change offer solutions to revitalize sector productivity where there is still room for improvement, and also to help it move towards an activity that will be more socially and environmentally beneficial. The following are some examples that represent the potential impact of digitalization and AI throughout the different stages of the activity, and that configure the vision of the so-called "intelligent mining".

- a. Smart prospecting:** based on data analytics and predictive models to facilitate the discovery of complex deposits, with high levels of reliability and savings in exploration costs.
- b. Teleoperation and autonomous mining:** to enhance process efficiency and minimize the risk of accidents at work, the use of remote teleoperated autonomous advanced

⁵⁴ www.precisiondev.org

⁵⁵ According to the average of the CEPALSTAT platform between 2017 and 2019.





machinery is spreading, with the support of sensors, cameras, location instruments and specific software.

c. Processing of minerals: separating and classifying valuable minerals and metals from the rest of the materials extracted from mines costs time and effort. Equipment capable of performing automated tasks has been developed based on solutions comparable to smart prospecting systems.

d. Digital twins: these are operation optimization models based on virtual replicas of physical systems. In mining, they allow for modelling of the behaviour of machinery and equipment based on their performance data transmitted by sensors and, thus, optimize variables of interest such as production levels, scheduled maintenance, energy consumption and so on, or operational suitability under different conditions.

e. e) Personal protective equipment: Personal protective equipment (PPE; such as clothes, hardhats and other protective accessories) has always been essential to protect mine and quarry workers. As the exploration and exploitation of more remote deposits and at greater depths expands, and with the use of more complex machinery, PPE becomes even more important. In this framework, technology-enhanced equipment is being produced with sensors, high-definition cameras, and virtual and augmented reality, in order to locate personnel, monitor their vital signs, and detect the presence of adverse conditions in mines. The devices, in turn, generate a variety of relevant data and metrics for adapting training programmes to the needs of each worker.

The adoption of these solutions, however, is not yet widespread in mining activity across the region. Digitalization of the sector is “low” in the three Latin American countries surveyed by the McKinsey Global Institute, that is, Colombia, Brazil and Argentina. Only the traditional services and education sectors are considered to have similarly low digitalization in the same three countries (ECLAC 2021).

The IDB-INTAL Survey on Technology Adoption, Employment and International Trade (Basco et al. 2020),⁵⁶ which includes companies from Argentina, Brazil, Chile, Colombia and Mexico, reveals that, on a sample of 160 surveyed mining companies, barely 12 per cent reported investments in R+D+I,⁵⁷ a percentage that drops to 9 per cent for companies with under 50 employees, rises to 18 per cent for companies with between 50 and 200, and is 26 per cent for those with employ more than 200 workers.

The survey shows that in mining, the main technologies are digital platforms and mobile services, cloud computing, Big Data, and integration systems. Big Data is a necessary condition to advance with solutions based on artificial intelligence, such as predictive systems and digital twins, which are at a less advanced stage of adoption.

When asked about the lack of personnel with specific skills,⁵⁸ a third of the companies consulted identify workers with STEM (science, technology, engineering and mathematics) skills as the main hindrance. The percentage falls to 20 per cent for mining companies with under 50 employees, reflecting small firms have lower demand for this talent. When asked

⁵⁶ We use the microdata from the 2019 edition of the survey. This sample includes 1,159 companies from the mining sector (14 per cent of the total surveyed), computer and communications services, professional and consulting services, and several groups from the manufacturing industry.

⁵⁷ R+D+I: Research, development and innovation.

⁵⁸ Including resource management; technical operation, equipment maintenance and repair, programming, creativity cognitive skills, problem reasoning and understanding; social skills of emotional intelligence, negotiation and guidance; ability to understand content, technological literacy and communication; ability to intervene in processes, monitoring and self-organization, entrepreneurship and leadership; semantic capabilities of systems analysis and decision making; and abilities to solve complex problems.

about the conditioning factors to meet companies' demand for skills, 33 per cent pointed to the low quality of the education system as very important, and 27 per cent mentioned the scarcity of workers skilled in new technologies.

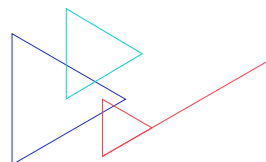
A substantial part of the added value of the mining activity is expressed through its productive chains, in particular between its suppliers and lateral or "knowledge" ones. Already in the last decades of the 20th century, large mining companies began to relocate tasks along the value chains, creating new opportunities for suppliers of associated goods and services. Developed countries with a strong participation of extractive industries such as Canada, Australia or Norway managed to consolidate technology clusters and knowledge-intensive services for mining. Many of them became important sources of exports and employment, but also of innovation and productive diversification. The integration of this type of knowledge-based goods and services is considered a crucial factor in successful natural resource-based development experiences (López 2017).

A good example of this is the implementation of a digital twin in the Los Bronces Chilean mine that in 2020 as part of a strategy of innovation and facilitation of mine operations in the face of the pandemic (Minería Chilena 2020). The supporting software was developed by Chilean startup TIMining, which has been producing specialized solutions for the mining industry since 2016. TIMining has 75 employees, is present in more than 30 mining operations in eight countries, and its CEO plans to expand to more than 100 deposits on all continents between 2021 and 2024 (Startups Chilenas 2021).

It is essential to identify mechanisms to accelerate the region's transition towards models of natural resource production based on science and development (Castillo et al. 2018). In this context, the potential of the sector for the incorporation of 4.0 technology was accompanied in many cases by clear policies to promote a chain of highly qualified service providers. For example, in Brazil, Petrobras managed the Mobilization Programme for the National Oil Industry (PRONIMP) for more than a decade with the goal of increasing the national content of the goods and services consumed to 65 per cent. It set up training, advice and links with science and technology networks to promote suppliers' technological development and competitiveness (López 2017).

In Chile, the Production Development Corporation (CORFO) and a group of government agencies, companies and business groups prepared a technological road map to 2035 under the National Mining Programme Law of 2015. This public-private partnership has as one of its main objectives the development of knowledge-intensive local providers. Thus, in 2017 the implementation of the Expanded Platform project began, of open innovation in mining, aimed developing providers of technological solutions to tackle priority sector challenges (Castillo et al. 2018).

Although the expansion of this type of supplier cluster has not yet reached the dimensions that can be seen in countries like Australia or Canada, they encompass strategies to foster technological change and generate quality jobs in a typically capital-intensive sector, while helping to diversify and sophisticate the export basket of the mining-energy exporting countries.



► **Box 3. The development of a cluster of knowledge-intensive service providers for the oil-gas sector in Trinidad and Tobago⁵⁹**

By the middle of the last decade, Trinidad and Tobago's energy services sector employed one-third of all oil and gas sector workers in the country. A significant part of the sector is made up of companies that provide knowledge-intensive services, of which there was a group of between 20 and 30 that operated and exported regionally to Latin America and the Caribbean and even occasionally to other regions.

Among the companies in the sector, the cases of Trinidad Offshore Fabricators (TOFCO), dedicated to the design and construction of offshore oil platforms, and Oil Mop Environmental Services and Kaizen International (environmental management and waste treatment services) are remarkable. Firms providing knowledge-intensive services for oil and gas in Trinidad and Tobago have generally introduced innovative products and services, and while most of these innovations have come from external knowledge sources and from imported and licensed technology, there are also cases of companies that have their own R&D departments or groups.

The emergence and expansion of these firms was partly supported by the existence of local science and technology institutions, as well as the training of qualified personnel. However, there are not enough incentives to stimulate the demand for innovations and create the necessary links and interactions to allow the exchange of knowledge and the generation of spillovers. In addition, although the government and the private sector have expanded education and training opportunities, there is no close alignment between training institutions and companies, to ensure that the workforce has the specific knowledge or know-how and the skills required by industry. In turn, Trinidad and Tobago's local content policy for the oil and gas industry lacks the necessary legal provisions to ensure compliance and the necessary resources to monitor its implementation and measurement against targets. There is also a lack of funding and support for R&D and other innovation activities. This poses a series of challenges for the public policy agenda in the country, to help ongoing continued growth and sophistication of the knowledge-intensive services sector for the energy industry.

6.2. Manufacturing industry

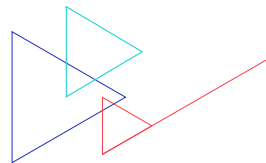
The set of new technologies applied to industrial sectors is known as advanced manufacturing, intelligent manufacturing, or industry 4.0. Table 4 presents the four technological generations that are expressed in the different functional areas of industrial companies, largely determining their performance and productivity trajectory.

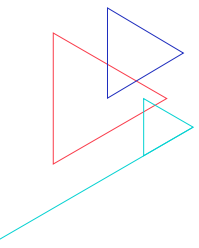
⁵⁹ Based on Mohan et al (2016).

► **Table 4. Technologies by technology generation and functional area**

	Relationship with suppliers	Product development	Production process management	Relationship with clients	Business management
Generation 1	Manual transmission of orders	Computer aided project system	Simple (rigid) automation with unconnected machines	Manual execution of records and contracts	Department-specific independent information systems
Generation 2	Electronic order transmission system	Integrated software-assisted design, manufacturing and engineering calculation system	Partially or fully automated procedure	Sales automation	Systems composed of integrated modules and database
Generation 3	IT support for purchasing, stock and payment processes	Integrated product data management systems	Integrated process execution systems	Integrated system for multiple channels and internet-based support	Web platform with databases to support business analysis
Generation 4	Real-time tracking of orders and supplier logistics	Development virtual systems	M2M (machine to machine) communication or other intelligent production systems	Customer lifecycle monitoring and management	Automated business processes supported by artificial intelligence

Source: CNI (2018)





Recent IDB-INTAL studies characterize three economies that have relatively dynamic industrial structures: Argentina, Brazil and Uruguay. Following the CNI (2018 methodology), the studies design the following scenarios or technological stages to capture the different degrees of integration, connection and intelligence used by industrial companies. Results show that in the three countries the diffusion of the fourth generation, also called Industry 4.0, is much less advanced than in developed economies. While in the United States or Germany it reaches 10-15 per cent of manufacturing companies, the average use of fourth generation technologies in functional areas is 2 per cent in Argentina, 1.6 per cent in Brazil and 1.2 per cent in Uruguay, pointing to a still incipient penetration of Industry 4.0 in these three countries.

