



Responding to COVID-19 with Science, Innovation, and Productive Development



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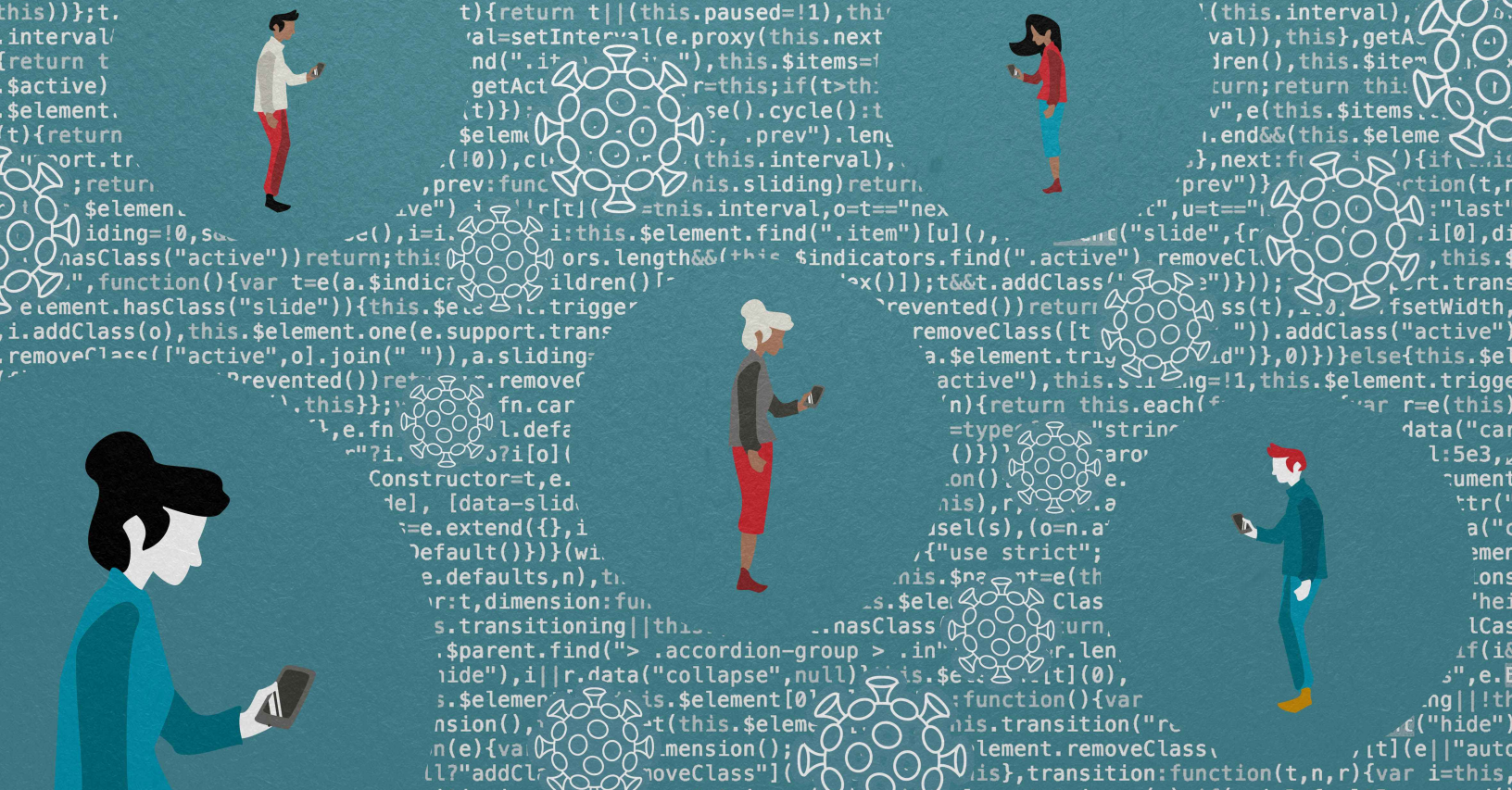


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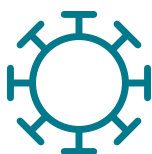
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About the First Edition

This is the first edition of the publication, which is a tool for further reflection and work. It will be updated according to input from sector experts and policymakers, as well as progress made in the implementation of programs to address the impacts of the present emergency and post-crisis period.

Introduction

Innovation in Times of Crisis: Relief Strategies and Opportunities for Transformation



The effects of the COVID-19 pandemic are shaking up global socioeconomic structures. The impacts are estimated to be astronomical in terms of the number of lives and jobs lost. Latin American and Caribbean (LAC) countries are taking health and economic measures to contain the pandemic, as uncertainty looms over its duration as well as the real-life consequences on the population and on the productive structure.

The scientific, innovation, and business communities are working frantically to support emergency responses and government actions. We are witnessing real-time collaboration between **scientists** across the globe in a race to develop the production of vaccines and antiviral medications. **The industrial sector** is repurposing production processes to produce health supplies on a large scale. **Technology innovators** and **startups** are teaming up to provide solutions to the most pressing issues.

However, we are only at the beginning of the most challenging part, which is how we will **emerge out of this situation and return to a “new normal.”** This is a race against the clock. The quarantine imposed on the population buys some time to curb infections and thus lighten the burden on the healthcare system, but countries should also take advantage of this time to prepare a proposal on how people could gradually resume their normal lives. We do not know exactly what the post-pandemic world will look like, but there seems to be a growing international consensus that any return to economic production will have to be supported by large-scale testing capacity and intensive monitoring of the evolution of infections, active health, and safety policies in all economic sectors, as well as urgent drug and vaccine development. In addition, as shelter-in-place measures will

likely remain over the short term, digitalization to the extent possible has become a priority in various sectors.

These challenges highlight the importance of **science, technology, and innovation as the decisive factors in any scenario of emergence from the crisis and economic recovery**. The urgent question is how to facilitate these efforts based on the existing capacities in the LAC region.

This report is intended as a first step in this direction and seeks to share experiences about the interventions undertaken from a production, innovation, and scientific point of view to mitigate the impacts of COVID-19 on the region. It includes **information on and references to ongoing practical experiences** in public policy and the private sector in the LAC region and the rest of the world. More importantly, the report presents **reflections and preliminary guidelines** on how these three aspects can contribute to creating conditions in the region for a faster emergence from the crisis and stronger economic recovery.

Aside from the analysis in each of the three chapters, there are four key takeaways herein. First, it is critical to have a comprehensive strategy to address the economic crisis. There should be a proper **balance between emergency interventions to support companies and other pro-growth measures**. Providing financing to prop up the liquidity of small- and medium-sized enterprises (SMEs) would make little sense if it comes at the expense of defunding programs that support innovation, business upgrade, and dynamic entrepreneurship. Without the former, many of our companies may not survive the crisis, but without the latter, it will be difficult to achieve a recovery at the speed we all desire.

Second, it is important to have **strong local capacities to respond in a way that is consistent with** the needs and realities of the LAC countries. Despite the global nature of the pandemic, some solutions are not universally applicable. A case in point is the problems with using diagnostic tests developed in Asia, given the speed of viral mutation and the weaknesses in local sampling capacities. Another example is the challenge of applying the sophisticated technological solutions for tracing, as these solutions are often at odds with the social, technological, or regulatory reality in LAC countries. It is important to have abundant local capacities in terms of laboratories, infrastructure, and experts in order to respond effectively to the challenges posed by this pandemic, especially considering the risks of similar future outbreaks.

Third, countries with **more mature innovation ecosystems and developed institutional capacities** can respond to the crisis more quickly and decisively. Investment in developing these capacities has proven to be the key to providing value-added solutions. There is also great potential in regional collaboration, which can shorten the learning curve of LAC countries and help develop solutions that harness each one's relative strengths.

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Finally, crises can present **opportunities to drive transformation agendas and new business models**. The involuntary digitalization imposed by social distancing strategies can be a way to accelerate the digital transformation of the LAC region, which was previously lagging behind. Furthermore, support for the recovery process should make a point to promote—in some cases vigorously—environmental sustainability and social inclusion.

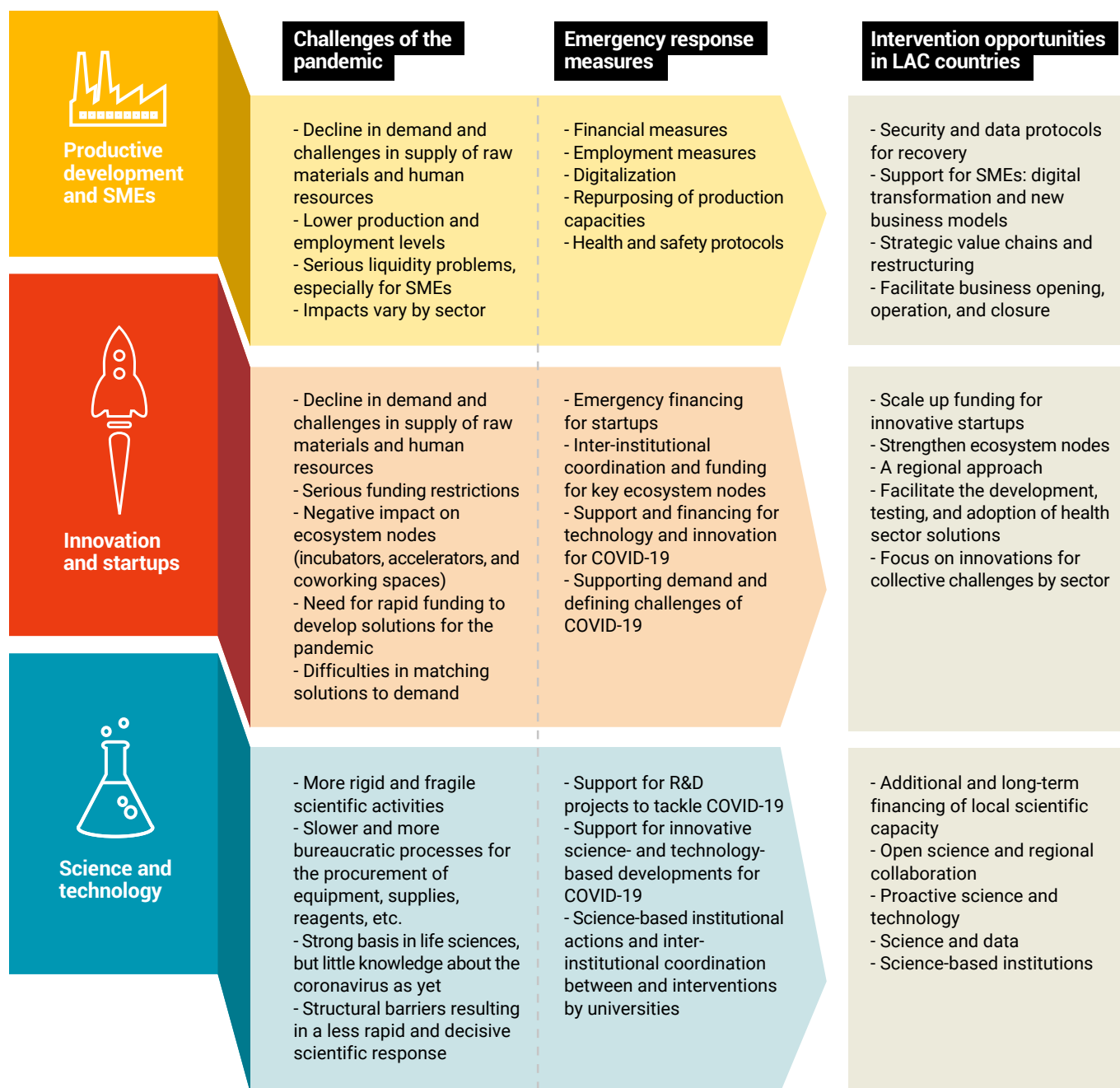
The ministries of economy or industry, as well as the ministries of science, technology, and innovation and their respective promotion agencies will play a crucial role in the recovery process. Now is also a good time to **redesign policies and interventions and redefine priorities** in light of the lessons learned and unresolved challenges in the region, most of which are far from being solved and will rather grow in complexity in the coming years. The Inter-American Development Bank (IDB) will continue to support its member countries in this process, recognizing it as a learning process that must be undertaken in unison.

Given the fast-moving nature of the emergency, this working document will be updated with new information and approaches that can help improve the response of LAC countries to the crisis and its impacts. Figure 1 presents the main ideas discussed herein.

Notes: At the time this report went to press (April 23, 2020), there were 2,682,225 COVID-19 cases confirmed worldwide, with 187,330 reported deaths. More than 730,000 people had recovered (Source: John Hopkins Coronavirus Resource Center).

At the time this translation was completed (June 3, 2020), the number of COVID-19 cases had risen to 6,390,085, with 381,950 reported deaths. More than 1.7 million people had recovered (Source: [John Hopkins Coronavirus Resource Center](#)).

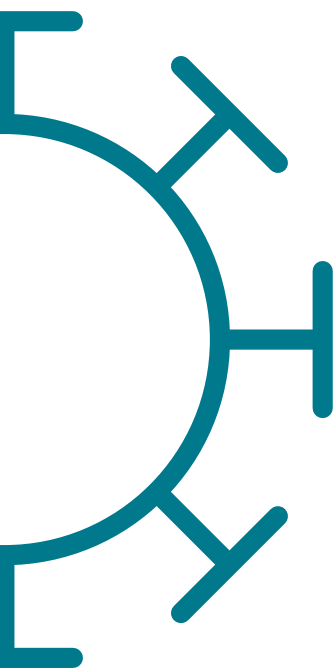
Figure 1. COVID-19: Impacts On and Responses From Business, Science, and Innovation Ecosystems



Source: Authors' elaboration.