The characterization changes when third generation technologies are included in the analysis. In this case, Brazilian industry is technologically more advanced. The proportion of firms that today use more advanced technologies — third and fourth generation lumped together — is appreciably higher in Brazil in all functional areas, particularly in outbound ones; that is, in their relationships with customers and suppliers. Meanwhile, in almost all the areas considered, Uruguay lags behind its neighbours.

Finally, the companies in the three countries express an expectation of a reversal of technological backwardness during the next decade; the percentage of companies that expect to use third and fourth generation technologies in 10 years is more than double in all functional areas for Argentina as well as for Brazil and Uruguay. However, very few firms are taking concrete actions to bridge the existing technological lag. Only one or two out of 10 firms are actively working on their digital transformation, and again, the percentage of companies that are taking corrective actions is three times higher in Brazil than in Argentina and Uruguay, when considering functional area averages.

The high heterogeneity by type of company does not come as a surprise. Most of the lagging manufacturing companies are micro and small companies (85 per cent in Argentina, for example), which operate in low-productivity sectors and invest very little in particular in activities where they could adopt more advanced technologies. When asked about the obstacles they face for their digital transformation, in addition to financing and the difficulty in finding human resources, they report internal constraints, such as ignorance of new technologies or even the corporate culture.

This highlights the issue of skills. In advanced manufacturing sectors globally, retraining workers' skills through technical and professional training schemes has been a fundamental tool to ensure digital transformation. Reskilling ranges from basic skills to perform routine tasks, digital literacy, soft skills training and foundational knowledge. However, the evidence for the region points to a severe underinvestment in skills retraining, due, on the one hand, to gaps in the supply of available training and, on the other, to demand factors, since on average, first and second generation companies tend to stick to routine skills with a low relative proportion of investment in worker training.

The analysis of the use of 4.0 technologies in the region's industry delivers five important messages. The first is that the diffusion of advanced technologies is still marginal. In no functional area does the percentage of firms using this type of technology exceed 4 per cent, while in countries like the United States that ratio reaches 15 per cent. The second is that there is a large majority of firms using lagging technologies: 86 per cent in Argentina, 82 per cent in Uruguay, and 78 per cent in Brazil still use first and second generation technologies. The third is that, although companies perceive that they are going to transform their processes, proportionally few are currently taking corrective actions to catch up: less than 15 per cent of firms in Brazil and 5 per cent in Argentina and Uruguay. The fourth is that Brazil is comparatively better positioned to reverse the technological lag than countries like Argentina and Uruguay. The fifth, that the evidence of this first stage of adoption of 4.0 technologies

points to the widening of gaps within the industry: the companies that lead the change are large, dynamic and export-oriented.

6.3. Service sector

i. Traditional services: the case of trade transformation

Traditional services are usually associated with lower productivity. However, digitalization is opening up opportunities for profound transformation for some of them. Traditional sectors such as commerce, financial services and passenger transport now have their digital-based counterparts in e-commerce, fintech⁶⁰ and localized digital platforms such as Uber and Cabify, respectively.

In 2018, there were almost 1,200 fintech startups in the region. The three segments with the highest number of startups were payments and remittances, loans, and business finance management (IDB, BINVEST, and Finnovista 2018). Meanwhile, a more recent report shows a strong growth in financing for these startups in LAC in 2020, with almost US\$ 3 billion compared to US\$ 2 billion in 2019 (Latam Fintech Hub 2021).

The development of the fintech sector in Latin America and the Caribbean can play a key role in improving financial access and inclusion, taking advantage of the high penetration of smart mobile devices. A significant part of the population and of the companies that are underserved and/or excluded from the formal financial system,⁶¹ either because they operate in informal conditions, or because the limitations or inefficiencies found in traditional financial actors translate into high access costs and high interest rates. Fintech services can favour the banking of micro and small businesses, as well as the self-employed through more efficient and less expensive financing solutions. In this way, they can also contribute to reducing internal productivity gaps through greater financial inclusion for this broad segment of companies and entrepreneurs.

As in much of the world, trade is one of the sectors with the greatest weight in Latin America and the Caribbean: it represents 30 per cent of employment and 17 per cent of value added in the region⁶². Although it is characterized by low productivity, in recent years it has been radically transformed by the emergence of electronic commerce (e-commerce). A growing number of companies from different sectors of activity offer the possibility of buying their products through the web, and specialized platforms have simultaneously emerged (electronic online markets or marketplaces), of a general scope or specialized in a particular sector, that allow buyers and sellers to connect.

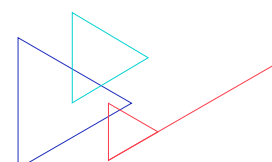
These platforms, significantly Amazon, eBay and AliExpress, among others, have contributed to democratize access of small and medium-sized producers to broader markets, including foreign ones, as they increase their visibility, also allows them to access data analysis services, based on the information generated from their own operations on the respective platforms, as well as their competitors', and thus improve marketing strategies, learn more about their target customers and predict consumption patterns.

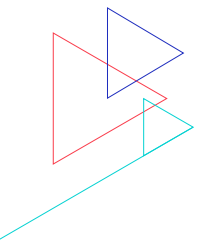
E-commerce has grown remarkably in recent years. In the European Union, for example, the percentage of firms that sell online went from 17 per cent to more than 20 per cent between

⁶⁰ The fintech industry denomination brings together a segment of enterprises oriented to financial intermediation, deploying all their operations through the Internet (deposits, transfers, credit granting, etc.). These companies make maximum use of digital tools and automate not only transactions with customers, but also all their internal processes (Hayward and Pollari 2015).

⁶¹ An estimated 45 per cent of adults in the region are still excluded from formal financial services (World Bank, 2017, cited in IDB, BINVEST and Finnovista, 2018).

⁶² CEPALSTAT platform.





2013 and 2019, while online sales by companies with more than 10 people rose from 14 per cent to 18.5 per cent of their total turnover, with 8 per cent of them making online sales to other countries (European Commission 2020). Latin America appears relatively behind in this matter. According to the report by Telecom Advisory Services (2020), households' adoption rate of electronic commerce is half that of OECD countries. Once again intra-regional heterogeneity is confirmed: while 14 per cent of individuals over 15 years of age in the top 60 per cent of income distribution use the Internet to make purchases, only 5 per cent buy online in the 40-year-old bracket. In the OECD the respective figures are 67 and 52 per cent, and in Asia and the Pacific 48 and 23 per cent (Grosman 2020). In turn, the use of digital sales channels by companies drops to 10 per cent or less in Chile, Ecuador, Mexico and Peru, while only in Colombia and Uruguay do adoption figures exceed 30 per cent (Telecom Advisory Services 2020).

However, the region has been at the origin of e-commerce companies that have managed to successfully expand across borders. The most notable case is that of the Argentine Mercado Libre, which has a presence in almost all Latin America. Other examples are OrdenesYa (Uruguay) and Rappi (Colombia). Meanwhile, although focused on its own internal market, the case of the Brazilian B2W Digital also stands out for its size.

E-commerce was already on an upward trend when the COVID-19 pandemic added momentum. Consumers, producers and merchants found in this modality a relatively accessible solution to carry out transactions and sustain operations that, otherwise, would have been impeded by the restrictions to access traditional commercial channels. During the first half of 2020, regional internet traffic on e-commerce sites grew 157 per cent (Díaz de Astarloa 2021). According to Visa, 20 per cent of its clients made their first online transaction in the first quarter of 2020. The digital payment service provider PayU, for its part, saw its number of clients grow by 75 per cent in the first half of 2020 and the aforementioned Mercado Libre doubled its number of sales in Chile, Colombia and Mexico in the second quarter of the same year (UNCTAD 2021a).

Businesses' won e-commerce web pages also grew. ECLAC reports a growth in the number of web pages of 800 per cent in Colombia and Mexico, and 360 per cent in Brazil and Chile, with emphasis on transactional platforms.⁶³ Commercial platform Shopify reported a 300 per cent year-on-year increase in the number of new products offered specifically by Mypimes⁶⁴ for the region (Díaz de Astarloa 2021).

COVID-19 and the associated containment measures that hampered the normal functioning of the economy highlighted the role of electronic commerce as an enabler of activity and as a factor of resilience and, at the same time, as a powerful digital transition vehicle for micro and small enterprises, including the informal sector. Its implementation and development are associated with a series of advanced digital technologies and solutions, with great potential to generate learning and capacity development, in areas such as cybersecurity, navigation architectures, data analytics, algorithms for translation and currency exchange, models simulation, among others.

Many of these processes may go unnoticed by the user companies themselves, but undoubtedly the accelerated adoption of e-commerce triggered new digitalization and learning processes for those who operated in online sales channels for the first time or bet on strengthening their digital strategies. A scenario of opportunities is also configured to develop productive "knowledge" chains, since these are technologies common to other advanced solutions and skills – both digital and non-technological – that can be extended to other possible implementations. This opens a new possibility to reinforce the skills acquired and accelerate digital transformation from and to a highly relevant sector in the region.

⁶³ Annual growth rate, August 2020.

⁶⁴ Annual growth rate, April 2020.

ii. Knowledge-based services (KBS)

As with primary goods, the services sector was traditionally characterized as having low productivity and little innovative dynamism. This panorama has changed remarkably in the last decades. Not only do services generate most of the jobs in developed countries and in much of the developing world, but they have also become one of the main sources of generation and diffusion of innovations and productivity gains in modern economies (Jensen, 2013; Stehrer et al. 2012; Gotsch et al. 2011; Desmarchelier et al. 2013) and GDP.

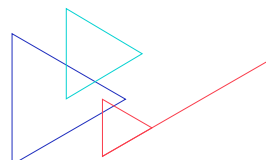
The activities behind these new trends are grouped under the name of knowledge-based services (KBS). The KBS sectors are characterized by: (i) being work-intensive, with a bias towards employing medium-high and highly qualified personnel; (ii) innovation activities based more on intangibles (human capital, use of software and databases, organizational management, brand value) than on the incorporation of machinery; and (iii) entry and exit barriers that are low in most sectors due to relatively low investment requirements in physical capital (Nayyar et al. 2021).