1. Productive Development and SMEs





Productive Development and SMEs From Shock to Business Recovery

1.1. COVID-19: Background and Challenges

The COVID-19 pandemic and shelter-in-place measures adopted are taking a heavy toll economically and socially on the Latin American and Caribbean (LAC) business community, especially on the micro-, small-, and medium-sized enterprises (MSMEs), which account for more than 99 percent of firms, 22 percent of GDP, and 61 percent of employment in the region, according to [data from ECLAC](#). As a result of reduced demand and challenges in the supply of raw materials, among other problems, companies are cutting back on production and jobs and suffering from serious liquidity problems.

Some business surveys conducted in LAC countries have revealed the impacts of the pandemic on sales, production, employment, and access to raw materials (Table 1). In Argentina, 58 percent of companies have experienced a decline in sales, while 69 percent of companies in the industrial sector in Uruguay and 79 percent of such companies in Brazil have suffered the same fate. Challenges in access to raw materials have affected 29 percent of companies in the industrial sector in Uruguay and 86 percent of the companies surveyed in Brazil. The percentage of firms that have experienced production declines ranges from 39 percent in Argentina to 81 percent in Brazil. All surveys show that smaller companies have been hit harder.

Table 1. Impacts of COVID-19 on SMEs

	Group surveyed	Percent of companies with sales declines	Percent of companies with production cuts	Percent of companies negatively affected in their purchases	Percent of companies with telework arrangements	Source March 2020 Survey**
ARGENTINA	788 SMEs across all sectors	58	39	40	37	SMEs Observatory Foundation. Survey conducted between March 13 and 17.
BRAZIL	734 companies	79	81	86	58	National Confederation of Industry. Survey conducted between March 26 and 27.
URUGUAY	122 companies in the industrial sector	69	56	29	65	Department of Economic Studies/Chamber of Industries of Uruguay. Survey conducted between March 20 and 27.
	96 IT companies	86*	n/d	n/d	97	Uruguayan Chamber of Information Technologies Survey conducted between March 24 and 31.
Caribbean countries**	325 companies	83	41	57	30	

Source: Authors' elaboration based on the studies cited.

* Sales declines expected for April 2020.

** Survey was conducted in early May and covered the following countries: The Bahamas, Barbados, Guyana, Jamaica, Suriname and Trinidad and Tobago. Firms that adopted telework refers to 20% or more employees teleworking.

*** The data in this table will be updated as new studies become available from Colombia (*Confecámaras*, Colombian Confederation of Chambers of Commerce), Peru (ASEP, Peruvian Association of Entrepreneurs), and Mexico (Ministry of Economy and National Institute of Statistics and Geography, among others).

The surveys cited in Table 1 show that the pandemic has had a negative impact in all economic sectors. The impacts have been smaller on sectors deemed essential, which have remained at least partially open (food and beverages, medicine, etc.), while tourism, restaurants, the creative economy, personal services, textiles and clothing, and the automobile industry have been hit the hardest, with devastating demand shocks. Differences in the severity of shocks are also common across countries, as confirmed in recent studies by [McKinsey](#), [Deloitte](#), and *The Economist*, among others.

Companies are addressing the health emergency through occupational health and safety protocols, telework arrangements, new digital tools, and flexible work schedules. However, companies have pointed out various obstacles that may limit the implementation and success of these measures, such as the scarcity and high costs of critical health supplies (alcohol, hand sanitizers, and face masks, etc.), shortage of devices (mainly computers), poor connectivity, lack of access to software, and inadequate digital skills of employees.

1.2. Policy Interventions Implemented to Address the Crisis

To mitigate the immediate impacts of the pandemic on businesses, governments, and civil society, a wide range of measures have been put into place. Countries around the world are developing policies and programs to support the productive sector, some of which target MSMEs in this emergency response phase through five main measures (Table 2).

Table 2. Main Measures to Address the Impacts of COVID-19 on Businesses

Type of measures	Specific measures	Countries	Level of adoption in developed countries	Level of adoption in LAC countries
FINANCIAL	<ul style="list-style-type: none"> • Soft loans and loan guarantees • Loan rollovers • Deferral and/or reduction of taxes, fees and social security payments • Timely or advance payments to government vendors • Monetary easing • Reduction of reserve requirements and benchmark interest rates 	Germany, Switzerland, United States, Argentina, Chile, and Peru	High	High
EMPLOYMENT	<ul style="list-style-type: none"> • Flexible unemployment insurance • Subsidies to partially cover the wages of workers affected by the health crisis • Telework arrangements 	Canada, Denmark, and Chile	High	High
DIGITALIZATION	<ul style="list-style-type: none"> • Subsidies for adopting digitalization solutions • E-commerce or digital invoicing platforms for MSMEs • Digital toolkit • Digital skills training 	Korea, Spain, Brazil, Chile, Colombia, and Mexico	Medium–high	Low
REPURPOSING PRODUCTION CAPACITIES	<ul style="list-style-type: none"> • Public–private coordination to temporarily repurpose idle production capacities to mass produce essential supplies 	Spain, United States, and Colombia	Low	Low
HEALTH AND SAFETY PROTOCOLS	<ul style="list-style-type: none"> • Design and implementation of health protocols for employees, customers, and suppliers of companies to work safely during the pandemic 	South Korea	Low	Low

Source: Authors' elaboration.

a) Financial

These measures improve the liquidity problems that companies, especially SMEs, are experiencing as a result of plummeting sales, severe supply chain and payment process interruptions, and a shrinking bank credit supply. These measures include credit facilities with preferential interest rates, loan rollovers, loan collaterals with special conditions, deferral on taxes, fees, and social security payments, timely or advance payment to government vendors, monetary easing, and reduction of reserve requirements and benchmark interest rates.

Germany
approved a
support
program for
SMEs



for up to
10%
of GDP.

Countries in developed regions as well as those in LAC have quickly adopted financial measures, albeit on a larger scale in the former. The governments of [Germany](#) and the [United States](#) have approved subsidized loan programs, loan guarantees, and tax relief for SMEs for historic amounts accounting for up to 10 percent of GDP. Nevertheless, there have been challenges in implementing these measures in order to disburse the funds to the SMEs swiftly and without too much red tape. [Switzerland is an excellent example](#), where close collaboration between the government and private banks, along with the use of a short and simple form, made it possible to disburse 75 percent of a fund of just over US\$20 billion to more than 76,000 SMEs in the first week of the fund's operation.

In the LAC region, one example is the Argentine Guarantee Fund (*Fondo de Garantías Argentino*, or FOGAR), which allocated [US\\$460 million](#) to facilitate the repayment of working capital loans to MSMEs, including payroll, employer contributions, and deferred check coverage. In [Chile](#), monthly corporate income tax payments were suspended and companies were allowed to pay VAT in 6 or 12 monthly installments depending on size and at zero real interest rate, in an effort to boost firm liquidity. In [Paraguay](#), the Central Bank took the following measures: (i) reducing the reserve requirement for deposits in local and foreign currency, freeing resources that could be used to increase credit supply to economic agents (both families and MSMEs) and the productive sector; (ii) cutting the benchmark interest rate by 175 basis points; and (iii) relaxing regulations on arrears, risk analysis, and loan renewal.

b) Employment

Employment measures increase business flexibility through human resource-related changes, protect workers, and facilitate work arrangements that are consistent with different operational and shelter-in-place requirements. These measures have been widely adopted in developed and LAC countries alike.

Good [examples of OECD](#) countries that are progressing in this area are Denmark and Canada. In Denmark, the government directly reimburses companies up to 75 percent of the wages paid to any worker who is quarantined, ill, or who cuts back on working hours

due to COVID-19, including the cost of independent contractors. In Canada, the government has freed up resources in the national employment insurance scheme to compensate workers whose hours have been reduced, offering a subsidy equivalent to 10 percent of business payroll to SMEs.

In terms of the LAC region, the government of [Chile](#) has enacted several laws to provide employment flexibility and worker protection. The Employment Protection Act (*Ley de Protección del Empleo*) protects the income and employment status of workers when they cannot work due to quarantines or business closures. In such cases, the law provides the option of temporary suspension of employment contracts, during which time the employer would continue to pay the social security contributions of their workers, whose wages would be paid from unemployment insurance. Another example is Chile's [new telework law](#), which allows workers and companies to agree on full- and part-time home-based working hours, promoting better balance between work, family, and social obligations. This is an innovative legislation in the region, since it adopts European standards such as the right for workers to disconnect, respecting their off-hour time, personal and vacation time, and personal and family privacy.

c) Digitalization

These measures rapidly equip companies with digital capabilities to ensure business continuity during the pandemic. They consist of technical assistance, training, technological services, information, testing facilities, and non-reimbursable resources to help companies (i) implement telework arrangements, (ii) sell and purchase through digital platforms, (iii) organize and manage production processes remotely, and (iv) strengthen cyber security and quality internet access. The roll-out of this digital agenda has been going strong in developed countries, which is why these new interventions have been implemented more rapidly in those countries than across the LAC region.

[South Korea and Japan](#) are providing funding to support companies to operate digitally. Korea allocated part of its €1.2 billion SME support package to develop virtual points of sale for traditional companies. Japan, under its US\$4.1 billion SME support package, provides subsidies to SMEs to facilitate telework, including the adoption of technological and e-commerce solutions. [Spain has created a digital platform](#) that serves as a repository of tools and information for SMEs to digitalize operations, in areas such as telework, cybersecurity, and digital commerce.

In the LAC region, Brazil provides a noteworthy example in this measure through [Sebrae](#), an online portal that provides digital services to SMEs, such as invoicing, e-commerce platforms, and comparisons of financial services. It also provides access to expert input on the impacts of COVID-19 on businesses, as well as a wide range of online courses for entrepreneurs and business professionals to help them to continue to thrive during the crisis (e.g., "Selling Online in Times of Coronavirus" and "Digital Marketing for Entrepreneurs").

Key digital capabilities:



telework, online commerce, remote management, cybersecurity, and connectivity

In Colombia, the Ministry of Information and Communication Technologies provides resources for MSMEs through its [digital platform](#). Moreover, the chambers of commerce offer additional training opportunities on e-commerce, telework methods, digital marketing, and new technologies, among others. They also provide tools to promote online business, for example giving MSMEs access to virtual showcases and creating a [Virtual Business Center](#) where companies can hold online meetings.

In Chile, the Ministry of Economy has implemented a program to support the digitalization of MSMEs. The program offers services and support through partnerships with technology companies and other organizations. One of the services, created in partnership with Chile's Foundation for a Digital Country (*Fundación País Digital*) and the IDB, is [digital checkup](#), a platform that allows MSMEs to conduct a self-diagnosis of their digital capabilities. Based on the results, it then provides a series of recommendations, tools, and available financing sources to implement the changes needed.

d) Repurposing Production Capacities

Through public–private partnerships, these measures facilitate the temporary repurposing of idle production capacity to ensure large-scale provision of essential goods, such as health supplies (disinfectants and hand sanitizers), personal protective equipment (PPE) (e.g., gowns and face masks), and medical supplies (e.g., diagnostic tests and ventilators).

In Spain, the Ministry of Industry has [collaborated with 15 companies](#), including Siemens and SEAT, as part of a nationwide call to boost domestic production of three strategic categories of essential supplies during the crisis: ventilators, PPE, and restricted products. In the United States, through powers conferred during World War II, the government has ordered automakers such as Ford and GM, as well as other industrial companies such as Medtronic, to [manufacture ventilators](#). Medtronic even [published its ventilator design specifications](#) to help fellow manufacturers improve their designs.

In the LAC region, the government of Colombia launched an initiative to support entrepreneurs ([#EmpresariosPorElEmpleo](#)), which is prioritizing the production of medical protection supplies in high demand (alcohol, hand sanitizer, gloves, and N95 masks) and [has announced a bid](#) for companies of all sizes and sectors to provide them. At the same time, Colombia's Ministry of Health has issued [a resolution](#) to streamline the health registration procedures for the production and sales of medical protection supplies. In Antioquia, [companies in the fashion industry have teamed up](#) to make medical protection gowns and supplies in coordination with the government and the Medellín Chamber of Commerce. The latter has created the “Cocreation Laboratory for Health Innovation” (*Laboratorio de Co-creación para la Innovación en Salud*) with assistance from the General Hospital and local universities.

In some countries,



industrial firms have repurposed their production toward manufacturing essential goods.

e) Health and Safety Protocols





These measures support companies in the design and implementation of health protocols that help their employees, customers, and suppliers function safely during the pandemic. Business continuity measures which have focused on essential services during the partial or total quarantine will be key with the relaxing of social distancing measures and reopening of businesses. Section 1.3 proposes a few ideas.

Although the majority of LAC countries have portals that provide general health recommendations, little progress has been made in developing specific protocols for the productive sectors. Nevertheless, some business associations and chambers of commerce are interested in developing these protocols and some large companies have put operational protocols into place. The situation varies in developed countries. For example, in South Korea, industries and ministries are developing health protocols collaboratively, with detailed information on issues such as the obligation of businesses in terms of the provision of hygiene supplies for their employees, protocols for cleaning and disinfecting workplaces, employee health monitoring, recommendations on the maximum number of people allowed in meetings, and protocols for dealing with COVID-19 cases, among others.

1.3. Ideas for Reopening the Economy and Addressing the Post-Crisis Impacts

The measures that have been developed so far, in developed regions as well as in the LAC region, provide a strong platform for sharing lessons and fine-tuning short-term interventions. However, additional innovative measures are needed to facilitate the recovery of the productive sectors. Recommendations in this area are grouped into four main categories (Table 3).

Table 3. **Proposals to Promote the Reopening of SMEs and Productive Sectors**

	Category	Specific measures
	PROTOCOLS AND DATA	<ul style="list-style-type: none"> • Public–private partnerships to establish, communicate, implement, and monitor health and safety protocols for various productive sectors • Administration of diagnostic and antibody tests on a massive scale • Creation of a personal risk certification system
	DIGITALIZATION AND SME SUPPORT	<ul style="list-style-type: none"> • Loans, subsidies, and cofinancing for technology adoption (software, digital applications and platforms, hardware, etc.) • Cofinancing of digitalization services (digital maturity assessment, expert advice, strategies, and digital skills training) • Business support services that focus on selling on digital platforms • Review of and update to the regulatory framework to support telework and the digital transformation of SMEs (e-signature, payment methods, and e-commerce) • Support for capacity building and infrastructure to enhance cyber security for SMEs
	VALUE CHAIN	<ul style="list-style-type: none"> • Strengthening strategic value chains • Capturing sustainable business opportunities that arise in the restructuring of global value chains • Repurposing companies to produce essential supplies to respond to the crisis
	BUSINESS OPENINGS AND CLOSURES	<ul style="list-style-type: none"> • Direct purchase of SME shares by governments with a clear post-crisis exit plan and clear rules beforehand • Creation of fast-track procedures for business openings and closures

Source: Authors' elaboration



a) Protocols and Data

When the number of new cases begins to decline and health systems are no longer overstretched, even in the absence of a COVID-19 vaccine, governments will face the challenge of reopening the economy and launching the transition to a “new normal.” Decisions on whether or not to isolate high-risk groups, reopen national and international travel, and relax restrictions on large gatherings will have to be made based on definitions of which sectors and regions can reopen and under what conditions. The criteria for defining this process will be a balance between pertinent economic and social considerations,

number of cases, and feasibility of working without causing new infections. In this context, some critical measures include the following:

- ▶ **Establish and clearly communicate business health and safety protocols.** It will be essential to define the minimum health and safety protocols for various productive sectors and sub-sectors. This will require coordination between the public and private sectors, an intensive training plan, and absolute clarity on the nature of the measures to be taken (i.e., whether they are voluntary or mandatory) and the consequences of non-compliance. In South Korea, for example, industry-specific standards have been established that include details on the type of minimum PPE required, rules on employee management (scheduling of shifts and reorganization of processes to ensure social distancing), health checks (taking workers' temperatures twice a day), and protocols for administering tests or managing infections. In the LAC region, with the support of the IDB, this process is under way. The ongoing challenge is to adapt these protocols to the reality of SMEs and economies with a significant informal sector.

- ▶ **Administer diagnostic and antibody tests on a massive scale.** There are still more questions than solutions in this area. What is clear is that in order to implement the protocols, governments will have to effectively manage a wide range of data to enable the monitoring of, for example, the infected population, recovered and immune population, and high-risk population. This requires the capacity to: (i) administer diagnostic and antibody tests on a large scale, and (ii) manage the test data to mitigate risks. Some LAC countries can use artificial intelligence to develop predictive models and/or use data to test and trace, as has been done successfully in South Korea and China, as long as the regulatory implications on data privacy are considered. However, the challenge for most LAC countries will be to come up with innovative solutions in the absence of such sophisticated technological capabilities. In these countries, the first response may come in the form of solutions proposed by startups or other innovative interventions.

- ▶ **Establish a personal risk certification system.** Any transition to normality must include a mechanism to differentiate between immune and at-risk individuals. Germany is exploring the possibility of issuing an “immunity passport” to people who have already recovered from COVID-19 and have antibodies in their immune systems, allowing them to work and move freely in the community. To mitigate some of the risks of this scheme, it is important to put in place a certification system with the right incentives and checks to ensure a transparent process and prevent unequal treatment of uncertified workers vis-à-vis their certified peers as well as anti-competitive practices by companies that poach workers from their competitors. For LAC countries, it seems reasonable to explore less technology-intensive solutions and focus on more feasible options, such as implementing biweekly shifts for companies to reduce infections.

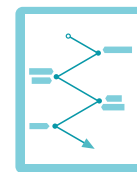


b) Digitalization and SME Support

The health crisis has led many companies to implement telework arrangements and other technological platforms to move sales, purchases, production management, and other critical processes online. In doing so, companies incurred significant costs and also learned a great deal. This digitalization process may create an inertia that will be difficult to stop in the productive sector, although the extent will vary greatly depending on company size and sector. Many MSMEs, especially those in the more traditional sectors, may be stuck at low levels of digital maturity, putting them at a greater disadvantage and making them more prone to exiting from the market. In this regard, in addition to providing liquidity measures, loan guarantees, and financial support, governments will have to implement specific and complementary programs to encourage digitalization, so as to increase the resilience of the productive sector in the medium term. The following resilience-building measures should be considered:

- ▶ **Promoting technology adoption** in terms of loans, subsidies, and cofinancing of software licenses, applications, and digital platforms, as well as hardware equipment and technological support services. These measures could be implemented in the transition period and even in the medium term to better prepare SMEs for digital transformation.
- ▶ **Digitalization schemes.** Providing cofinancing for digital maturity assessment services, digital transformation strategies, expert advice, and digital skills training (boot camps and others) on a large scale can provide essential support to companies making the organizational and management changes necessary to shift toward digitalization. Measures to support these schemes can be part of a business development package or other specialized interventions.
- ▶ **Business support services.** In the post-crisis period, business support services provided by entities such as small business development centers (SBDCs) will be more critical as SMEs navigate challenges in liquidity, working capital, and rules of potential government assistance programs. SBDCs and MSMEs should consider expanding their digital platforms and placing a greater focus on remote training.
- ▶ **Regulatory framework and data security.** It is necessary to ensure that the regulatory conditions to support telework and digital transformation are in place. This involves reviewing and updating when necessary issues such as e-signature, electronic payment methods, and ease of doing e-commerce during the emergency transition period. Also, as the pandemic continues to speed up digital transformation, more effective cybersecurity infrastructure will be needed across the region. LAC governments could play a leading role in providing such infrastructure as a public good as SMEs typically lack the resources to do so themselves.

c) Value Chain



The LAC region can expect to see three trends in value chains in the post-crisis period: (i) restructuring of value chains and local production to avoid disruptions in critical products; (ii) opportunities for the region in new global value chains; and (iii) dismantling of production and supply schemes for critical supplies established during the emergency. The following measures are consistent with these trends:

- ▶ **Strengthening strategic value chains.** In the post-crisis period, countries may rethink value chains in terms of strategic importance. These value chains may include, for example, those of medical and health supplies, for which production capacity must be maintained within the country or closer to its borders (nearshoring). Countries may also promote large-scale additive manufacturing domestically due to national defense considerations. Under this scheme, countries could mobilize companies to make emergency supplies such as ventilators, replicating the model of maker communities. In this case, countries will have to consider having special rules for the treatment of intellectual property of emergency supplies.
- ▶ **Restructuring global value chains.** While it would be hard to deny that the pandemic has caused disruptions in the global value chains, one cannot assume that they will go back to where they were previously. As some economies recover, and with them the demand for certain products or services, countries that recover faster or manage the transition to the “new normal” more effectively may have better opportunities to participate in the rebuilding of global value chains.
- ▶ **Special powers to repurpose certain industries.** Countries with a legal framework to repurpose certain industrial sectors have found it helpful in scaling up the production of essential supplies to meet the needs of the crisis. This approach is not risk-free, however, as special powers to facilitate repurposing can also be used for protectionism in production or distribution.