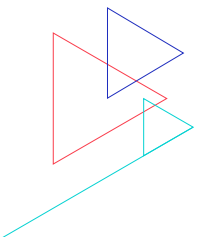
KBS industries include accounting, legal, management, consultancy and advisory services, financial and market intelligence and analysis, architecture, design, audio-visual, animation, engineering, software and IT services, advertising and marketing, research and development (R&D), health and education, among others. Some of these activities consist of the provision of professional services (back and front office, advice, consulting), others are strongly based on scientific or technological knowledge (R&D, engineering, software) and others still on creativity (audio-visuals, design, advertising). While some segments within the world of KBS are horizontal or cross-cutting, others (so-called vertical) are highly specialized and adapt to the requirements of consumer sectors. Finally, in some taxonomies, within the KBS, those that we can call “market” KBS, separate from health and education, for instance).

Activity in these sectors occurs mainly in the area of bits, a space that is not limited by geography. Consequently, it is associated with the expansion of what Baldwin and Forslid (2020) call “telemigration” (hiring freelance workers to provide professional, creative, and other such services to companies in the advanced world), whose impacts on developing countries are not they are obvious. It opens income and learning opportunities for certain types of freelancers and is closely associated to the so-called gig economy and, therefore, with the danger of generating higher levels of informality and precariousness in certain strata of the labour market. Additionally, a scenario in which the offshoring of KBS is carried out via direct relations between companies in the advanced world and workers in emerging countries (instead of company-company relations) will surely make it even more difficult to scale processes in the service sectors’ value chains, given the greater asymmetry of power and information between contracting parties, and the greater difficulty for the learning obtained to be transformed into lasting organizational capacities, beyond the individual workers’ gains in human capital building.

What are the factors behind the growing relevance of KBS? In the first place, the tendency of large companies to focus on their core business, outsourcing activities that were previously carried out in-house. This trend ranges from routine tasks that employ mostly low-qualified personnel, such as catering, security, cleaning or transportation, to more complex ones, such as information technology or various back office processes, and even, although to a lesser extent, design and I +D. This has given rise to the emergence of companies or corporate business units specialized in the provision of various types of KBS, with consequent productivity gains for the economy as a whole and the possibility of developing product and process innovations for an increasingly wider market; in other words, a new twist to the old division of labour (López and Ramos 2014).

Second, at present a substantial part of the added value of an industrial product is generated from KBS (R&D, design, software, branding, marketing and so on). This is the result of the





evolution of the competitive and technological dynamics in the different branches of activity and is part of the so-called “servification” of the economy. This is evident in the growing presence of embedded software in automobiles or different types of machinery, the various services and applications that are included in a smartphone, or the transformation of household appliances since the advent of the “Internet of Things”.

Third, new production and business models intensive in digital services have emerged (agtech, fintech, Industry 4.0, edtech and so on). This trend has not stopped encompassing extractive activities, where processes of “deverticalization” and digitalization of the forms of productive organization have also occurred, resulting in the emergence of a growing number of specialized KBS providers for these industries.

Fourth, firms from the most varied sectors face more and more frequently requirements for certifications and standards in terms of quality, traceability, health, environment and so on, and must therefore adopt systems that guarantee and certify compliance with them. The development, application and certification of these systems are generally carried out by independent specialized providers whose activities also fall under the category of KBS.

Fifth, the explosive development of digital media and communication networks has led to new patterns of entertainment consumption and social interaction mediated by ICTs (for example, streaming services, social networks and so on). Finally, the very “dematerialization” of various objects (in the area of the publishing industry, audio-visuals or music, for example) means that products that were previously made in industrial establishments, such as books, now become intangibles that do not require physical production, but are purely digital.

The weight of the KBS sectors has been growing in various regions, both developed and developing (see, for example, Godlewska-Dzioboń et al. 2019, for the case of the European Union). López (2018) presented a comparison of the relative presence of KBS between Argentina, the US and the European Union with data from 2014. There it was shown that, in the case of employment (only in the KBS market sectors), these sectors absorbed around 14 per cent of total employment in the US and the EU, while the respective number for the Argentine economy was 13 per cent. In the same sense, the KBS were 13 per cent, 17 per cent and 14 per cent respectively of the added value of the economy in the EU, the US and Argentina. This shows that, at least for developing countries where KBS have already established themselves as a relevant industry, the latter’s relative weight does not differ much from that found in advanced nations.

The relevance of KBS has also grown remarkably in trading. Between 2005 and 2019, global exports from these sectors grew 185 per cent (from US\$915 million to US\$2.6 billion). In the same period, total exports of other services rose 105 per cent and those of goods 80 per cent (estimates based on UNCTAD data). “Indirect” exports of KBS have also increased, that is, those incorporated in goods and services sold (Heuser and Mattoo 2017).

This type of services also acquires a growing weight in total private R&D in developed countries (OECD 2015). In 2017, the sector with the highest intensity of R&D over sales in the US was scientific R&D services (25 per cent), followed by software development (15 per cent); in fifth place (after pharmaceuticals and computers and electronics) appears the computer systems design sector and related services (almost 9 per cent). Similar trends are observed among patents.⁶⁵

Studies based on firm-level data in the European Union show that KBS sectors are more likely to train their workers, introduce organizational innovations, and cooperate with external agents (customers, competitors, and universities) than their manufacturing peers. Furthermore, the percentage of innovative firms within these sectors is also higher than in manufacturing, and

⁶⁵ Data from the National Science Foundation.

the same occurs with expenditure on R&D, and the percentage of sales of new or improved products (Gotsch et al. 2011).

Although the above-mentioned data corresponds to developed countries, KBS can also be engines of growth in emerging countries (see Di Meglio et al. 2015; Nayyar et al. 2021). Indeed, KBS have characteristics that were previously thought to be exclusive to the industrial sector, including the possibility of achieving economies of scale (mainly thanks to digital technologies and the use of artificial intelligence), generating and disseminating innovations, and developing upstream and downstream linkages. Thus, as mentioned above, KBS can contribute to increasing economies' productivity.

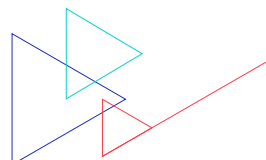
Furthermore, the productivity of some KBS sectors may be higher than in manufacturing; For example, for a sample of 20 emerging countries selected in Nayyar et al. (2021), the total factor productivity (TFP) of the telecommunications, software and computer services sector was 1.5 times higher than in the industrial sector. In the case of professional services, TFP is also higher than in the industrial sector, although the difference is smaller (around 10 per cent). In both sectors the findings are similar for high-income economies. In general, the KBS sectors with the highest levels of productivity are those that sell to other companies rather than to final consumers.

Emerging countries have also been gaining ground in international KBS trade. From 2005 to 2019, its weight in the total global exports of these sectors rose from 17 to 24 per cent, while 45 per cent of KBS exports from emerging countries come from China and India (70 per cent, when adding South Korea, the Philippines, Singapore and Taiwan) and another 16 per cent from Eastern Europe. These estimates are based on data of UNCTAD for 2019.

Latin America and the Caribbean are also players in the worldwide growth of KBS markets. Several countries in the region have attracted investment from large multinationals in the industry in areas such as software and computer services, business process outsourcing (BPO) and audio-visuals. The competitive advantages of Latin America in these sectors stem essentially from its qualified labour force at competitive costs and location in a time zone that favours supplying these services within the same time zones of the US or other Latin American markets. Cultural affinity is also key to supplying these destinations (see López et al. 2014). In several countries there are also special incentive regimes for these activities.

In addition to attracting foreign companies, the region has been home to several successful BPO software and service export firms that have gone global, including Globant (Argentina), TOTVS and Stefanini (Brazil), Sonda (Chile), Neoris (Mexico) or Genexus (Uruguay). Various digital "unicorns" have also emerged, such as Mercado Libre (e-commerce, Argentina), Ualá (fintech, Argentina), Nubank (fintech, Brazil), Kavak (e-commerce, Mexico) or Rappi and Loggi (logistics and distribution, Colombia and Brazil respectively). However, in general, digital companies in Latin America basically operate in their local (this is especially the case in Brazil) and regional markets (Cahen and Miranda de Oliveira 2018).

Despite these success stories, the region has lost relative weight in the KBS markets. Their share of global exports fell from 12 per cent to 8 per cent between 2005 and 2019. Table 5 shows that Latin America and the Caribbean lags behind both in the share of KBS in total service exports and in exports of KBS per inhabitant compared to the aforementioned Asian countries, Eastern Europe and the developed world. However, this hides a mixed landscape. Some small nations, such as Costa Rica and Uruguay, show very good export performances, as do other larger countries such as Argentina, Brazil and Chile. But even in some of these cases, such as Argentina or Chile, for example, the export dynamism of recent years was below the world average.



► Table 5. Exports of knowledge-based services as a percentage of total services exports. US dollars per inhabitant (average 2017–19)

Country	Export share (%)	SBC Exports (US dollars per inhabitant)	Country	Export share (%)	SBC Exports (US dollars per inhabitant)
India	63%	95	Taiwan	32%	668
Philippines	59%	212	Chile	31%	159
Brazil	58%	95	Guatemala	30%	63
Costa Rica	49%	889	LAC	26%	81
Argentina	48%	161	Colombia	20%	37
China	45%	82	El Salvador	12%	53
OECD	45%	1685	Peru	12%	27
Singapore	39%	13545	Bolivia	9%	11
South Korea	38%	705	Ecuador	7%	13
Eastern Europe	36%	318	Panama	6%	206
Uruguay	35%	557	Mexico	0%	1

Source: Albreu, Ballester and López (2021)

Among the factors that hinder further advancement of the region in these markets, the insufficient availability of qualified human capital, the low level of English prevailing in many of the Latin American countries and the deficiencies in the infrastructure and the regulatory environment can be noted. digital. It is these same factors, together with the weakness of the innovation systems, that mean that the region is not generally perceived as an attractive location to develop the most complex tasks in the KBS value chains, although there has been an upgrade in this sense in several countries, both large, such as Argentina or Brazil, and small, such as Costa Rica.

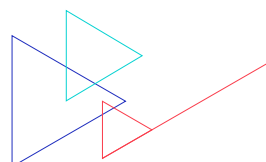
The likely acceleration of trends towards digitalization in the post-pandemic era, together with the also growing “servification” of economic activity, will open new opportunities to export KBS for the countries of the region. Likewise, a greater connection between KBS providers and their domestic environments is expected, as the various productive sectors in Latin American countries follow the path towards the new digital paradigms and increasingly demand services and solutions from those providers.

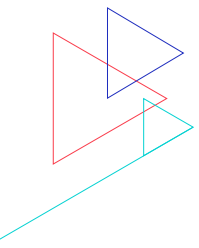
On the other hand, there are two processes that could eventually generate threats to the region’s competitive position in these sectors. On the one hand, the trends towards the automation of tasks, which may erode the advantage that low labour costs imply for attracting offshoring operations in these sectors. For example, the so-called Robotic Process Automation (RPA) consists of the introduction of technologies that allow a software program to execute actions previously developed by humans in digital environments. Some calculations suggest that while the outsourcing of services to countries with lower labour costs generates savings of 20-40 per cent, those derived from RPA could reach up to 70 per cent (Peña Capobianco 2017). In this regard, a survey carried out by Deloitte (2018) of some 400 leading global companies showed that more than half of them had already begun to use this technology, and more than 70 per cent planned to expand its use in the next two years. Likewise, another variant of process automation with an impact on these sectors is the so-called Business Process as a Service (BPaaS), where various business services are provided from the cloud. Automation is also advanced in areas such as customer interaction. However, the automation of processes can also generate new offshoring opportunities, as long as the countries of the region have qualified personnel in areas such as artificial intelligence or machine learning, for example, given that the automation itself requires the development of algorithms with human intervention.

6.4. Challenges and projections for the region

The sectoral dynamics reviewed in this section shed some light on the global productive transition process based on the main trends and opportunities generated by the emergence of new technologies and digital solutions. The available evidence – mainly from advanced economies – points to the fact that these are technologies with enough potential to radically change how people produce, consume, exchange and, of course, how they work. They can also help the economic inclusion of actors that today find it difficult to participate in the most dynamic segments of the market, through various service platforms, such as fintech, which facilitate access to credit for companies with no financial history or with weak guarantees, the electronic commerce, which helps SMEs to gain visibility and expand their markets, or digital technologies can improve the access of small rural producers to commercial and weather information, or to streamline and make the chain of transactions and payments more transparent.

Historically, Latin America and the Caribbean have not been able to reap the fruits of growth and productivity that the successive waves of technological change have offered in the past, as has happened, for example, with Asia and the Pacific since the revolution in electronics and ICTs. The brief review made in this section of the evidence available in the





region regarding the adoption and widespread use of new digital technologies leads rather to redefine Raúl Prebisch's diagnosis of the late 1940s on the spread of technical progress in the region: "slow and uneven". Everything seems to indicate that, given the current scenario of transition and technological change, it is possible to take advantage of the opportunities of digital transformation to improve productivity and promote the economic insertion and sustainability of broad segments of companies in the region, to the extent that progress is made. in capacities and institutional functions, which allow closing gaps and promoting the productive jump that the countries of the region require.

Digital transformation has also created opportunities for the countries of the Region to start exporting new goods and services linked to that transformation, thus helping the essential diversification and sophistication of their export baskets. In several cases, these opportunities are mounted on natural resource platforms (agricultural or extractive), but the potential of the target market may be considerably broader. This axis is intensive in science and technology policies, aimed at resolving or mitigating market and coordination failures that can hinder the development of business innovation activities, such as strengthening the links between different actors within national innovation systems.

A foreseeable effect of the digital transition is that there will be more companies in the region that can participate and scale functions in global supply chains, either as direct exporters, or through the provision of inputs, equipment and services to exporting firms. At the same time, this greater contact with global markets will help companies improve their productivity and facilitate their knowledge, access, and use of the new waves of innovations associated with digital transformation. However, for most micro and small businesses in the region, many of them informal, the first step is to access digital solutions that can favour their sustainability and eventually their transition to the formal economy.

The public policy agenda for digital transformation to be the basis of productive development in the region is challenging. Decades of relative backwardness must be reversed, and governments must work simultaneously on matters as diverse as infrastructure, skills, and financing. However, if the region seeks a future of rapid growth, high productivity and quality jobs, this is necessarily the way to create it.

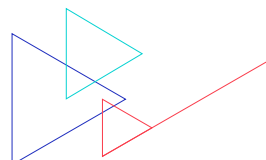
7. Final considerations for the design and implementation of policies to boost productivity and create decent employment

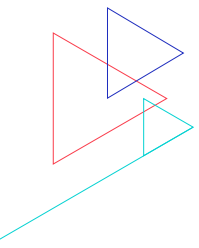
For years it has been recognized that “creating conditions to improve productivity growth rates is a central objective of the region’s sustainable development strategy” (Moreno 2014). The persistence – and deepening – of productivity gaps, both between LAC and other reference regions or economies with a higher level of economic development, as well as within the region, between countries, economic sectors and productive units, constitutes the best proof that it is necessary and relevant to strengthen the design and implementation of productive development policies, as well as the respective institutional scaffolding to close the aforementioned gaps and thus bring our countries closer to higher levels of development and prosperity.

Just as there is a broad consensus regarding the relevance of productive development policies for the economic development of all the countries of the region, it is likewise acknowledged that, in view of the high disparity of conditions by country, sector or value chain, size and type of companies, it does not seem advisable to aim for such policies to meet a single set of priorities, applicable uniformly across all countries. Additionally, having sufficient institutional capacity to implement effective policies is as important as adapting to the specific context of each country (Agosin and Fernández-Arias 2014).

A first structural feature to consider for the design and implementation of productive development policies in the region is the heterogeneous productive structure of most regional economies, as well as their relatively low value-added goods and services output (Correa, Leiva and Stumpo 2020). This has a decisive influence on the persistence of deep productivity gaps between companies in the region, referred to in section 5 above, where it is also pointed out that, as a result of the Covid-19 pandemic, there has been a tendency for the gaps in labour productivity between economies to widen according to their income level, at a global level, as indicated by the 8th edition of ILOS’s Monitor/Observatory Report (October 2021).

In view of the foregoing, any policy initiative aimed at increasing productivity must distinguish across very different realities, and even within sectors and company size segments. To characterize this diversity, five categories of companies or production units in the region





are identified based on the factors affecting the productivity of companies, as examined in section 5.

En atención a lo anterior, toda iniciativa de política orientada al incremento de la productividad debe distinguir realidades muy diferentes entre sí, incluso al interior de sectores y de segmentos de tamaño de empresas. A objeto de caracterizar esta diversidad, a partir de los factores incidentes en la productividad de las empresas, examinados en la sección 5, se distinguen cinco categorías de empresas o unidades productivas en la región:

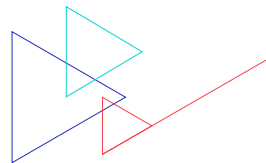
- i.** Modern companies inserted in international markets, with high productivity standards.
- ii.** Large companies in the primary/exporting sectors, natural resources or commodity-intensive exporters, highly sensitive to international price cycles, with the potential to increase their productivity and lead virtuous production dynamics with local supplier companies.
- iii.** Young companies and ventures or startups with high growth potential, based on knowledge or technology, that require a robust ecosystem to scale productively.
- iv.** Small and medium-sized companies that operate mainly in domestic markets with gaps in the adoption of technologies and basic management skills, which places them closer to survival dynamics, and prevents or hinders them from improving their productivity, and
- v.** Informal microenterprises and self-employed workers, the segment hardest hit by the economic impacts of the pandemic, without greater access to training and technology transfer channels.

It should not be forgotten that the companies in categories (iv) and (v) of the above typology account, in number of units, for most of the business and entrepreneurial universe of the region. ECLAC estimates for 2016 show micro and small formal companies represent 98 per cent of formal companies in Latin America, while medium and large companies account for only 2 per cent. Small companies also fall into category (iii), corresponding to nascent companies or startups with high growth potential that, in any case, represent a much smaller proportion of the segment of micro and small companies across the region. According to the same source, micro and small companies absorb 48 per cent of formal employment, compared with 15 per cent for medium-sized companies and 37 per cent for large companies. The distribution of formal employment by company size remained relatively stable in percentage terms between 2009 and 2016 (ECLAC 2020a).

Table 6 lays out schematically the main characteristics that affect the level and dynamics of productivity for each type of productive unit.

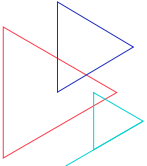
► Table 6. Aspects affecting productivity, by type of company

Company Type Factor	(i) Dynamic companies, inserted in international markets	(ii) Large primary-exporting companies	(iii) Startups with high growth potential	(iv) Local SMEs with low levels of productivity	(v) Workshops, micro-enterprises and self-employed, informal merchants
Size and competitive environment	Large or medium in size, in highly competitive markets.	Predominantly large companies, state-owned and private. Price takers in global NR or commodities markets.	Small businesses, some with projected rapid growth.	Micro, small and medium-sized companies, with limited market segments.	Mostly very small, family or single-person (subsistence enterprises). Includes most service providers on digital platforms.
Technology adoption and absorption capabilities	High development, with units responsible for R&D and technology strategy and management.	Routinely buy turnkey solutions from global vendors. Tend to be highly competent in the use of technologies, but have a low ability to scale their own developments.	High capacities for adoption and technological development are part of its core business model.	Level of capacity development highly dependent on the founder or leader of the business.	In general, limited, although a growing percentage, mainly urban, actively uses collaborative applications or social networks in digital sales and payment methods.
Job training, skills, and competencies	Highly trained staff. Recruitment and improvement policy.	Strongly differentiated ranks, usually experienced professional and technical personnel and career development in the company.	Small, horizontal staff structure, with a high level of professional and/or technical specialization.	Significant gaps in human resources education and training.	Most have primary or incomplete secondary education, do not access training and skills training options.
Innovation	A high percentage systematically develop and manage innovation.	In general, this type of company prioritizes security and operational predictability, and usually resist innovation.	They incorporate innovation management in their DNA, it is a substantive part of their business model.	Rarely does a company in this segment innovate systematically.	The vast majority do not innovate, although in many cases they have talent and significant creative potential.



Company Type Factor	(i) Dynamic companies, inserted in international markets	(ii) Large primary-exporting companies	(iii) Startups with high growth potential	(iv) Local SMEs with low levels of productivity	(v) Workshops, micro-enterprises and self-employed, informal merchants
Work organization	Efficient and optimized. Strategic design, management control and systematic monitoring.	Rather hierarchical organizational structures, not necessarily efficient or optimized.	Given their small size, they are organizationally simple and multifunctional.	Tend not to plan or optimize their organization, but rather distribute tasks as they arise.	The organization of work is rather individual, based on reconciling other domestic and family tasks (significant gender gap).
Institutional setting	Informed and fluid access to financial and non-financial services, national and international.	Informed and fluid access to financial and non-financial services, national and international. Direct and close access to counterparts from public institutions.	Related to a specific ecosystem of services and institutions. In some countries the ecosystem is more developed.	Some countries have segment-specific technical cooperation services or networks.	Due to their informal status, they do not enjoy much access to support and training channels. In some cases, they can access social assistance and projects that give them support to formalize.