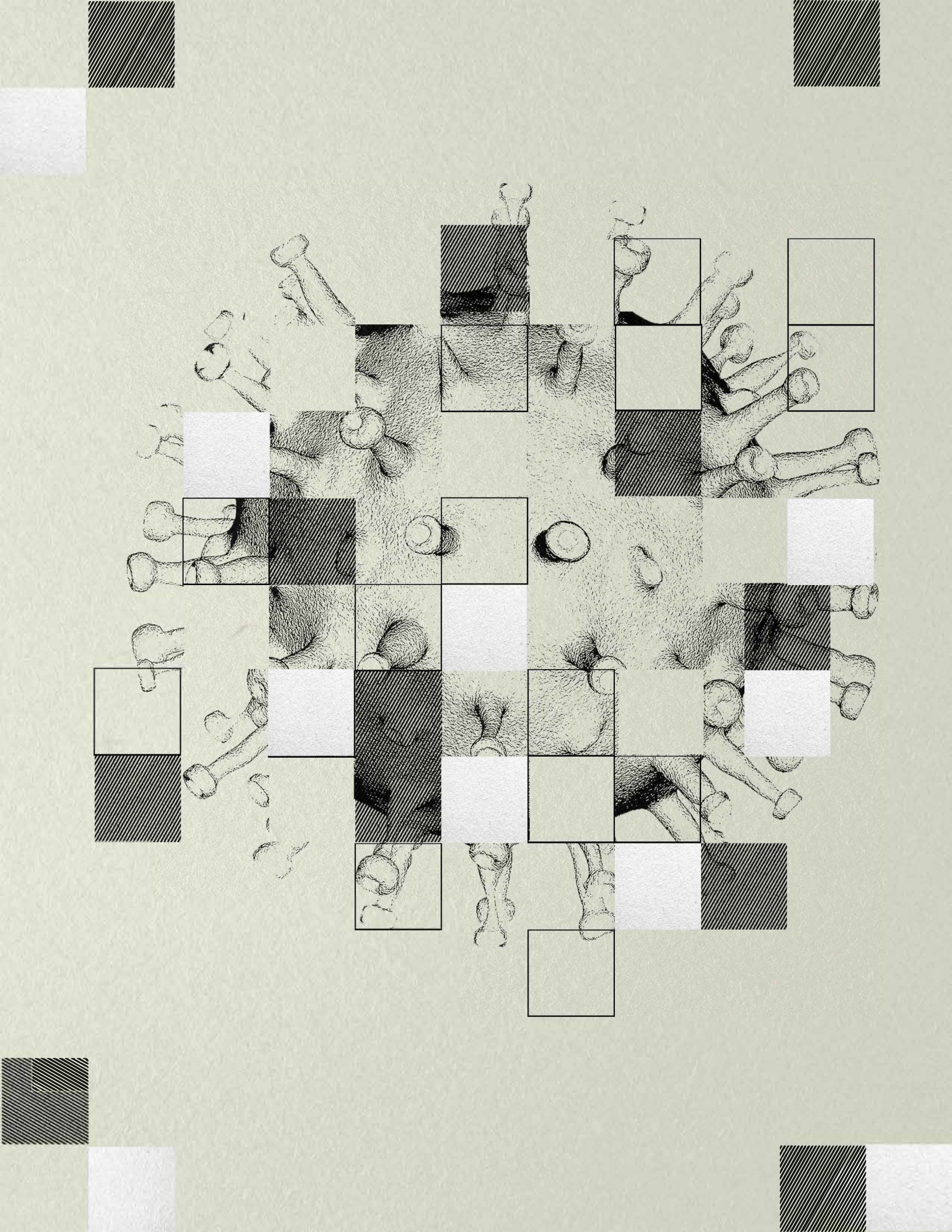
d) Business Openings and Closures



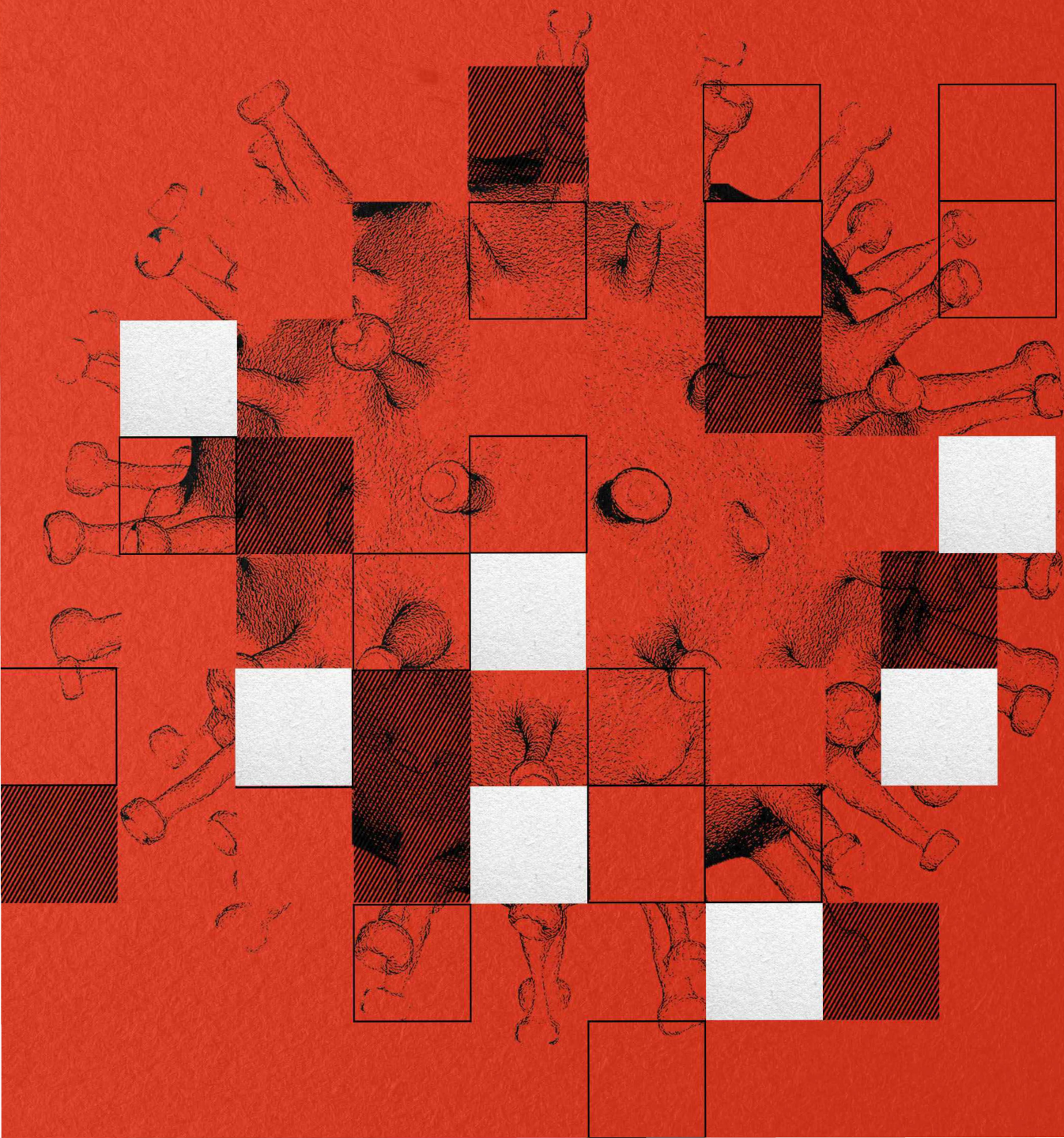
Several countries are taking measures to avoid business bankruptcies by extending deadlines on the repayment of loans, taxes, and other business obligations. These efforts are crucial for preventing the loss of productivity, capital, and knowledge that bankruptcies entail. They are also key to mitigating the social consequences of bankruptcies. Countries should consider extending such measures in the post-crisis period to prevent liquidity and insolvency problems. However, despite extraordinary efforts by the public and private sectors, it is likely that many MSMEs will still go bankrupt at some point as a result of the economic crisis.

- ▶ **Stock purchase.** A more direct way to prevent mass bankruptcies may be the direct purchase of SME shares by governments. Some countries are already doing this to support the capitalization of dynamic companies and enterprises, which will be key to strengthening the national innovation system. This practice had some success stories during the 2008 crisis. Nevertheless, governments that decide to undertake these measures this time must have a well-defined post-crisis exit plan and be crystal clear on the rules before making any stock purchases. Some countries may require legal or regulatory changes in order to explore this option.

- ▶ **Create fast-track procedures for business openings and closures.** The LAC region lags behind other regions in the category of resolving insolvency in the [Doing Business Index](#), ranking at 110th place compared the OECD high-income region which comes in at 28th. If a significant amount of companies go bankrupt in LAC countries during the post-emergency transition period, existing bankruptcy mechanisms may be overwhelmed, delaying the reallocation of productive assets from bankrupt firms and consequently steps toward economic recovery. In this regard, countries could consider creating fast-track bankruptcy procedures, which would take into account best practices in asset reallocation. At the same time, countries should consider fast-track processes for businesses to open to facilitate entrepreneurship in the transition period. The latter could be important for MSMEs in the informal sector that may have experienced the potential benefits of the formal economy during the crisis. If these fast-track procedures work well, countries could initiate legislative processes to embed these procedures into their legal systems.



2. Innovation and Startups





Business Innovation and Startups

Responding to the Emergency and Rethinking the New Normal

2.1. COVID-19: Background and Challenges

Health crises such as the COVID-19 pandemic highlight the urgency of finding solutions to a number of problems. Business innovation and startups can identify unmet needs and respond with proposals to provide effective solutions to certain aspects of the pandemic.¹

One of the greatest challenges for innovation and entrepreneurship ecosystems in the LAC region in a context such as this one is the **coordination capacity** of stakeholders in each ecosystem to respond swiftly, both to emergencies and to ongoing needs. This challenge is particularly complex when stakeholders cannot meet in person to solve coordination problems quickly.

Financing can also be a challenge. Although there are programs aimed at supporting the development of new ideas, they must now compete with other initiatives, especially health response initiatives, for resources. In addition, similar to MSMEs, **startups** are confronting both demand-side and supply-side constraints in the supply of parts, components, services by vendors, and other critical inputs, which may threaten the survival of MSMEs in the short term. This is reflected in their capacity to obtain financing. Data from China, the

¹ In this report, “innovation or business innovation” refers to the process through which established companies develop solutions based on new knowledge that has the potential to create economic and/or social value, while “entrepreneurship or startups” refer to the process of creating new companies with purposes similar to the previous case.

first country hit by the health emergency, show that **venture capital investments** in the country **decreased by more than 50 percent** between November 2019 and February 2020 relative to the rest of the world. A recent study of more than 500 startups in Europe and Latin America by the **incubator Wayra** shows that the COVID-19 crisis is negatively affecting three out of every four startups, and one in four believes that it will not survive if the crisis lasts more than three months. The results of a recent survey by **Prodem and the IDB** of more than 2,200 startups in the LAC region are even more alarming. The survey shows that the crisis is having a negative impact on the output of three out of every four startups, and 83 percent of respondents reported a decline in sales. Fifty-nine percent of these companies did not believe that they would survive if the crisis were to last more than two months. According to Dealroom—a company specialized in data and innovation—technology companies in Europe **lost nearly €400 billion** between February and March 2020. If the pandemic were to have a similar impact on the rest of the world, startups and innovation companies could suffer devastating repercussions.

In addition, this crisis is affecting some key nodes in the **innovation and entrepreneurship ecosystems**, such as incubators, accelerators, and coworking spaces. According to a **survey by Coworker** in March 2020 of more than 14,000 coworking spaces in 172 countries, since the COVID-19 outbreak, more than 71 percent of coworking spaces have experienced a significant decline in the number of people working on the premises, as well as a decrease in contract renewals and new membership inquiries.

Based on this preliminary analysis, there are at least four broad areas where business innovation and entrepreneurship activities will require support to bring about effective responses to the crisis.

- a) **Emergency financing** to solve liquidity problems
- b) **Coordination mechanisms for innovation and entrepreneurship ecosystems**, as well as **funding of support networks**, such as coworking spaces, accelerators, incubators, angel investors and venture capital network
- c) **Funding for innovative proposals** of established companies (innovation) and new companies (startups) alike, either individually or in partnership
- d) **Demand-side support**, both to quickly define challenges and problems and to improve the capacity to finance the capacity to design solutions

The crisis will wreak havoc on countries' productive and social structure, and its outcome will lead to a new normal that will require stakeholders to take on different roles in the entrepreneurship and innovation ecosystems. The new normal will also mean innovative business models, financing structures, and collaborative networks. Therefore, in addition to responding to the health emergency with innovation, stakeholders will need to think about how innovation and startups can facilitate regional economic recovery in the medium and long term. Time and resources must be devoted to the bioeconomy, artificial intelligence, and industry 4.0, among others.

2.2. Ongoing Policy Interventions to Respond to the Crisis

While innovative startups have been hard hit by the pandemic, they are also proving to be part of the solution. A number of innovative initiatives are already providing solutions and technologies for short-, medium-, and long-term health, social, and economic challenges (Box 2). Throughout the world, groups of entrepreneurs, business associations, technology communities, and manufacturers have been working to identify urgent needs and bottlenecks with an eye toward finding quick and creative solutions.

Although some startups and innovative companies find opportunities in the current circumstances, many others with ideas and solutions fail to grow and bring their ideas to the marketplace, either due to a lack of funding or because the crisis has affected their innovation and entrepreneurship ecosystems. Table 4 summarizes the four areas mentioned above and a detailed analysis follows.

Table 4. Key Measures Adopted to Support Startups and Innovative Companies In Light of COVID-19 Impacts

Type of measures	Specific measures	Examples	Level of adoption in developed countries	Level of adoption in LAC countries
EMERGENCY FUNDING FOR STARTUPS	• Emergency funds earmarked for ensuring liquidity for innovative startups	France and Germany	Medium-low	Low
COORDINATION AND FUNDING OF KEY NODES OF INNOVATION AND ENTREPRENEURSHIP ECOSYSTEM	• Strengthening of ecosystem nodes such as incubators, accelerators, and coworking spaces	South Korea, Spain, Argentina, and Chile	Low	Low
	• Institutional coordination to pool efforts and connect supply and demand in light of challenges posed by COVID-19		Medium	Medium-low
SUPPORT AND FINANCING OF INNOVATIVE SOLUTIONS	• Quick calls for innovative solutions for COVID-19	Italy, Spain, Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Honduras, Panama, Paraguay, Peru, and Uruguay	High	High
DEMAND-SIDE SUPPORT AND DEFINITION OF CHALLENGES	• Hackathons and definition of the challenges posed by COVID-19	Germany, Italy, United Kingdom, Estonia, European Commission, United States, Peru, and other LAC countries	High	Medium
	• Public procurement of innovations for COVID-19	Brazil	Medium	Low

Source: Authors' elaboration.

Startups



are not usually eligible for financial assistance geared toward SMEs.

a) Emergency Funding for Startups

The constraints faced by startups and SMEs in terms of demand and supply of their products and access to capital are creating liquidity problems. In view of the strategic importance of innovative ventures for economic growth, a rapid response to this challenge is required. [Germany and France](#) are among the countries that have acted swiftly.

The German government announced a €2 billion fund earmarked for financing technology startups. Similarly, France announced a €4 billion plan to support startups affected by the crisis, including a short-term refinancing scheme (€160 million), early payment of certain tax credits (€1.5 billion), accelerated payment of planned investments in the sector (€150 million), and liquidity guarantees (€2 billion). The French government also plans to meet with representatives of venture capital funds to help raise more financial support for their startups.

LAC governments have rolled out many policies to address the liquidity problems of SMEs (see Section 1 herein), but they have yet to propose specific initiatives that respond to the urgent liquidity problems of technology startups. This puts the survival of these emerging businesses at risk, as they are not usually eligible for financial assistance geared toward SMEs.

Box 1. Innovative Startups for Crisis Response

From diagnostic and telemedicine tools to ventilators and CT scanners, the following are some of the innovative solutions designed in record time to respond to the health crisis. In **South Korea**, where one of the key strategies was mass testing, a startup [created coronavirus diagnostic kits](#) within three weeks, obtained approval from the health authorities, and began producing 10,000 kits per week. In **Italy**, a small startup specializing in earthquake sensors [designed ventilator valves](#) and repurposed off-the-shelf snorkeling masks into mechanical ventilation masks in a matter of days. In the **United States**, a startup launched a diagnostic [sample collection kit](#) for home use. In the **United Kingdom**, Babylon Health, a digital unicorn, designed an [application for detecting and reporting COVID-19 symptoms](#).

A startup in **Chile** shared its designs for [3D printing of antimicrobial masks](#) containing copper micro-particles and promoted their use around the globe. In **Brazil**, the startup Hi Technologies, created by former students of the PUC-PR University, is producing a kit that uses artificial intelligence and the internet of things to [diagnose the coronavirus in less than 15 minutes and with a very high accuracy rate](#) (93-98 percent) at a cost of US\$30. Another example from Brazil is Timpel, a bioengineering startup that [developed a portable CT scanner](#) to monitor and optimize artificial respiration

for critically ill patients, which helps reduce occupancy of ventilators and intensive care unit (ICU) beds. The project received public funding from development institutions such as Finep (*Financiadora de Estudos e Projetos*) and Fapesp (the São Paulo Research Foundation), as well as funding from private equity and venture capital. The CT scanner costs one-tenth the price of conventional alternatives, and it is being used for the treatment of COVID-19 in Japan, Spain, Italy, the United States, and eight other countries. The technology has resulted in seven international patent families, all owned by Timpel.

For their part, IDB Lab and Connect Americas launched an interactive map that shows innovators throughout the LAC region that are spearheading potential solutions for the coronavirus by country and by category.

b) Coordination and Funding of Key Nodes of Innovation and Entrepreneurship Ecosystems

The second type of interventions aims to strengthen capacity and coordination between the various stakeholders in innovation and entrepreneurship ecosystems. In the current crisis, it is particularly important to strengthen some of the key nodes of these ecosystems, such as incubators, accelerators, and coworking spaces, to keep the entrepreneurial and innovative communities socially active and engaged during this period of social distancing. One of the most direct approaches, for example, is to provide financing and technical support for virtual workshops, trainings, and meetings for members and support them in moving their activities online as much as possible. Some of the most capable organizations are [creating new platforms for their members](#) with virtual meeting rooms (e.g., Zoom and Skype) that are open all day long. Nevertheless, the public sector has not been doing enough in this regard.

It is also important to have effective coordination mechanisms, which allow solution providers to understand the requirements they must meet, speed up feedback on their proposals, and encourage rapid piloting. In the LAC region and elsewhere, there have been rapid responses to this challenge.