Source: Prepared by the authors.



The typology of companies and enterprises characterized in Table 6 reflects the diversity and complexity of the productive fabric in the region, which makes it inadvisable to propose a single recipe to boost productivity. On the other hand, proposing specific productive development policies for each type of company and national context is beyond the scope of this document. Instead, transverse aspects and conditions are presented to be considered for their design and implementation.

Cornick, Stein and Fernández-Arias (2014) highlight that the design and implementation of successful productive development policies depends on the availability of technical, operational and political capacities of the institutional fabric responsible for them. This type of policy poses some specific challenges. On the one hand, the need to “discover” intervention models, since the causes and effects of the problems or gaps to be addressed are often not obvious. This opens space for processes of experimentation, pilots, adjustments and maturation “learning by doing”. On the other hand, given that many effects of these policies require diffusion processes and maturation periods, it is important to ensure temporal coherence between the designs of policy interventions and the expected results. Finally, the various coordination problems that are often critical to resolve in this type of intervention require the validation of robust public-private collaboration modalities against capture risks, as well as the possibility of cooperating, coordinating and preventing duplication of functions between public institutions, which often proves more complex than expected.

The policies to be implemented must be inclusive to promote the adoption of new digital technologies in most of the productive apparatus of LAC. They can favour a better insertion and greater productive articulation throughout supply chains. The good news is that many of the governments in the region are implementing programmes that show the importance of the issue for public policy⁶⁶. However, the strategies are still in the early implementation phase, with much to learn from the most advanced countries on the subject.

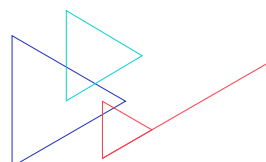
What should a plan contain to accelerate the adoption of new digital technologies, in terms of the digital transition of micro, small and medium-sized companies?

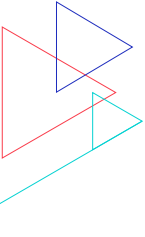
In the case of companies with intermediate progress in digital transition, these policies should aim to accelerate processes and ensure that the ongoing transformations – many of them accelerated during the pandemic – are much deeper and more sustainable, with a greater focus on productivity rather than the urgencies of the disruptive episode. These companies have business models with high potential to evolve towards the use of new technologies, although the need for better infrastructure adds to the difficulty in accessing markets where complementary factors are in demand: talent, financing and technological solutions.

In the case of smaller-scale companies and establishments, far from digital transformation and not very dynamic, policies must promote the development of technological adoption capabilities, as a prior condition to modernizing their production systems or renewing their products. This challenge is shared in part by the companies of the previous group, although in this case it is more complex since many companies in this segment operate in old technological paradigms, still far from digitalization, and with high levels of informality and/or few modernization requirements.

Technological change is risky, so public policy must partially absorb this risk, for example with active horizontal policies (subsidies for R&D, preferential credits), as well as with selective policies, such as public purchases with the objective of innovation. Regarding access to digital solutions that favour financial and market inclusion, public policy should encourage a greater

⁶⁶ For example: the Industry 4.0 Plan in Argentina, the National Internet of Things Plan in Brazil, the National Artificial Intelligence Plan in Chile, the National Policy for Digital Transformation and Artificial Intelligence in Colombia and the Digital Transformation Strategy towards Costa Rica Bicentennial 4.0 2018–2022.





connection and exchange of information between the supply and demand of technology, through institutional networks of transfer and technological extension with preferential orientation and methodologies. ad-hoc for micro and small businesses.

Another fundamental focus of policies to raise productivity is the development of digital skills. According to the available data for four countries of the region (Chile, Ecuador, Peru and Mexico) that are part of the PIAAC, there are great distances with the OECD average in terms of the percentage of adults who reach high levels of achievement in problem-solving in digital environments. Less than 10 per cent of workers in the region use ICTs for more advanced tasks, such as programming, and this percentage corresponds, largely, to people with higher educational credentials. While a third of workers in Latin America use ICTs regularly in their work, in Europe this percentage rises to more than half (OECD 2020).

It is necessary to promote the retraining of the skills of people who are in the labour market. How many workers in the Region have intensive occupations in complementary skills with new technologies, such as perception and manipulation in complex contexts, creativity and social intelligence? Albrieu et al. (2018b) estimated that around 18 per cent of the total number of employed persons. In a scenario of rapid technology adoption, the remaining 82 per cent would require training to a greater or lesser extent to readjust their skills.

At the same time, it is key that public policy promotes the acquisition of these skills for future workers, so it is necessary to rethink the education system. In general terms, education policy must be strengthened, and its emphasis updated throughout the training cycle, this includes achieving a generalization of the education policy for early childhood, substantially improving the quality of basic education in order to incorporate more advanced general skills and knowledge, many of them digital in nature (see Busso et al. 2017). In tertiary and university education, it is key to aim for greater flexibility and agility to modify curricular programmes, create new careers, offer specializations of shorter duration than traditional alternatives, initiatives that, at the end of the day, aim to mitigate the risks of falling behind in educational provision in the face of the speed of technological change and its consequences in terms of demands for new skills.

Finally, there is the issue of lifelong learning. Dynamic companies of a certain size allow themselves to design in-house mechanisms to readapt skills, but such a practice is not usual outside of this select group. That is why technical and professional education must be promoted, adding the fact that these instances have to be redesigned to make them more inclusive. In the region, as in much of the emerging world, this type of training does not reach people who are in vulnerable segments of the labour market. The gender gap is also significant.

► **Box 4. The Finishing School program and other national initiatives for the development of digital skills**

There is a wide set of policy interventions aimed at promoting digital skills that can serve as inspiration for the countries of the region. A case in point is the Finishing School programme, first implemented in India and emulated in several other countries. It is intended to correct the shortage of human resources in the offshore service sectors. Its curriculum is designed by actors from government, industry and academia.

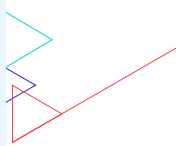
It is a program based on providing short-term, non-formal training. 3Edge Solutions, Dale Carnegie, Octopus, and Tholons Institute are the four most recognized Finishing School programme institutions in India.

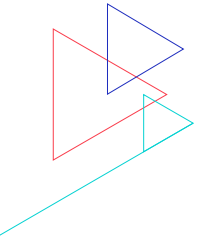
The programme has its chapter in the region: Uruguay XXI Finishing School is a national initiative launched in 2012 within the Global Services program of Uruguay XXI (the national agency for the promotion of exports and investments) with technical assistance and co-financing from the IDB. It is a training programme whose content is “tailored” to the needs of the service sector that seeks to promote and develop both technical and soft skills.

The content is proposed by companies and/or business chambers. The proposals are then evaluated and approved by Uruguay XXI and the IDB (García and Bafundo, 2014). The scheme lists other similar experiences that are worth considering for the region.

Human Capital: International Experiences

Ireland	India
<p>Springboard+ Programme</p> <ul style="list-style-type: none"> ► Free courses (certifications, degree, master’s) for upskilling and reskilling in areas with employment opportunities ► ICT conversion courses – part of the ICT Action Plan 2019–22 ► Involvement of various government, education and industry bodies ► Part-time (2-year) or full-time (1-year) courses in state or private institutions providing job training for people without a background in the sector ► On finishing the course, a 12-week internship in a company ► Proposals in partnership with the private sector are prioritised 	<p>Future Skills Platform (NASSCOM)</p> <ul style="list-style-type: none"> ► Training in nine disruptive technologies (artificial intelligence, Internet of Things, virtual reality, cybersecurity, cloud, 3D, blockchain, big data, robotic automation, mobile) ► Content suppliers and teaching methods generate information about new job opportunities and the qualifications required, and make content, assessments and certifications available ► Train up to 4 million people in the aforementioned technologies
Israel	Korea
<p>Competition between coding boot camps (platforms that offer programming courses)</p> <ul style="list-style-type: none"> ► The jury includes the public sector, private sector and experts ► Organisations present a plan with a descriptions of courses, student selection criteria, marketing plan, teaching staff and letters of support from businesses ► Subsidies given conditional on attaining objectives (for example, number of students graduated, salaries obtained, obtaining and staying in employment) 	<p>Promotion of Industrial Education and Industry-Academy Cooperation Act (2003)</p> <p>Government finances cooperation initiatives (led by university, private or public sector) for:</p> <ul style="list-style-type: none"> ► New education and training programmes, including infrastructure ► Plans for improving quality ► Adapting training plans to the needs of the most dynamic productive sectors ► Employing teachers with experience in the private sector ► Programmes that include training experiences in companies for students

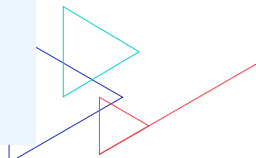




In the previous sections of this report, the existence of two sources that determine the medium- and long-term productivity trajectories of economies are put forward: intra-firm evolution and the effect of intersectoral allocation of productive resources. Both effects (intra-company and intersectoral) affect the aggregate trajectories of productivity in the region, so initiatives and policies can be implemented with a focus on one or both of them. Table 7 summarises the categorization of companies and the factors to be mobilized according to different types of practices, initiatives or policies that could be adopted.

► **Table 7. Identification of good practices, initiatives and differentiated policies to facilitate the adoption of technologies and digital transition in order to boost productivity and decent employment**

Company Type Factor	Dynamic companies, inserted in international markets	Large primary-exporting companies	Startups with high growth potential	Local SMEs with low productivity levels	Workshops, micro-enterprises and self-employed, informal
Size and competitive environment	Initiatives for productive articulation around value chains: articulated initiatives for the development of MSME suppliers.	Promotion of dynamic entrepreneurship. Strengthening entrepreneurial ecosystems	Comprehensive support for a better insertion in markets and supply chains. Compliance with standards, associative agendas for learning and models of collective efficiency	Facilitate formalization simultaneously with opening possibilities of insertion in commercial circuits (fair trade channels or value chains). Access to financial and non-financial services appropriate to their needs as part of the transition to the formal economy	Transition programmes towards formality should consider access to connectivity and technological advice.
Technology adoption and absorption capabilities	Stimulus to the "science-business" link through technology contracts and tax incentives.	Facilitate access to financing sources (venture capital) to perfect proprietary technological developments	Extension and technology transfer models with public promotion instruments for supply and demand (for example, Red CITES of Peru).	Facilitate access to occupational safety programmes, as well as the development and certification of STEM and labour skills associated with the management of generic and specific technologies	
Job Training, Skills, Competencies	Talent management (recruitment, retention of people) as a critical dimension of the operating model. Explore and promote corporate entrepreneurship schemes.	Dynamic entrepreneurship acceleration platforms, and access to specialized counselling in aspects such as business management, negotiation and English	Consolidate permanent substantive training and improvement systems as part of the trajectory and career design, with an adequate recognition system		



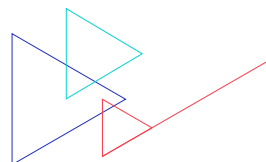
Company Type Factor	Dynamic companies, inserted in international markets	Large primary- exporting companies	Startups with high growth potential	Local SMEs with low productivity levels	Workshops, micro- enterprises and self-employed, informal
Innovation	Systematic management of innovation as a core competence. Interrelation and synergies with other actors in the innovation ecosystem (R&D centres, universities, startups, public agencies)	Progressive inclusion of innovation strategies. Linking with Pilot Centres of new technologies, in alliance with other actors of the innovation ecosystem	Regular access and participation in open innovation challenges, in collaboration with private companies and public bodies.	Access to training programmes (MOOC or workshops) in innovation. Promotion and orientation of collaborative peer-to-peer innovation opportunities, within the framework of business networks or supplier development programmes.	Access to basic training programmes (workshops, MOOCs and so on)
Organización del trabajo	Oferta de mercado		Consejerías especializadas, en aceleradoras de emprendimientos. Apoyar en el reclutamiento de talento	Redes de orientación y consejería en el territorio (modelo SBDC de EE.UU. adoptado en países como El Salvador, Panamá y Chile).	
Contexto institucional	Adecuado funcionamiento de instituciones en los ámbitos: (i) regulatorio; (ii) de provisión de infraestructura habilitante; (iii) de fomento al desarrollo productivo; (iv) de desarrollo laboral; (v) de innovación y transferencia tecnológica bienes Favorecer una gobernanza institucional que evite capturas institucionales, promueva la rendición de cuentas y estimule las instancias de diálogo y colaboración de triple hélice: Estado, academia, empresas (empleadores y trabajadores). Favorecer el cierre de brechas de género, territoriales u otras. Velar por la sostenibilidad medioambiental, económica y social de las actividades productivas de y servicios				

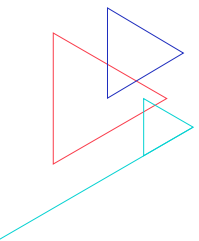
Source: Prepared by the authors.

As has been repeatedly mentioned in this report, international experience clearly shows that achieving virtuous productivity trajectories responds to systemic strategies rather than specific initiatives, and that they must also be consistent over time.

Strategic initiatives at different levels and productive segments must necessarily be accompanied by measures that also guarantee the sustainability of activities from the environmental and social points of view. In this sense, it is crucial to actively accompany the objectives of an agenda of this nature with strategic goals in terms of labour inclusion and closing critical, gender, and territorial gaps, among other dimensions. To this end, national social dialogue institutions can play a key role, to the extent that they have political support and an effective mandate beyond the legitimate interests of their constituent parts (Guardiancich and Molina 2020).

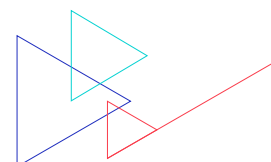
For now, the post-pandemic scenario demands significant and urgent actions regarding infrastructure, institutions and enabling capacities, to take on the emerging challenges while also taking advantage of the opportunities created by the digital economy.

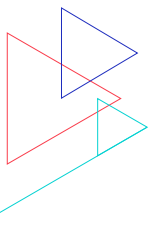




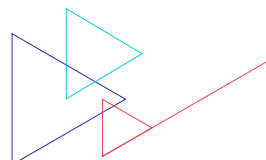
8. Bibliography

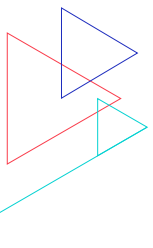
- Acemoglu, D., P. Aghion and F. Zilibotti. 2006. *Distance to Frontier, Selection, and Economic Growth*. Journal of the European Economic Association 4(1):37-74
- Agosin, M. and E. Fernández-Arias. 2014. *Hora de repensar el desarrollo productivo*. In Crespi, G., Fernández-Arias, E. and E. Stein. eds. *¿Cómo repensar el desarrollo productivo? Instituciones sólidas para la transformación económica*. Banco Interamericano de Desarrollo.
- Aguayo et al. 2021 *El Futuro del Trabajo en América Latina y El Caribe. «¿Cómo afecta el COVID-19 a los niveles de desigualdad?»*. Banco Interamericano de Desarrollo.
- Albrieu, R. 2020. *Evaluando las oportunidades y los límites del teletrabajo en Argentina en tiempos del COVID-19*. Buenos Aires: CIPPEC.
- Albrieu, R. et al. 2020. *Hacia una Economía de Baja Proximidad Física*. Documento de Trabajo N°196. Buenos Aires: CIPPEC.
- Albrieu, R. and M. Ballesty. 2020. *Políticas públicas para pensar el sendero laboral hacia la nueva normalidad post-COVID-19*. Buenos Aires: CIPPEC.
- Albrieu, R.; A.I. Basco, C. Brest López; B. De Azevedo; F. Peirano; M. Rapetti; G. Vienni. 2019. *Travesía 4.0: Hacia la transformación industrial argentina*. Buenos Aires: Banco Interamericano de Desarrollo/CIPPEC.
- Alvarez, F., M. Eslava, P. Sanguinetti, M. Toledo, G. Alves, C. Daude, and L. Allub. 2018. *Instituciones para la productividad: hacia un mejor entorno empresarial*. CAF. [RED 2018. Instituciones para la productividad: hacia un mejor entorno empresarial \(caf.com\)](#)
- Andreoni, A. and H-J Chang. 2016. *Bringing Production and Employment Back into Development: Alice Amsden's Legacy for a New Developmentalist Agenda*. Cambridge Journal of Regions, Economy and Society. Oxford University Press.
- Astorga, R. and F. Beltranou. 2017. *El debate de la productividad y el trabajo*. In Astorga y Beltranou (coords). *Chile: desafíos de la productividad y el mundo laboral*. ILO. Santiago.
- Astudillo, S. and A. Briozzo. 2017. *La innovación y sus efectos: la evidencia de los sectores manufactureros ecuatorianos y argentinos*. Journal of Technology, Management and Innovation. Vol.12 N°4. Santiago
- Altinok, Nadir, Noam Angrist, Harry Anthony Patrinos. 2018. *Global Data Set on Education Quality (1965-2015)*. Policy Research Working Paper; No. 8314. World Bank, Washington, DC. World Bank.
- Bakker, B., M. Ghazanchyan, A. Ho and V. Nanda. 2020. *The Lack of Convergence of Latin-America Compared with CESEE: Is Low Investment to Blame?*. IMF Working Papers. 20.
- Baptista, B. 2016. Los instrumentos de política de ciencia, tecnología e innovación en América Latina. In: *El estado de la ciencia. Principales indicadores de ciencia y tecnología iberoamericanos/interamericanos 2016*. RICYT-OEI-UNESCO.
- Barañano, A. M. 2007. Gestión de la innovación tecnológica empresarial. Estudio exploratorio de las PYMES portuguesas y españolas. In: Dutrénit, G., J. Jasso and INITIAL Villavicencio, eds. *Globalización, acumulación de capacidades e innovación. Los desafíos para las empresas, localidades y países*. México. Fondo de Cultura Económica.



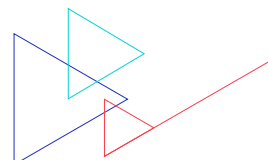
- 
- Basco, A.I. and C. Lavena. 2021. *Competencias y habilidades para la cuarta revolución industrial en el contexto de pandemia*. Banco Interamericano de Desarrollo/INTAL.
- Beylis, G., R. Fattal-Jaef, M. Morris, A. Rekha Sebastian and R. Sinha. 2021. *Efecto viral COVID-19 y la transformación acelerada del empleo en América Latina y el Caribe*. Estudios del Banco Mundial sobre América Latina y el Caribe, World Bank Group.
- Bloom, N., R. Sadun and J. van Reenen. 2012. *The Organization of Firms across Countries*. The Quarterly Journal of Economics, 1663-1705.
- Bloom, N., R. Sadun and J. van Reenen. 2017. *Management as a Technology?* Working Paper 16-133. Harvard Business School.
- Brynjolfsson, E., D. Rock., and C. Syverson. 2019. *Artificial Intelligence and the Modern Productivity Paradox*. In *The Economics of Artificial Intelligence: An Agenda*, 23. AUTHORS
- Busso, M., J.P. Cristia, D. Hincapie, J. Messina and L. Ripani. 2017. *Learning Better: Public Policy for Skills Development*. In: <https://publications.iadb.org>
- Castillo, J. et al. 2018. *Políticas de fomento productivo para el Desarrollo de sectores intensivos en recursos naturales. La experiencia del Programa Nacional de Minería Alta Ley*. Serie Desarrollo Productivo. Santiago: ECLAC and CORFO.
- Céspedes, N., M. Aquije, A. Sánchez and R. Vera Tudela. 2016. Productividad sectorial en el Perú: un análisis a nivel de firmas. In: *Productividad en el Perú: medición, determinantes e implicancias*. Universidad del Pacífico, 69-63. Lima
- CNI. 2018. *INDUSTRY 2027 - Risks and Opportunities for Brazil in the Face of Disruptive Innovations*.
- Comisión Nacional de Productividad. 2017. *Informe anual 2017*. Santiago, Chile: Gobierno de Chile.
- Conferencia Internacional del Trabajo. 2019. *Declaración del Centenario para el Futuro del Trabajo (2019)*
- Cornick, J., E. Stein and E. Fernández-Arias. (2014). *La parte difícil: construir capacidades públicas*. In Crespi, G., E. Fernández-Arias, and E. Stein, eds. *¿Cómo repensar el desarrollo productivo? Instituciones sólidas para la transformación económica*. Banco Interamericano de Desarrollo.
- Corporación Andina de Fomento, CAF (2020). *El estado de la digitalización de América Latina frente a la pandemia del COVID-19*. Observatorio CAF del Ecosistema Digital.
- Correa, F., Leiva, V. and Stumpo G. 2020. *Mipymes y heterogeneidad estructural en América Latina*. In Dini, M. and G. Stumpo. (coords). *Mipymes en América Latina. Un frágil desempeño y nuevos desafíos para las políticas de fomento*. Documentos de Proyectos (LC/TS.2018/75/Rev.1), ECLAC, Santiago.
- Crespi, C. and E. Tacsir. 2011). *Effects of Innovation on Employment in Latin America*. Paper presented at The Atlanta Conference on Science and Innovation Policy. Atlanta.
- Crespi, G. and P. Zúñiga. 2012. *Innovation and Productivity. Evidence from Six Latin American Countries*. World Development 40(2): 273-290.
- Crespi, G., E. Tacsir and F. Vargas. 2016. *Innovation Dynamics and Productivity. Evidence for Latin America*. In Grazi, M. and C. Pietrobelli. eds. Banco Interamericano de Desarrollo.
- Diaz de Astarloa, B. 2021 *Post-pandemic COVID-19 Economic Recovery: Enabling Developing Countries to Better Harness E-commerce and Digital Trade in LAC*. Santiago. Economic Commission for Latin America and the Caribbean (ECLAC)
- Dieppe, A., ed. 2020. *Global Productivity. Trends, Drivers and Policies*. World Bank Group.