In [South Korea](#), representatives from startups, the government, and the Korean Pharmaceutical Association jointly created an action plan to develop digital solutions to enable the production and distribution of face masks. In the [United Kingdom](#), the Department for Business, Energy, and Industry Strategy (BEIS); Department for Research and Innovation (UKRI); Department of Education (DfE); Office of Students (OfS); and others established a task force to collect data on the financial impact of the pandemic and design evidence-

**Incubators,
accelerators,
and coworking
spaces**



**are key to
keep the
entrepreneurial
communities
socially
active and
engaged.**

based public policies. In [Spain](#), the government and major biotechnology companies established an industry roundtable to coordinate the production of numerous types of diagnostic kits.

Chile's economic development agency (Corporación de Fomento de la Producción, or CORFO) has strengthened the [Colaboratech](#) platform, which aims to coordinate efforts to provide solutions to specific health challenges. With financial and technical support from the IDB, CORFO launched a platform to connect its work on both the supply (designers and engineers) and demand side (doctors and the Ministry of Health) in the [development and scaling up of mechanical ventilator prototypes](#). Once they are technologically viable, these prototypes can be scaled up through the [Conecta y Colabora Program](#), recently created by CORFO to increase the chances of success of innovative ventures in challenging times through collaboration. In [Argentina](#), to improve the coordination of pandemic-related innovation activities, the Ministry of Science, Technology, and Innovation (Mincyt); the National Scientific and Technical Research Council (Conicet); and the National Agency for Scientific and Technological Promotion (R&D&I Agency) created a COVID-19 Coronavirus Unit. The goal is to mobilize financial resources as well as scientific and technological capacities to promote technological projects, human resources, infrastructure and equipment, the creation of collaboration networks, and coordination mechanisms with public and private sector organizations.²

Finally, in Chile, coordination between the public and private sectors mandated the timely compulsory licensing of certain potentially useful patents for the treatment of COVID-19. In fact, soon after the [Chilean Congress](#) approved a draft resolution on the compulsory licensing of patents useful for the treatment of COVID-19, the company AbbVie coordinated with the National Institute of Industrial Property to [give up some of its patents](#) on drugs being studied for their effectiveness against the coronavirus that can be produced by Chilean laboratories once their effectiveness against the coronavirus is proven.

c) Support and Financing of Innovative Solutions

These measures facilitate the supply of innovative products and services by supporting entrepreneurs with direct and indirect financing, which complements or crowds in private financing. At the global level, many public initiatives are emerging to stimulate the supply of innovative solutions and products to tackle COVID-19. They include calls for proposals in research, technology, and innovations to finance SMEs, startups, companies, and scientific centers that provide solutions to emerging challenges.

In this regard, the [European Commission](#) launched a special call with €164 million in funding from the European Innovation Council Accelerator, which offers subsidies and

² Due to its recent creation, there is currently no further information on the measures adopted and their results.

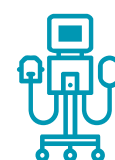
venture capital investments to startups and SMEs with technologies and innovations that address different aspects of the coronavirus. In [Italy](#), the public innovation agency issued a call for technological solutions (aimed at startups, established companies, universities, and research centers) that involve, for example, robots that perform activities usually carried out by nurses, or drones to disinfect public areas or to monitor compliance with social distancing rules. Similarly, [Innovate UK](#) has issued a specific call for companies and startups with innovative solutions to tackle the pandemic in the United Kingdom.

In the LAC region, many public innovation and entrepreneurship agencies have launched or are in the process of launching special initiatives and calls to support innovation to address the health emergency and its impacts. Many of them address research and scientific issues as well as the development, production, and distribution of innovative products. Since mid-March 2020, calls of this nature have been launched in Argentina, Brazil, Chile, Colombia, Dominican Republic, Honduras, Paraguay, Panama, Peru, and Uruguay.³

In [Uruguay](#), the National Agency for Research and Innovation (*Agencia Nacional de Investigación e Innovación*, or ANII) issued a call for teams consisting of companies and research institutions to develop and produce a COVID-19 diagnostic kit that must be ready and in use by May 2020. In addition to requiring collaboration between companies and the scientific community, the Ministry of Health set up a working group for the call to develop guidelines for the kit. It facilitated access by applicant companies to the Ministry's data on dozens of suspected cases of coronavirus infection, which were studied to develop the diagnostic kit.

In [Brazil](#), a fascinating collaboration between startups and large companies has emerged. Magnamed, a startup company supported by IDB Lab and Fapesp committed to producing 6,500 ventilators in 90 days under a contract with the Ministry of Health. Despite having the human and technological capacity (producing 1,800 ventilators annually for 50 countries), Magnamed needed to ramp up production to deliver these ventilators. For this purpose, Magnamed entered into a production and industrial repurposing agreement with other large companies. Positivo will supply circuit boards for the ventilators. Suzano will provide engineering solutions, global procurement of inputs, and working capital. Kablin will be responsible for procurement, managing component import, and supplying packaging for the ventilators to be shipped to hospitals. Flextronics will create a dedicated production line to assemble the ventilators in accordance with Brazilian health authority standards. Fiat-Chrysler will help identify and eliminate production bottlenecks and obtain credit facilities to expand the production capacity. White Martins will supply the oxygen for ventilator testing, as well as gas consumption engineering design and infrastructure.

**1 startup
and 7 large
companies**



**collaborated
to produce
6,500
ventilators for
the Ministry of
Health in
Brazil.**

³ Many calls for innovative solutions have been issued in the LAC region to address COVID-19. Due to limited space, only a few of them are highlighted in this section. Chapter 3 provides a more detailed description of research support initiatives.

[Start Up Chile](#), the Chilean government accelerator, has launched a contest to encourage entrepreneurship with innovative solutions for the coronavirus. The support includes funding and a package of business services, including acceleration, mentoring, thematic workshops, pitch training, and legal advice and networking with companies, investors, accelerators, and incubators around the world.

Argentina has rolled out supply-side policies in response to COVID-19. With support from the IDB, the Ministry of Productive Development of Argentina plans to issue a special call open to companies and startups to solve problems for other companies and startups. The call aims to increase the production of equipment and development of technological products to address the health dimension of COVID-19, as well as other aspects related to the improvement of MSME management in the context of social distancing.

Box 2. Sectoral Policies to Address COVID-19: The Case of Creative Industries

The cultural and creative industries (CCIs) are among the hardest hit by the current crisis. While some CCIs (museums, theaters, and public libraries) receive public support and several of them are dominated by large multinationals with relatively robust and sustainable revenues (e.g., television networks and content platforms like Netflix or Spotify), most CCIs consist of MSMEs and self-employed professionals. In the LAC region, the percentage of self-employed and informal workers in these industries is very high.

The current crisis poses a structural threat to all of these players. Public policies are urgently needed to support cultural and creative productions so that they can recover from the crisis and take advantage of new opportunities. These include policies to support companies in the creation and adoption of new business models that leverage the high demand for digital content driven by the spread of COVID-19.

[Uruguay](#) has taken the first step in this direction. ANII and IDB Lab launched an innovative initiative to finance proposals for up to US\$4,500 from creative industries in various sectors to raise awareness about the treatment and care of COVID-19, or to provide entertainment or make prolonged shared living arrangements and quarantine more enjoyable. Similarly, [Paraguay](#), with the support of the National Culture Secretariat, the IDB Lab and the CIRD Foundation, issued a call for creative and cultural companies to develop solutions to help overcome the impacts of the health emergency. Proposals can be experimental productions or services, disruptive technologies, new business models, or the development and/or production of works of art (e.g., recordings, scripts, and audiovisual works, etc.), video games, applications, online art festivals, virtual theater workshops, and others.

d) Demand-side Support and Identification of Challenges

In the LAC region and elsewhere, new initiatives are emerging in an effort to identify challenges and problems. Companies, startups, and technological communities, often with the support of governments, are launching a series of virtual hackathons at a national, regional, or global level. Among developed countries, initiatives have emerged in [Estonia](#), [Finland](#), [Germany](#), [Italy](#), the [United Kingdom](#), the [United States](#). Joint initiatives include the [Pan-European hackathon EU vs Virus](#) organized by the European Commission, the [COVID-19 Global Hackathon](#), and the [Global Hack](#). Global Hack was launched as part of the UN Sustainable Development Goals Action Campaign to identify the main challenges caused by the pandemic and propose offline or online solutions.

In the LAC region, numerous initiatives have been launched. Among them is the [Hackaton COVID-19](#), launched by the *Innovate* Program of the Peruvian Ministry of Production. It has produced prototypes of applications, drugs, disinfectants, and chatbots that could be implemented in the short term. One of the strengths of Peru's initiative is its clear objective of pooling efforts and coordinating stakeholders. The initiative established protocols on how to coordinate two or more proposals by institutions that are proposing similar solutions.

These types of hackathons are key, given the rapidly changing nature of the challenges posed by the crisis. Their goal is to develop a structured definition of challenges and problems. While the challenges were primarily in the production of tests and personal protection equipment during the first weeks of the crisis, in the coming months, hackathons and other demand-side coordination programs will probably focus on [more targeted and accurate applications of social distancing measures](#) to allow for a gradual and safe return to work for those who are immune to the virus. [Immunity passports or chips](#), which are being designed, could provide a preliminary response to these new challenges.

Public procurement of innovation (PPI) programs for COVID-19 are among the extraordinary demand-side support policies being designed to address the health crisis. These programs focus primarily on procuring medical and health supplies in the initial phase. PPI initiatives address problems for which there are no off-the-shelf solutions (e.g., a COVID-19 vaccine). Through PPI, public institutions can establish mechanisms to identify challenges in the provision of services to citizens and receive proposals for solutions from companies and startups in an ongoing manner. Since the outbreak of the coronavirus, many public entities are expediting their procurement processes. For example, in Brazil, the Ministry of Science, Technology, Innovation and Communications is [procuring seven technical solutions](#) to tackle COVID-19, which include, among others, clinical trial protocols, AI-based selection of molecules to inhibit viral replication, and vaccine development through Finep (Financiadora de Estudos e Projetos), the public government science and innovation development agency. In addition, the Brazilian Ministry of Health had to [introduce temporary flexibility measures in its procurement procedures](#) in light of the public health emergency, paving the way for more effective PPI processes over the coming months.

Through PPI,








**institutions
can focus on
problems for
which there are
no solutions
in the market.**

2.3. Ideas for Economic Recovery and Addressing the Post-Crisis Impacts

All projections show that, once the pandemic has passed, LAC economies will be in a state of fragility and deterioration as a result of the decline in both local and foreign demand (income effect) and supply (mandatory quarantine). Additionally, LAC will also face the challenge of restarting the economies amid ongoing risks of new infections and a potential return to quarantine, with their corresponding economic and social impacts on the population. Innovation will play a key role in the recovery phase by providing solutions for the development of new diagnostic tests, vaccines, medicines, tools to manage infection monitoring, and solutions to facilitate the adoption of new business models, adapted to the needs and capacities of the region. Table 5 presents public policy proposals to promote innovation and entrepreneurship in the new normal as a result of the crisis.

Table 5. Proposals to Promote Innovation and Entrepreneurship and to Accelerate Economic Recovery

	Proposals	Specific measures
	SCALE UP TARGETED FUNDING FOR INNOVATIVE STARTUPS	<ul style="list-style-type: none"> • Provide emergency financing to solve liquidity problems. • Provide financing to scale up technological solutions to tackle the crisis and innovative companies whose business model adapts to the conditions under the new normal.
	ACT AS A LENDER OF LAST RESORT TO THE NODES (HUBS) OF INNOVATION AND ENTREPRENEURSHIP ECOSYSTEMS	<ul style="list-style-type: none"> • Provide dedicated funding and technical support to move the activities and spaces of ecosystem nodes online. • Create steering committees that bring together leaders of innovative and entrepreneurial communities to discuss challenges and solutions, offer mutual assistance, and develop a sense of community.
	COMMIT TO A REGIONAL AGENDA	<ul style="list-style-type: none"> • Strengthen collaboration through international networks such as the Latin American Network of Innovation Agencies and the Pacific Alliance.
	FACILITATE THE DEVELOPMENT, TESTING, AND ADOPTION OF INNOVATIVE SOLUTIONS IN THE HEALTH SECTOR	<ul style="list-style-type: none"> • Create technology test beds for health sector applications. • Encourage the use of public procurement of innovation.
	FINANCE SECTORAL KNOWLEDGE PRODUCTS	<ul style="list-style-type: none"> • Pool funding from companies in a given productive sector to finance science and technology institutions to propose solutions that address common challenges in the sector.

Source: Authors' elaboration.

a) Scale Up Targeted Funding for Innovative Startups

In previous crises, such as the one in 2008–09, venture capitalists retreated more abruptly and readily than others. Thus, many high-growth startups fail to attract venture capital, which can hamstring their growth, making it necessary for the public sector to respond rapidly. Therefore, it is crucial to ensure that technology startups can access financing for SMEs activated in response to the current crisis (see Section 1 herein) and/or to design targeted funding to ameliorate the liquidity problems faced by innovative ventures. At the same time, while the high number of calls for innovative solutions to address the health crisis shows the willingness of many countries to achieve high-impact innovations in the shortest possible time, it may lead to a duplication of effort. It is therefore not the best solution, especially in the absence of subsequent interventions to scale up these innovations.