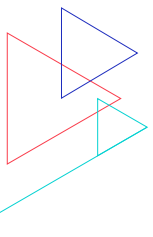
- Dingel, J., and B. Neiman. 2020. *How Many Jobs Can Be Done at Home?* *Journal of Public Economics*, 189, 104235.
- ECLAC. 2020a. *Sectores y empresas frente al Covid-19: emergencia y reactivación*. Informe Especial N°4. Santiago.
- ECLAC. 2020b. *Universalizar el acceso a las tecnologías digitales para enfrentar los efectos del COVID-19*. Informe especial N° 7, Santiago.
- ECLAC. 2020c. *Construir un nuevo futuro: una recuperación transformadora con igualdad y sostenibilidad*. (LC/SES.38/3-P/Rev.1). Santiago.
- ECLAC. 2021. *La paradoja de la recuperación en América Latina y el Caribe. Crecimiento con persistentes problemas estructurales: desigualdad, pobreza, poca inversión y baja productividad*. Informe Especial COVID-19 N°11. Santiago, Julio de 2021.
- El Mercurio. 19 October, 2020. «Minera implementa “gemelo digital” en Chile». El Mercurio. Available at: <https://www.pwc.com>
- Figal Garone, L., P. López-Villalba, A. Maffioli and C. Ruzzier. 2020. *Firm-level Productivity in Latin America and the Caribbean*. IDB/IIC. Development through the Private Sector Series, TN 20.
- Fusco, G., M. Melgiovanni, D. Porrini and T.M. Ricciardo. 2020. *How to Improve the Diffusion of Climate-Smart Agriculture: What the Literature Tells Us*. Sustainability (12). <https://doi.org/10.3390/su12125168>
- Gallego, J. M., and L.H. Gutiérrez. 2015. *ICTs in Latin American and Caribbean Firms: Stylized Facts, Programs and Policies*. Washington, DC: Banco Interamericano de Desarrollo.
- Gaurav, N., M. Hallward-Driemeier and E. Davies. 2021. *At Your Service? The Promise of Services-Led Development*. Washington, DC: World Bank. doi: 10.1596/978-1-4648-1671-0
- Ghani, E. and H. Kharas. 2010. *The Service Revolution*. N. 14. World Bank
- Gitelman, L. 2013. *Raw Data Is an Oxymoron*. The MIT Press.
- Grazzi, M. and J. Jung. 2016. *Information and Communication Technologies, Innovation and Productivity: Evidence from Firms in LAC*. In: Grazi, M. and C. Pietrobelli, eds. *Firm Innovation and Productivity in LAC*. Banco Interamericano de Desarrollo.
- Grazzi, M. and C. Pietrobelli, eds. 2016. *Firm Innovation and Productivity in LAC*. IDB/Banco Interamericano de Desarrollo.
- Guardiancich, I. and O. Molina. 2020. *The effectiveness of National Social Dialogue Institutions. From Theory to Evidence*. ILO Working Paper 16, Nov. 2020
- Guimón, J., C. Chaminade, C. Maggi and J.C. Salazar-Elena. 2017 *Policies to Attract R&D Related FDI in Small Emerging Countries: Aligning Incentives with Local Linkages and Absorptive Capacities in Chile*. *Journal of International Management*. Elsevier
- Haldane, A. *Is Home Working Good for You?* Speech given at the Engaging Business Summit and Autumn Lecture, 14 October, 2020. <https://www.bankofengland.co.uk/speech/2020/andy-haldane-engaging-business-summit-and-autumn-lecture>
- Hausmann, R., D. Rodrik and A. Velasco. 2008. *Growth diagnostics*. In: N. Serra and J. Stiglitz eds. *The Washington Consensus Reconsidered: Towards a New Global Governance*. New York. Oxford University Press.



- 
- Hellerstein, D., D. Vilorio, M. Ribaud, M. Aillery, D. Bigelow, M. Bowman, C. Burns, R. Claassen, A. Crane-Droesch, J. Fooks, C. Greene, I. Hansen, P. Heisey, C. Hitaj, R.A. Hoppe, N. Key, L. Lynch, S. Malcolm, W.D. McBride, R. Mosheim, R. Nehring, G. Schaible, D. Schimmelpfennig, D. Smith, S. Sneeringer, T. Wade, S. Wallander, S.L. Wang and S.J. Wechsler 2019. *Agricultural Resources and Environmental Indicators, 2019*. Economic Information Bulletin No. (EIB-208) 142 pp. USDA.
- United States Department of Agriculture. <https://www.ers.usda.gov/publications/pub-details/?pubid=93025>
- Helpman, E. 2011. *El comercio internacional*. (2014). Mexico. Fondo de Cultura Económica.
- ILO/OIT, Governing Body. 2021. *Decent Work and Productivity*. [Decent work and productivity \(ilo.org\)](https://www.ilo.org/publications/decent-work-and-productivity)
- ILO/OIT – IoE – KAS (2021). *Small goes digital - How Digitalization can bring about productive growth for micro and small enterprises*. International Labour Office – Geneva: ILO, 2021. [Small goes digital \(ilo.org\)](https://www.ilo.org/publications/small-goes-digital)
- ILO 2021. *Empleo informal en la economía rural de América Latina 2012 – 2019. Un panorama y tendencias regionales pre-pandemia COVID-19*.
- ILO 2021a. *World Employment and Social Outlook. The role of digital labour platforms in transforming the world of work*. Flagship Report.
- ILO 2021b. *Observatorio de la OIT: La COVID-19 y el mundo del trabajo*. Octava edición, Octubre 2021.
- ILO 2022. *Panorama Laboral 2021 América Latina y el Caribe. Informe Laboral*. Febrero 2022.
- International Monetary Fund, IMF. 2021a. *World Economic Outlook: Recovery during a Pandemic—Health Concerns, Supply Disruptions, Price Pressures*. Washington, DC.
- International Monetary Fund, IMF. 2021b. *Boosting Productivity in the Aftermath of COVID-19*. Washington, DC.
- Kantis, H. and J. Federico. 2014. *Dinámica empresarial y emprendimientos dinámicos: ¿Contribuyen al empleo y la productividad? El caso argentino*. Banco Interamericano de Desarrollo., Washington, DC
- Katz, J. 2000. *Reformas estructurales, productividad y conducta tecnológica en América Latina*. ECLAC. Fondo de Cultura Económica. Comisión Económica para América Latina y el Caribe. Primera edición, Chile.
- Katz, J. *Reformas estructurales orientadas al mercado, la globalización y la transformación de los sistemas de innovación en América Latina*. In Durtrènit, G.; Jasso, J.; D. Villavicencio. 2007. *Globalización, acumulación de capacidades e innovación*. Fondo de Cultura Económica, México.
- Lachman, J. and A. López. 2018. *Nuevas oportunidades y desafíos productivos en la Argentina: Resultados de la Primera Encuesta Nacional a Empresas de Agricultura y Ganadería de Precisión*. IIEP- BAIRES, Serie Documentos de Trabajo 38, Buenos Aires.
- Lachman, J., A. López, G. Tinghitella and S. Roca-Gómez. 2021. *Las Agtech en Argentina: desarrollo reciente, situación actual y perspectivas*. IIEP-BAIRES, Serie Documentos de Trabajo 57. Buenos Aires.
- Lagos, G. 2013. *El superciclo del cobre y sus efectos en Chile*. Programa de Investigación en Economía de Minería Universidad Católica de Chile. Santiago de Chile.
- Laney, D. 2001. *3D Data Management: Controlling Data Volume, Velocity and Variety*. META Group Research Note, 6.