Thus, in the medium term, it will be essential to design and implement mechanisms to support the scaling up of innovative enterprises whose business models adapt to the circumstances of the new normal and address existing challenges (for example, by finding substitutions for unavailable imports). This should be done with direct public funding and potentially in partnership with private organizations, seeking complementary sources of financing such as corporate venture capital (CVC) and allowing participation by new players such as pension funds.

b) Act as a Lender of Last Resort to the Nodes (Hubs) of Innovation and Entrepreneurship Ecosystems

Supporting innovation and entrepreneurship ecosystems will be essential in facilitating the reopening of industrial production, as well as the restructuring and upgrading of value chains in the post-crisis period. This means, for example, implementing last-resort ecosystem mechanisms that which will ensure that key nodes (incubators, accelerators, and coworking spaces) can operate. Key nodes are often ineligible for existing business support policy instruments.

One of the fastest measures would be to move the activities and spaces of the ecosystem nodes online by providing dedicated technical support and funding (e.g., by organizing workshops, trainings, and virtual meetings for the members of incubators, accelerators, or networking spaces). Furthermore, to navigate these new, uncertain scenarios, it is even more important to create or strengthen steering committees that bring together all the main leaders of innovative and entrepreneurial communities to discuss challenges and solutions, offer mutual support, and develop a sense of community.





c) Commit to a Regional Agenda

The crisis has highlighted the importance of working together within and among regions to find solutions and learn from each other's experiences. An early example in this regard is the experience of the Latin American Network of Innovation Agencies (Red Latinoamericana de Agencias de Innovación, or RELAI), which consists of 12 innovation agencies from 10 LAC countries and is coordinated by the IDB. In light of the spread of COVID-19, RELAI managed to quickly mobilize innovation agencies in the region to analyze the implications of the pandemic for the sector, exchange information, communicate their preliminary responses, and inspire new ideas for rapid interventions.

These developments show that building up innovation agencies can be key to strengthening regional institutions in the medium and long term, and to supporting science, technology and innovation through attracting ideas, cocreation, and testing of nimble and flexible tools. Another case in point is the call for the Pacific Alliance Transfer Network (PA) to support the implementation of proposals to provide technological solutions to COVID-19. The value proposition includes the development of a specialized roadmap based on the Network's connections in the technology community within the four PA member countries and elsewhere and direct access to venture capitalists who are also part of the PA networks.



d) Facilitate the Development, Testing, and Adoption of Innovative Solutions in the Health Sector

One of the main problems faced by developers of innovative solutions for human health application is meeting the confidentiality and security requirements in handling patient data. Another problem is the lack of space for conducting actual tests. At the same time, the health system is struggling with testing and adopting innovations. To solve this problem, a few years ago the United Kingdom's National Health Service (NHS) launched a [test bed](#) program in partnership with the national innovation agency. The program is open to innovators with digital solution prototypes. It provides funding, support, and monitoring while they apply their proposed solutions in hospitals or clinics. The program also includes rigorous impact, security, and confidentiality assessments. Based on the results, some innovators are given support to scale up their solutions. Thanks to the direct participation of hospitals and medical staff in selecting projects for the test beds, the program has contributed enormously to the adoption and scaling up of the solutions.

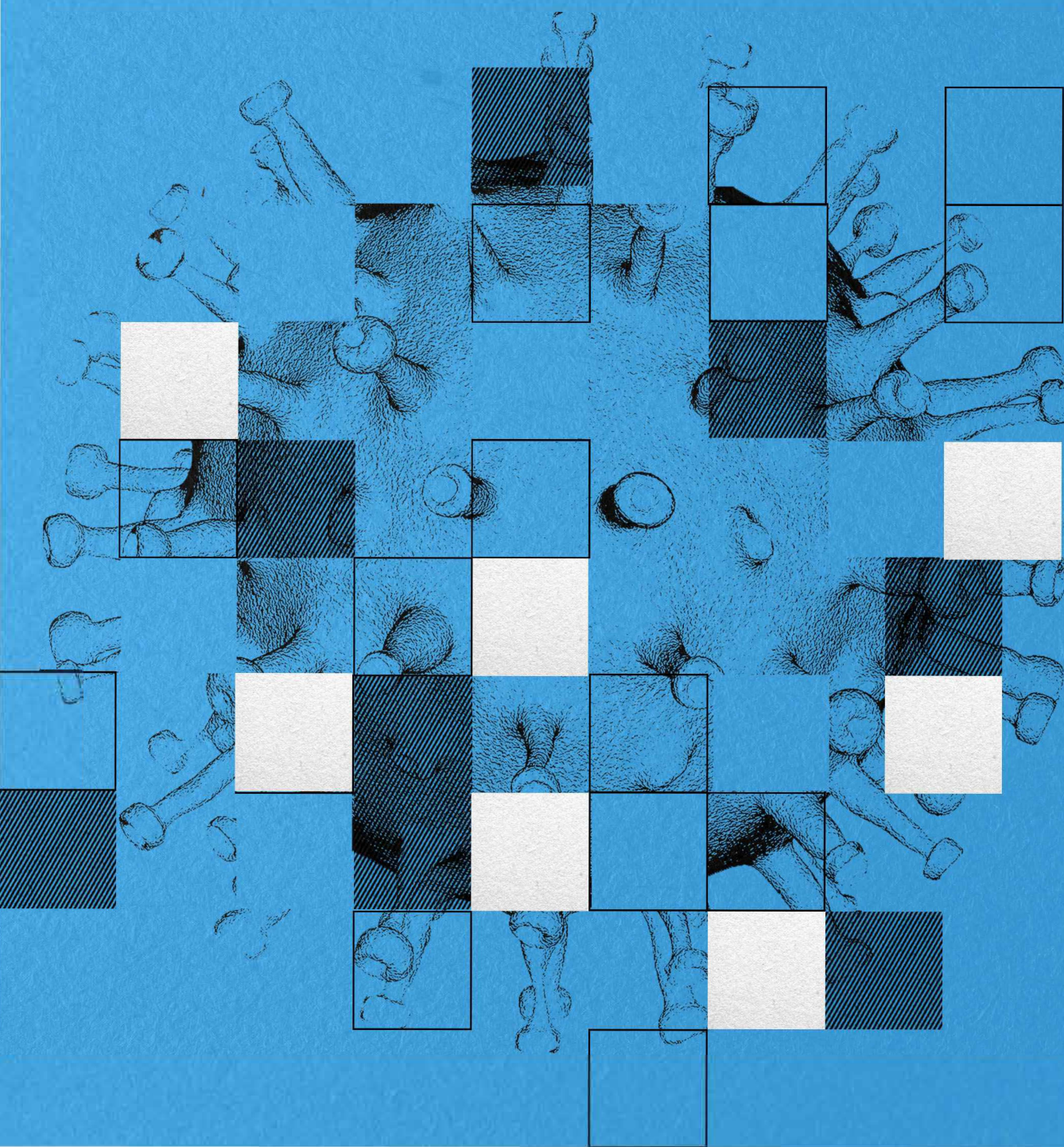
In LAC countries, test beds can be extremely valuable in facilitating the adoption and scaling up of innovative solutions for the pandemic. In addition, they can galvanize PPI processes because they represent public sector initiatives aimed at speeding up the testing and adoption of solutions.

e) Finance Sectoral Knowledge Products

A complementary proposal to finance innovation in the new normal is to develop a mechanism to finance the creation of sectoral knowledge products. Along the lines of Romer's tax proposal, a collective financing scheme could be proposed, with contributions from companies of a given productive sector to support science and technology institutions that develop solutions to address common challenges of the sector under the leadership and management of the companies that have come together for this purpose.



3. Science and Technology





Science and Technology

The Time Has Come for Science. Will Latin America and the Caribbean Listen?

3.1. The Role of Science in a Global Crisis

The COVID-19 pandemic is the first challenge that has triggered a response from the global scientific community, putting to the test countries' capacity to respond in terms of science policy. Everyone wants to work together to find answers and solutions. Evidence shows that almost all other research has ground to a halt due to changing priorities and social distancing measures that restrict access to laboratories. As a result, scientist from many different fields are now involved in the study of SARS-CoV-2.⁴

This crisis has come at a time when science is much more sophisticated and developing faster than ever before. The internet, a rising culture of open science, and confluence of digital technologies and biotechnology have transformed the research landscape. The following are some of the emerging dynamics and characteristics in science.

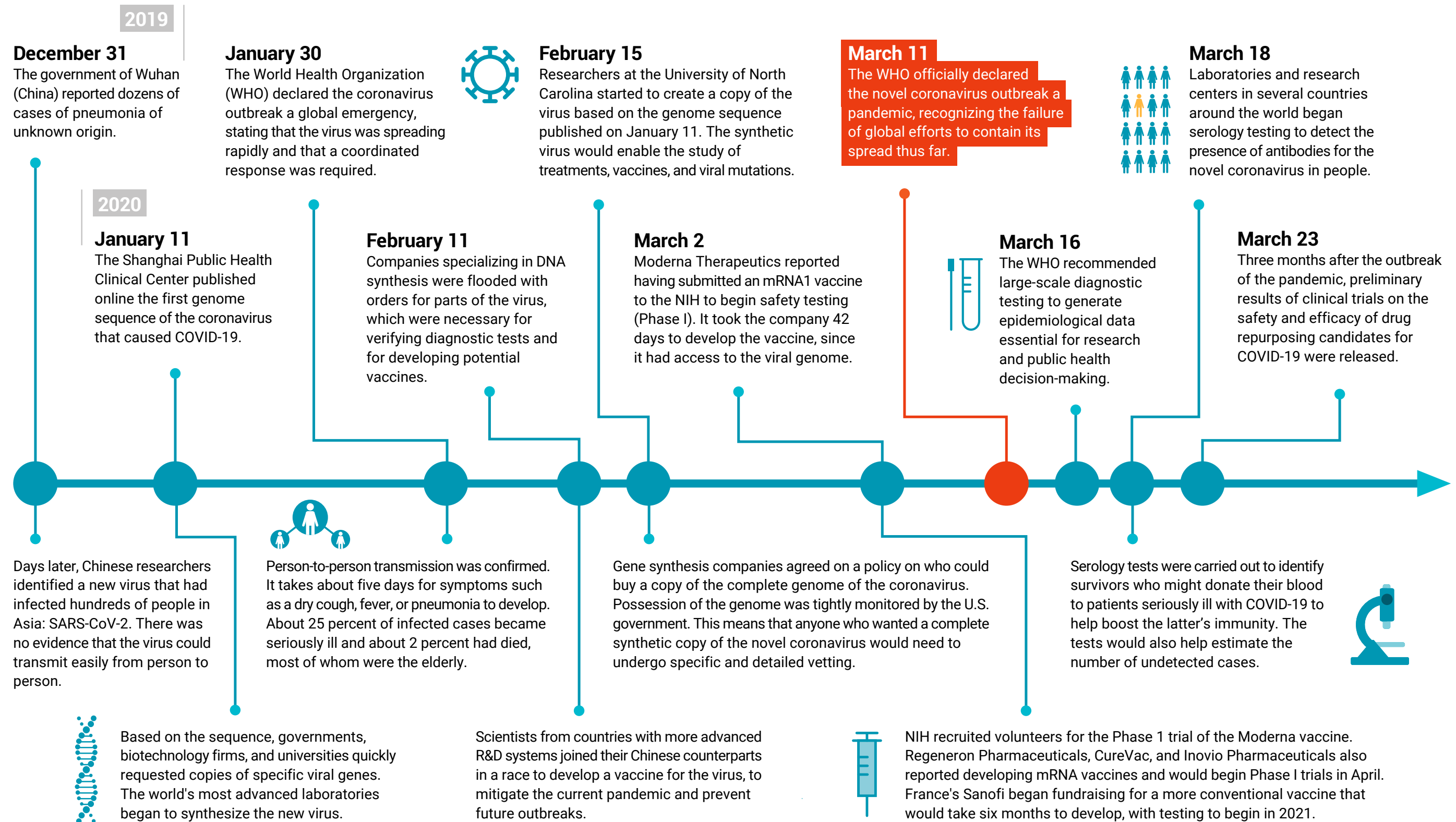
⁴ Similar examples include the height of the AIDS epidemic in the 1990s and the Ebola epidemic of 2014 in West Africa, when scientists and medical professionals from around the world came together to work on solutions and save lives.

- ▶ **Collaborative work through global networks.** While most countries have closed their borders, scientists have opened theirs, bringing about global collaboration of an unprecedented scale. Consortia of research centers, university laboratories, hospitals, and vaccine manufacturers in different parts of the world are emerging. In less than two months, more than 400 clinical trials have been launched to develop therapies and vaccines. An example of this global knowledge sharing is the Chinese laboratory that released the first coronavirus genome in January, paving the way for COVID-19 testing worldwide.
- ▶ **Open science and data sharing.** Online repositories make studies available months before they are published in scientific journals. Within 60 days, researchers have sequenced and shared hundreds of viral genomes, and published more than 4,000 new studies related to SARS-CoV-2.
- ▶ **Synthetic Biology.** Based on the viral genome sequencing, it is possible to synthesize complete copies of the virus or its segments in a few days, speeding up the research process. Precision gene editing capabilities also provide new possibilities to develop RNA-based gene therapies.⁵
- ▶ **Bioinformatics.** Bioinformatics is the result of combining biology and computer science, and it incorporates advancements in artificial intelligence into essential tools for scientific strategies. For example, new computer models can cut down the time needed to configure the infrastructure required to research an emerging virus from months to days.
- ▶ **Multidisciplinary teams.** These teams feature researchers from a wide range of fields, such as biology, genomics, virology, epidemiology, biochemistry, mathematics, statistics, physics, and computer science.