- Lastres, H. and J.E. Cassiolato. 2007. *Sistemas locales de producción e innovación: nuevas estrategias para promover la generación, uso y difusión de conocimientos*. In Dutrénit, G., J. Jasso and INITIAL Villavicencio eds. *Globalización, acumulación de capacidades e innovación. Los desafíos para las empresas, localidades y países*. Mexico. Fondo de Cultura Económica.
- Leung, D., C. Meh and Y. Terajima. 2008. *Firm Size and Productivity*. Working Paper. Bank of Canada.
- Lipsey, R.; H. Carlaw and C.T. Bekar. 2006. *Economic Transformations: General Purpose Technologies and Long-Term Economic Growth*. Oxford University Press.
- López, A. 2017. *Las Industrias Extractivas en el Desarrollo de América Latina y el Caribe*. Reporte Red Sur 2016/2017. Serie Recursos Naturales y Desarrollo. Montevideo: Red Sudamericana de Economía Aplicada.
- Lowenberg-DeBoer, J. and B. Erickson. 2019. *Setting the record straight on precision agriculture adoption*. *Agronomy Journal*, 111 (4).
- Lucero, F. 2021. *Problemas de productividad en Chile: El rol del Estado en el diseño e implementación de una política industrial de desarrollo*. *Gobierno y Administración Pública*. 1, 117-147.
- Lundvall, B.A. ed. 1992. *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. London. Pinter.
- Lundvall, B.A., C. Chaminade, J. Van Lauridsen and K.J. Joseph. 2009. *Innovation policies for development: towards a systemic experimentation-based approach*. 7th Globelics Conference. Dakar, Senegal.
- Maggi, C. 2017. *Los Programas de Especialización Inteligente de CORFO: focalizando esfuerzos para elevar la productividad en Chile. Desafíos de la Productividad y el Mundo Laboral*. Oficina Internacional del Trabajo, OIT.
- Manyika, J. and M. Spence 2021. *A Better Boom. How to Capture the Pandemic's Productivity Potential*. *Foreign Affairs* July/August 2021
- Martínez, R., A. Palma and A. Velázquez. 2020. *Revolución tecnológica e inclusión social. Reflexiones sobre desafíos y oportunidades para la política social en América Latina*. Serie políticas sociales N° 233, ECLAC, Santiago.
- Maurizio, R. 2021. *Desafíos y Oportunidades del Teletrabajo en América Latina y el Caribe*. Nota Técnica en Serie Panorama Laboral en América Latina y el Caribe. Oficina Internacional del Trabajo, OIT.
- Mazzucato, M. 2018. *El valor de las cosas. Quién produce y quién gana en la economía global*. Taurus. España.
- McKenzie, D. and C. Woodruff. 2017. Business practices in small firms in developing countries. *Management Science* 63(9): 2967-2981.
- McMillan, M., D. Rodrik and C. Sepúlveda. 2014. *Structural change, fundamentals and growth: A framework and case studies*. National Bureau of Economic Research, Working Paper. Cambridge.
- Moravec, H. 1988 *Mind Children: The Future of Robot and Human Intelligence*. Harvard University Press.
- Moreno, L.A. 2014. *Prefacio*. In Crespi, G., E. Fernández-Arias and E. Stein, eds. *¿Cómo repensar el desarrollo productivo? Instituciones sólidas para la transformación económica*. Banco Interamericano de Desarrollo.



- 
- Morris, P. 2021. *Trabajo en plataformas en Chile y desafío para el trabajo decente: situación actual y lineamientos para diseñar políticas públicas dirigidas al sector*. Documento en el marco del Programa *Enhancing Human Capacities throughout the Life Cycle*. ECLAC.
- NASEM. 2020 *Information Technology Innovation: Resurgence, Confluence, and Continuing Impact*. The National Academies Press. In: www.nap.edu
- Nelson, R. and S. Winter. 1982. *An Evolutionary Theory of Economic Change*. London, England: Harvard University Press
- Nowak, B. 2021. *Precision Agriculture: Where do We Stand? A Review of the Adoption of Precision Agriculture Technologies on Field Crops Farms in Developed Countries*. Agricultural Research, <https://doi.org/10.1007/s40003-021-00539-x>.
- OECD. 2001. *The Well-being of Nations: The Role of Human and Social Capital*. OECD, Paris. OECD. 2011. *Skills for Innovation and Research*. OECD Innovation Strategy
- OECD. 2019. *Shaping the Digital Transformation in Latin America: Strengthening Productivity, Improving Lives*. Paris.
- OECD. 2020. *Latin American Economic Outlook 2020: Digital Transformation for Building Back Better*. Paris, France: Organisation for Economic Co-operation and Development.
- OECD. 2021. *OECD Compendium of Productivity Indicators*, [OECD iLibrary | OECD Compendium of Productivity Indicators \(oecd-ilibrary.org\)](https://oecd-ilibrary.org/productivity)
- Pagés, C., ed. 2010. *La era de la productividad: Cómo transformar las economías desde sus cimientos*. Banco Interamericano de Desarrollo, Washington, DC
- Rodrik, D. 2016. "Premature Deindustrialization." *Journal of Economic Growth* 21 (1): 1–33
- Rogers, J. 2020. *Gobernanza conjunta de Fondos y Programas para la CTI en el Perú*. Informe de consultoría para CONCYTEC y el Banco Mundial.
- Sánchez, J. 2018. *Gobernanza para la minería del siglo XXI: Viejos y nuevos desafíos para la región andina*. Seminario Gobernanza para la minería del Siglo XXI en los países andinos, septiembre de 2019. Santiago: ECLAC.
- Savona, M. 2020. ¿La "nueva normalidad" como "nueva esencialidad"? COVID-19, transformaciones digitales y estructuras laborales. *Revista de la CEPAL N°132*, Santiago.
- Schein, E. 1985. *Organizational culture and leadership*. Jossey-Bass Publishers.
- Schumpeter, J.A. (1934). *The Theory of Economic Development*. Cambridge: Harvard University Press.
- Schwab, K. and S. Zahidi. 2020. *How Countries are Performing on the Road of Recovery*. The Global Competitiveness Report. Special Edition 2020. World Economic Forum.
- Stein, E. 2014. *Un marco conceptual para las políticas de desarrollo productivo*. In Crespi G., E. Fernández-Arias and E. Stein. (eds). *¿Cómo repensar el desarrollo productivo? Instituciones sólidas para la transformación económica*.
- Taddy, M. 2019 *The Technological Elements of Artificial Intelligence*. In: Agrawal, A.; J. Gans and A. Goldfarb, eds. *The Economics of Artificial Intelligence: An Agenda*. Chicago University Press.
- Telecom Advisory Services LLC. 2020. *El estado de la digitalización de América Latina frente a la pandemia del COVID-19*. CAF-Banco de Desarrollo de América Latina. Caracas.
- Toner, P. 2011. *Workforce Skills and Innovation: an Overview of Major Themes in the Literature*. OECD Science, Technology and Industry Working Papers, 2011/01, OECD Publishing

UNCTAD. 2021. *COVID-19 and e-commerce. A Global Review*. Nueva York. United Nations Conference on Trade and Development, UNCTAD.

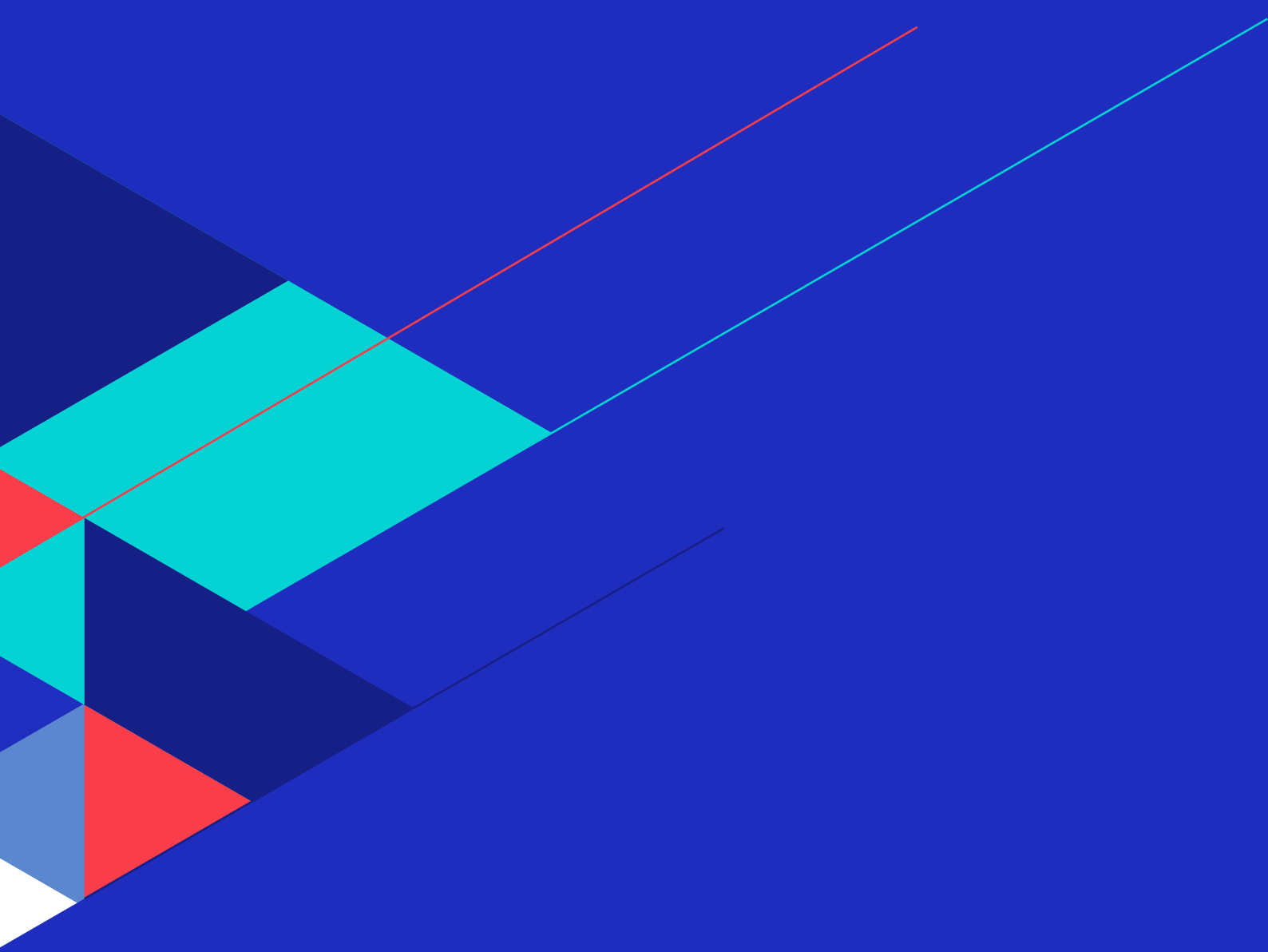
UNCTAD. 2021b. *Technology and Innovation Report 2021. Catching Technological waves. Innovation with equity*. Geneva.

Vitón, R., A. Castillo and T. Teixeira. 2019. *AGTECH: Mapa de la innovación AgTech en América Latina y el Caribe*. Banco Interamericano de Desarrollo., Washington DC.

Vivarelli, M. 2013. *Technology, Employment and Skills. An Interpretative Framework*. Eurasian Business Review 3(1): 66-89

World Bank (22 January, 2019). *The Education Crisis: Being in School Is Not the Same as Learning*.

In: <https://www.worldbank.org>



- ▶ ilo.org/americas
- ▶   OITAmericas
- ▶  oit_americas

ILO Regional Office for
Latin America and the Caribbean