These factors have made it possible to articulate a scientific response to the pandemic almost in real time (Figure 2).

⁵ mRNA vaccines incorporate the genetic instructions for a component of the virus into a nanoparticle, which can then be injected into the human body. mRNA vaccines are a promising but as yet unproven modality.

Figure 2. A Summary of Global Scientific Responses to the Coronavirus



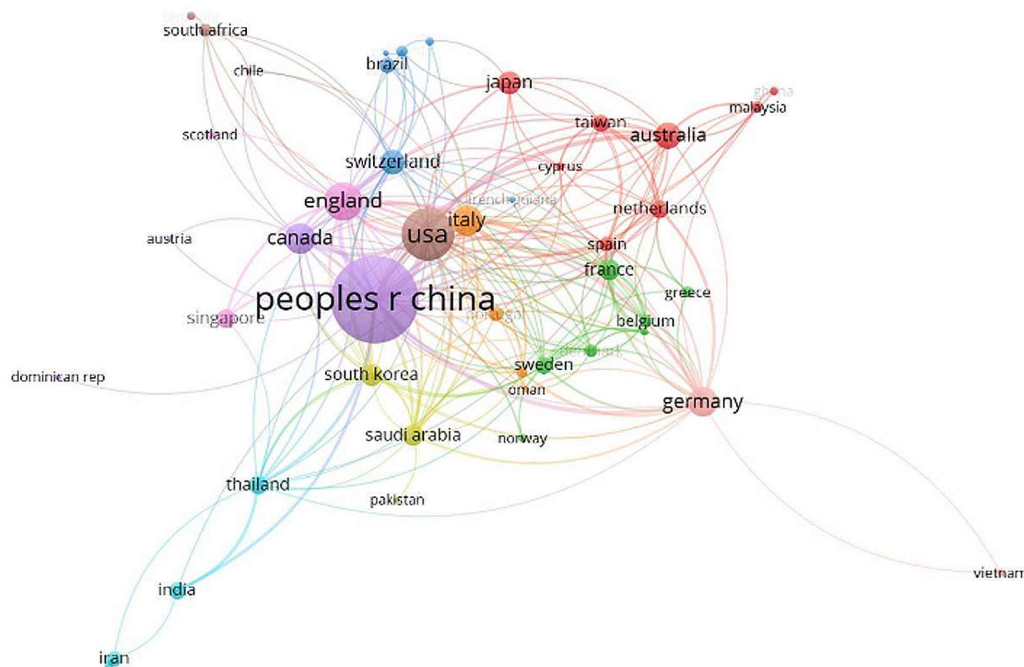
Source: Authors' elaboration.

3.1.1. The Scientific Response in Latin America and the Caribbean

Coping with a health crisis of the scale of the COVID-19 pandemic requires advanced scientific systems that are capable of developing rapid and effective diagnostic tests (both sensitive and specific), finding effective therapies, developing vaccines, and fine-tuning algorithms to predict the pandemic's evolution. These systems cannot function without the knowledge of the biological mechanisms of similar viruses, a base which requires years of research and enabling research conditions, such as access to reagents, specialized equipment, and professionals; laboratories with appropriate levels of biosecurity; and large databases on mobility patterns and characteristics of the population.

The LAC region has the advantage of a strong tradition of scientific excellence in medicine and the life sciences, which are essential but not sufficient for responding to the challenges posed by the pandemic. However, LAC's scientific response to the crisis has not been as swift and forceful as that of China, the United States, and some European countries.⁶ An analysis of the scientific publications related to COVID-19 shows that the scientific institutions of LAC countries have so far played a marginal role in building the knowledge map (Figure 3).

Figure 3. **International COVID-19 Research Collaboration Network**



Source: Hossain, Md M., Current Status of Global Research on Novel Coronavirus Disease (COVID-19): A Bibliometric Analysis and Knowledge Mapping (April 2, 2020).

⁶ Together, China and the United States have produced about 65 percent of the publications related to COVID-19, while the United Kingdom and Italy have made contributions that exceed what is expected of scientific systems of their size.

Indeed, while research produced in the LAC regions represents about 4 percent of the world's total publications and about 4 percent of publications in medicine and life sciences, only 1 percent of the publications on COVID-19 have been written by authors from LAC-based institutions.⁷

While researchers in countries that experienced outbreaks early on will likely be able to gather more knowledge (and document it), it is also true that these countries have, on average, more flexibility, resources, and capacities to redirect efforts toward the study of the pandemic. This contrasts with the rigidity and fragility of scientific activities in the LAC region. This is seen, for example, in the complex and time-consuming bureaucratic procedures required to obtain authorization by ethics committees and in the obstacles in the procurement of laboratory equipment and import of essential supplies such as organisms, genetic material, and reagents.

Most LAC countries that have managed to improve the quality of scientific research have done so through public financing structures in the form of competitive funding, which has undeniably improved the quality of the projects implemented. However, science support systems that overly rely on competitive funding and focus less on baseline funding for research centers, compounded by other structural obstacles in the development of scientific activity, are less flexible and capable of responding to crises such as the one currently under way.

⁷ Confraria, H. (2020). Publications on covid-19 in LAC. Unpublished report. This stocktaking took into account indexed academic journals and repositories such as medRxiv, SSRN, and bioRxiv, among others. A valid clarification, however, is that assessing the scientific capabilities of developing countries by the number of publications in indexed international journals may lead to an underestimation of these capabilities. It cannot be ruled out a priori that researchers of the LAC region may be focused on replicating existing research to the local context and therefore the global dissemination of their work may not be considered necessary, but their replication work could have a significant impact on expanding the knowledge of certain local issues.

Box 3. Science Policy Response in South Korea

South Korea learned the importance of epidemic preparedness after its experience with the outbreak of Middle East Respiratory Syndrome (MERS) in 2015. The experience showed that laboratory testing is essential to containing an emerging infectious disease and improving the prevention and control of hospital-acquired infections.

Legislation enacted since then gave the Korean government authority to collect data on people who have tested positive from mobile phones, credit cards, and other means to find out their recent whereabouts. The information is then de-identified and shared on social network applications to help others determine whether they may have had contact with an infected person.



3.2. Policy Interventions to Respond to the Crisis

Responses to the crisis reflect significant progress in the institutional capacity of several LAC countries to roll out science and technology policies. In contrast to the global pattern in pandemic response (with science responding faster than science policy), public policy in the region seems to have taken the lead in light of a seemingly slower response in research.

Indeed, science, technology, and innovation agencies and ministries in several LAC countries have acted quickly with a number of initiatives. Table 6 provides a non-exhaustive list of some of the policy responses, followed by a deeper analysis. The annex of this document provides a more complete, although still non-exhaustive, list.

Table 6. Policy Responses in Latin America and the Caribbean

Category	Measures taken	AR	BR	CH	CO	CR	HO	ME	PA	PE	UY
SUPPORT FOR SCIENTIFIC RESEARCH PROJECTS	Calls for research on COVID-19	✗	✗		✗		✗	✗	✗	✗	
	Funding for strategic research projects										✗
SUPPORT FOR INNOVATIVE SCIENCE- AND TECHNOLOGY-BASED DEVELOPMENTS	Calls for innovation projects related to the pandemic	✗	✗	✗	✗			✗		✗	✗
	Hackathons									✗	
INSTITUTIONAL MEASURES	Hiring scientists to advise policymaking								✗	✗	
	Inter-institutional coordination between science and technology organizations under the leadership of science promotion agencies			✗		✗		✗		✗	
	Organization of university-led research and response efforts to the pandemic		✗			✗		✗			

Source: Authors' elaboration.

Notes: AR: Argentina; BR: Brazil; CH: Chile; CO: Colombia; CR: Costa Rica; HO: Honduras; ME: Mexico; PA: Paraguay; PE: Peru; UY: Uruguay.

a) Support for Scientific Research Projects

Calls for mission-oriented research on topics related to the pandemic

In the past two decades, funding scientific research through calls for proposals or tenders has become mainstream practice in most LAC countries. The origin of the practice is associated with the National Science Foundation of the United States, and such calls are now an important part of the science policy toolkit around the world. The public agency in charge of science and technology policy issues a call for proposals to groups of researchers (based in laboratories, universities, and companies) to participate in a competitive process through which the best projects are awarded pre-determined amounts of financing. These calls are sometimes open (to any research project in any field), but more often they focus on scientific fields or topics related to particular problems that society needs to understand better. The latter is usually referred to as “mission-oriented research,” and examples include several fairly recent calls (starting in March 2020 in several countries) aimed at mobilizing scientific capacity to respond to the challenges posed by the pandemic. In cases such as the *Innovate* Program in Peru, mission-oriented research focused on technology-based innovation, [calling on the scientific and business communities to participate in hackathons](#).

Calls for mission-oriented research have been the main form of response to the pandemic in many countries. For example, in late January, the European Commission launched a call for [emergency funding](#) of research and development (R&D) projects to improve epidemiology and public health, including outbreak preparedness and response, rapid diagnostic tests, new therapies, and new vaccine development. On March 6th, the Commission announced the selection of 17 projects, awarding €48.5 million to 140 research teams from across the European Union (the 18th project was selected on March 30th).

In the LAC region, for example, Brazil’s Ministry of Science, Technology, Innovation and Communication has issued [seven calls for science and technology proposals](#) through Finep in the following areas: genetic sequencing of the coronavirus, clinical trial protocols for COVID-19 drugs, AI-based selection of molecules that can inhibit viral replication, research on diagnostic kit innovation, vaccine development, and pandemic-related social projects.

Financing specific strategic projects

Sometimes, especially when authorities have a clear idea about the specific goals or problems to focus on (e.g., treatments for COVID-19) and when an institution or a small group of institutions have clear strengths in their research and innovation capacity, it can be faster and more effective to create a strategic project and finance it directly, instead of making a call for proposals, with its inherent uncertainties and delays. In South Korea, the Ministry of Science and ICT, the Ministry of the Interior and Safety, and the Korea

**Sometimes
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**to directly
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strengths.**

Centers for Disease Control and Prevention launched the “[Emergency Response Research Program for People’s Safety](#),” which supports four urgent and R&D-intensive projects to respond to the pandemic, projects that (i) develop rapid testing kits for COVID-19, (ii) use artificial intelligence to repurpose drugs for COVID-19, (iii) study the virus characteristics for risk assessment, and (iv) collect and provide epidemiological information.

In LAC, a good example in this regard is Mexico’s National Council on Science and Technology (CONACYT), which launched [more than 35 R&D projects](#), with short-, medium- and long-term goals to tackle the pandemic. Uruguay’s National Agency for Research and Innovation (ANII) has made direct investments to finance a consortium consisting of *Institut Pasteur*, the University of the Republic, and the biotechnology company ATGen to produce 10,000 coronavirus diagnostic kits.

b) Support for Innovative Science- and Technology-Based Developments

[Financing science- and technology-based business innovation projects related to the pandemic](#)

Often, science and technology agencies are also skilled promoters of science- and technology-based innovation. Just as there have been calls for scientific research projects related to COVID-19, there have been more calls for companies, both established firms and startups, to come up with innovative projects that tackle one aspect of the pandemic or another by making use of new developments in science and technology. The nature of the latter is similar to that of research projects but with two major differences: the target audiences called upon to participate are mainly companies (although they may team up with laboratories or universities), and calls for companies focus much more on practical and short-term aspects of the pandemic, such as making ventilators, developing tests, conducting epidemiological studies on the characteristics of the spread of the virus, or using digital technology (artificial intelligence and geolocation, etc.) to improve policymaking in the midst of the crisis.

A notable example is Uruguay’s [National Agency for Research and Innovation \(ANII\)](#), which has launched three specific calls for proposals, one on the design and implementation of technological developments, applications, and devices to [contain the spread](#) of COVID-19 through access to information; a second on [making ventilators](#); and the third one on projects that [raise public awareness](#) of SARS-CoV-2-related treatment and care and facilitate preventive quarantine.

In Spain, the institutions involved in the response to the crisis are working with the biotechnology industry to produce diagnostic tests. There are already four certified companies capable of producing Polymerase Chain Reaction (PCR) tests. The European Commission [offered €80 million in funding to the company CureVac](#) to speed up the

Uruguay



**launched 3
calls for
proposals
to address
COVID-19.**

development of an mRNA-type vaccine for the coronavirus. The European Innovation Council Accelerator [received more than 1,000 proposals](#) from SMEs with innovations related to preventing the spread and mitigating the impact of the coronavirus. It will allocate €164 million in grants in May 2020.

c) Institutional Measures

Hiring scientists to advise policymaking

Aside from financing research projects or issuing calls for proposals, governments can tap into the country's existing scientific experience by having experts provide advice and guidance to the complex decision making required in fighting the pandemic. Generally speaking, no direct decisions should be made during these advising sessions, but they provide critical information for policymakers who recognize the complexity of the emergency and value evidence-based decision making.

One example comes from Germany, where public decision makers are advised by several prominent scientists, such as the head of the Robert Koch Institute for public health and the director of the Institute of Virology at Berlin's Charité Hospital. The latter discovered the pathogens responsible for the SARS epidemic.

In this regard, and in addition to other scientific initiatives related to the pandemic, in February 2020 the government of Panama created the [Advisory Commission on COVID-19](#) as a science expert panel to support the government's decision making in response to the pandemic based on the best available scientific evidence.

Inter-institutional coordination between science and innovation agencies under the leadership of science promotion agencies

Given the characteristics of the emergency caused by the pandemic, the ministries of health or public health have been at the forefront of the battle with public policy responses. Nevertheless, ministries and agencies of science and technology have also become involved in decision making due to the scientific nature of the crisis. In some countries, science and technology ministries and agencies have been entrusted with specific responsibilities for coordinating measures, resources, or initiatives with various public entities and the private sector.

For example, Peru's National Council on Science, Technology and Technological Innovation (CONCYTEC) supports the coordination between university laboratories and the Ministry of Health, which are working to make testing available. [Costa Rica's](#) Ministry of Science, Technology and Telecommunications (MICIT) is promoting a public-private initiative to speed up the production of PPE and other critical supplies for healthcare workers by mobilizing the capacity of the local medical device and equipment industry.

In complex scenarios,



groups of specialists can offer valuable advice for evidence-based decisions.

Organization of university-led research and response efforts to the pandemic

In some countries, universities—and in particular their scientific research arms—have taken the lead in coordinating actions or launching broad-based initiatives with other stakeholders. For example, in the United States, the Office of Science and Technology Policy brought together experts from 11 countries to call on scientific journals to provide free access to all COVID-19-related publications and make the associated data available in machine-readable format. The Office then called for collaboration between the National Library of Medicine of the National Institutes of Health (NIH), Microsoft, and the Allen Institute of AI (AI2) to develop the [COVID-19 Open Research Dataset \(CORD-19\)](#), the largest collection of scientific literature with more than 52,000 scholarly articles related to COVID-19 and the family of coronaviruses, with open access and articles updated in real time. The Office then issued [a call to action on Kaggle](#) for artificial intelligence experts from around the world to develop new techniques for analyzing the data in CORD-19, with guiding research questions formulated by the committee of the National Academies of Sciences and the World Health Organization. An example from the LAC region is the [University of the West Indies](#), which launched a working group to support the mobilization of science and health sector resources to address the COVID-19 emergency in the Caribbean.

Box 4. Science Policy Response in the United States

COVID-19 arrives in United States

On January 19, the first case of SARS-CoV-2 infection was confirmed in the United States. The first relevant response from the federal government came 10 days later, with the establishment of the Coronavirus Task Force. Senior government officials rushed to involve biomedical and public health experts in the government response. Federal science agencies took action to understand and address the threat.

Emergency declaration activates additional emergency funding for science

On March 13, two days after the World Health Organization declared the COVID-19 pandemic, President Trump declared a national emergency. Between March 13 and March 25, Congress provided additional resources to several federal agencies: US\$4.5 billion to the Centers for Disease Control and Prevention (CDC), US\$3.5 billion to the Biomedical Advanced Research and Development Authority, US\$945 million to the National Institutes of Health (NIH), US\$75 million to the National Science Foundation (NSF), US\$100 million to facilitate access by researchers to the computing resources of the Department of Energy (DOE), and US\$66 million to the National Institute of Standards and Technology (NIST).

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Science policy priorities of major federal agencies

Office of Science and Technology Policy (OSTP)

- Developed research agendas to understand the geographical distribution of the virus, incubation period, potential for spread, and persistence of the virus on surfaces, which has proven to be essential for informing decontamination and social distancing efforts.
- Created a permanent committee on emerging and infectious diseases to respond quickly to government needs for information on and beyond the current crisis.
- Promoted the creation of the [COVID-19 Open Research Dataset](#) (CORD-19), the largest collection of scientific literature with more than 52,000 academic articles related to COVID-19 and the family of coronaviruses.
- Issued a [call to action on Kaggle](#) to artificial intelligence experts from around the world to develop new techniques for analyzing the data in CORD-19.

National Institutes of Health (NIH)

- The NIHs are currently focused on studying the characteristics of the virus and developing vaccines and therapies. In February, the NIH began a clinical trial to evaluate the safety and effectiveness of an experimental drug that could be used on people who already have COVID-19. On March 16, the NIH launched a six-week clinical trial of a vaccine developed by [Moderna Therapeutics](#). The goal of the first phase is to evaluate different doses for safety and the ability to induce an immune response. The trial was launched with record speed.

Center for Disease Control and Prevention (CDC)

- The CDC is working on expanding testing capacity to monitor the spread of COVID-19 and prevent new infections.

National Science Foundation (NSF)

- The NSF is supporting “non-medical, non-clinical-care” coronavirus research projects through a Rapid Response Research funding mechanism which is activated when disasters occur. One of the first projects supported by this call for proposals studies how the structure of the coronavirus withstands changes in temperature and humidity.

Department of Energy (DOE)







- The DOE is accepting proposals on how the science and computing infrastructure of its laboratories could be used for coronavirus research. The Oak Ridge National Lab uses a supercomputer to model molecular interactions between the coronavirus and more than 8,000 drug compounds. The Argonne National Lab uses its advanced photon source to map the protein structure of the coronavirus to identify potential drug targets.

3.3. Lessons and Proposals for the Future

For too long, investment in scientific research in the LAC region has been relatively low by any standard. With very few exceptions, governments have considered it a low priority to finance a sector whose short-term contribution to development is clearly less visible, in contrast to other investment priorities in infrastructure or social services.

The experience of COVID-19 should help LAC countries draw important lessons for the future, not only on the importance of investing in scientific capacity building but also on the intensity and form of this effort. Table 7 presents a summary of these lessons followed by a deeper analysis.

Table 7. Proposals for the Science and Technology Sector

	Area of reflection	Specific ideas
	STRENGTHEN LOCAL CAPACITIES	<ul style="list-style-type: none"> • Invest in human resources, infrastructure, and raw materials to integrate and adapt global developments to local and regional realities. • Increase investment in science and technology infrastructure for bioscience and Biosafety Level 3 (BSL) laboratories, and promote emerging modalities such as shared laboratories. • Simplify bureaucratic procedures for importing biology equipment and supplies • Enhance approval procedures for drugs and medical devices.
	LONG-TERM FUNDING FOR SCIENTIFIC CAPACITY BUILDING	<ul style="list-style-type: none"> • Supplement competitive funds with baseline funding resources for centers and laboratories, with longer funding terms than what is typical for individual projects. • Redesign incentives for careers in science and modernize science practices in universities. • Implement new mechanisms for evaluating public investment to enhance the transparency and efficiency of public spending on science.
	OPEN SCIENCE AND REGIONAL COLLABORATION	<ul style="list-style-type: none"> • Foster collaboration mechanisms between countries for viral genome sequencing and other areas of study that will mitigate the regional spread of the virus. • Promote open science practices, such as sharing databases and preliminary results.
	PROACTIVE SCIENCE AND TECHNOLOGY	<ul style="list-style-type: none"> • Establish interdisciplinary mission centers that focus on addressing social needs and anticipating responses to future outbreaks of COVID-19 and the next pandemic.
	SCIENCE AND DATA	<ul style="list-style-type: none"> • Train bioinformatics and data science researchers to pave the way for the development of machine learning and artificial intelligence. • Expand availability and access to data to inform pandemic evolution models, decision making, and development of technological solutions
	SCIENTIFIC INSTITUTIONS	<ul style="list-style-type: none"> • Continue to strengthen the institutional framework for science, technology, and innovation policy in a consistent manner with a long-term vision.

Source: Authors' elaboration.

a) Strengthen Local Capacities

The significant scientific progress and responses to the challenges of the pandemic will most likely come from nations with the most developed scientific systems. Does this mean that LAC countries can simply sit back and wait for solutions and simply adopt them when available? Does it mean, therefore, that there is no point in investing in science in the region itself?

In fact, the crisis teaches that the opposite is true. To make this point, two examples will suffice. First, there is evidence that the virus mutates and behaves differently when climatic variables are considered, so it is necessary to have strong local capacities to ensure that tests, therapies, and models for the spread of the disease are adapted to the characteristics of the virus and its environment. Second, a pandemic can trigger a global shortage of safety devices and scientific instruments such as thermocyclers, medical devices, and medications, as well as reagents and other basic supplies.

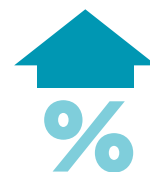
Providing scientific systems with adequate human resources, infrastructure, equipment, and supplies allows countries to understand and benefit from global advancements, testing whether they can be replicated under the unique conditions of each country. This facilitates potential adaptations and development of domestic capacity to respond to excess demand for products, raw materials, and services to respond to emergencies.

Addressing the urgent need to strengthen local science systems requires measures that includes, at the minimum the following: (i) stepping up investment in bioscience infrastructure, considering the emerging option of shared laboratories,⁸ (ii) simplifying bureaucratic procedures for importing biological equipment and supplies, (iii) expanding the availability of Biosafety Level 3 (BSL3) laboratories, (iv) improving the work of ethics committees, and (v) enhancing approval procedures for drugs and medical devices.

b) Long-term Funding for Scientific Capacity Building

The main mechanism for supporting scientific research in the LAC region is competitive funding for projects. This tool is capable of promoting excellence in research and transparency in resource allocation, and has been effective at aligning research efforts guided by curiosity within laboratories, universities, and research groups with national policies and priorities.

However, in light of the lessons learned already from the pandemic, this mechanism must be supplemented by resources that support the creation and strengthening of centers and laboratories through financing mechanisms with longer timeframes than what is typical for individual research projects. This financing structure allows for greater freedom in



⁸ One benchmark in this regard is the [Pagliuca Harvard Life Lab](#), one of Harvard University's innovation laboratories.

resource allocation for new research objectives, which has proven to be critical for articulating a scientific response before the issuance of ad-hoc calls for proposals. Likewise, the increase in baseline funding must go hand in hand with a redesign of incentives for careers in science in each country, modernization of the science work conducted by universities, and new mechanisms for evaluating public investment to improve the transparency and efficiency of public spending on science. An important issue is to avoid “corner solutions” in funding, in which all or most of the resources are concentrated in a small number of disciplines, since the solutions proposed for this pandemic come from different scientific angles and are highly multidisciplinary.



c) Open Science and Regional Collaboration

COVID-19 and the coronavirus family do not respect geopolitical boundaries. The transmission path follows people moving between Guayaquil and Quito, just as it does between Arica and Tacna. Thus, the same SARS-CoV-2 variant will have an impact across the region. Collaboration among countries on viral genome sequencing as well as on studying the behavior of the virus and possible mitigation strategies is key to successful infection mitigation on a regional level. This is precisely one of the opportunities that has yet to be explored by science and technology promotion agencies in the LAC region. The inaction may be due in part to a lack of experience, appropriate tools, or institutions that promote collaborative science between countries.

The speed of scientific progress has picked up due to open science practices, which have allowed the proliferation of anonymized databases on COVID-19 infections and of articles sharing results, models, and preliminary therapies. Hence, it is imperative that LAC countries improve their mechanisms for addressing the common challenges posed by the pandemic.



d) Proactive Science and Technology

As with other disasters and catastrophes, the outbreak of COVID-19 will lead to a series of global innovations and technological advancements that will allow countries to recover from the negative impacts and adapt to new living conditions. These innovations emerge once the need or demand becomes evident. However, there is an even greater social return on investments in science and technology that are proactive in preparing for future outbreaks of COVID-19 and the next pandemic. Given the uncertainty inherent in investments that address unknown events, such potential solutions are unlikely to come from the private sector. For this reason, the State has a critical role in establishing a network of interdisciplinary mission centers that will focus on anticipating responses to the next pandemic.⁹

⁹ An equally urgent and compelling argument could be made on improving the scientific readiness of LAC societies to respond to other immanent challenges such as climate change.

e) Science and Data



While there is growing use of digital tools in various fields of scientific research, the pandemic has shown it to be a sweeping trend, especially in the life sciences. The training of researchers in all fields should therefore include the teaching of bioinformatics skills, from the use of advanced computing tools to the development of machine learning and artificial intelligence algorithms.

The crisis has exposed the lack of access of the scientific community to data that could better inform the pandemic evolution models. This type of data is usually unstructured and comes from multiple sources, from population censuses to public transport usage records. There is an urgent need to collect, structure, store, and provide access to this type of data while maintaining strict privacy criteria, which are essential for the design of analytical models to inform public policy decision making and the development of technological solutions.

f) Scientific Institutions



A country's capacity to respond has been directly linked not only to its national scientific capacity but also to the strength of the institutions that regulate science and technology. Science and technology agencies and ministries have stepped up to the plate, organizing calls for proposals and competitions to find solutions, defining the questions in collaboration with the relevant ministerial counterparts. This was one of the biggest assets of the LAC region at the time of the outbreak. Going forward, every country in the region must continue to strengthen its institutional framework for science, technology, and innovation policy in a consistent manner.

Annex



Click on the link to see a list of funding calls issued by institutions promoting science, technology, innovation, and entrepreneurship in the LAC region.

The list is non-exhaustive and is updated regularly.

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Authors:

Chapter 1: Pablo Angelelli, Michael Hennessey and Pauline Henriquez

Chapter 2: José Miguel Benavente, Vanderleia Radaelli and Simone Sasso

Chapter 3: Rafael Anta, Gustavo Crespi, Juan Carlos Navarro and Fernando Vargas

Editors: Gonzalo Rivas and Claudia Suaznabar

Production and editorial review: Nicolás Cañete and Sarah Schineller

Design: Miguel Lage

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Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, D.C. 20577
www.iadb.org

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