SISTEMA ECONÓMICO LATINOAMERICANO Y DEL CARIBE

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UNITED NATIONS
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Trade and Competition in the era of the digital economy

Economic and Technical Cooperation

VII Annual Meeting of the Working Group on Trade and Competition of Latin American and the Caribbean (WGTC)
San Salvador, El Salvador
12 and 13 October 2017
SP/VIIRAGTCCALC/DT N° 2-17

C O N T E N T S

F O R E W O R D

This document has been drafted in compliance with Activity II.1.6 of SELA's Work Programme for 2017, entitled "Latin American and Caribbean cooperation in Trade and Competition. Joint UNCTAD-SELA project. VII Annual Meeting of the Working Group on Trade and Competition of Latin America and the Caribbean (WGTC)".

The document summarizes the main elements of the impact of the digital economy on the commercial relations among the countries of the region, their effects on the competitiveness of the commercialization chains and how the strategies to face the ongoing technological changes are viewed.

The Permanent Secretariat of SELA wishes to thank Mr. Luis Ascencio for his work as a consultant in drafting this document.

EXECUTIVE SUMMARY

The Digital Economy, also known as Internet Economy, New Economy or Web Economy, refers to an economy based on digital technology. Digital Economy has been the result of an evolutionary, disruptive process due to the use of Information and Communication Technologies (ICTs), affecting several sectors of the economy, and social and personal activities. Smart and connected products offer more functionalities, more reliability and a better use of the capabilities. In this sense, there are three relevant lines of development: analytical methods for the treatment of large data bases (data analytics): the Internet of Things (IoT), referring to the use of sensors and connected devices; and the cryptocurrencies, such as bitcoins and smart contracts such as block chain. As indicated by Tapscott, (1995), the Internet has changed the way we do business, and is having a significant impact on the value chains. All this is forcing companies to define new strategies, business models and ways to compete in the face of new opportunities, and at the same time, the threats posed by this new era.

It is for this reason that the action of the governments is required to promote strategies and public policies that would allow to strengthen their digital ecosystems, foster a harmonic development of the structures, as well as facilitate the adoption of digital platforms in the corporate fabric of the nations. There is a significant gap between Latin American countries and other regions in the areas of innovation, development of the Industry of Information and Communication Technologies, and Digital Economy. At a regional level, a comprehensive effort is required to facilitate the adoption of digital strategies. The United Nations Economic Commission for Latin America and the Caribbean (ECLAC), has been developing a relevant effort to promote the adoption of digital strategies in the region, through the "Regional Digital *Agenda*" (e-LAC2018). The mission of this agenda is to develop a digital ecosystem in Latin America and the Caribbean such that, through a process of regional integration and cooperation, would strengthen the policies that would drive a society based on knowledge, inclusion and equality, innovation and environmental sustainability. The agenda tackles several subjects, among which is the Digital Economy.

The objective of this document is to provide the VII Meeting with global technical background information and regional cases to open the debate on the growing importance of the Digital Economy on trade and competition. Following the guidelines set forth by the Regional Digital Agenda (E-LAC2018), a series of initiatives has been proposed to deepen the variable of digital economy in the countries, incorporating better practices for the digital strengthening of the value chains and intraregional trade, taking advantage of the new public-private technological and governance capabilities in the facilitation of trade and transportation which today are being adopted by different countries and economic blocs in Latin America and the Caribbean.

INTRODUCTION

The Digital Economy is the result of an evolutionary and disruptive process being produced by the use of Information and Communication Technologies (ICTs) in wide sectors of the economy, social and personal activities pretty much in every country and culture in the world. Once the .com bubble was overcome in the late 1990s, Internet emerges as the information superhighway that has allowed for apps, processes, contents and digital bodies, as well as the associated services, to have an irreversible effect on real economy, offering global platforms so that people, companies, governments and, ultimately, machines and things that interact with each other can communicate, collaborate and search for information, thus forcing themselves to define new strategies, business models and ways to compete.

This digital transformation has only started in sectors such as health, industrial production, financial services and education. It has implications beyond the ICT sector, consolidating new emerging business models based on networks and on the use of data as a source of value. Additionally, the internet is empowering people in new and different ways to create and share ideas, giving way to new contents, new ways to endeavour and new markets.

The challenges implied by the use of the digital enablers, such as computing in the cloud, big data analytics, and ultimately block chain technology, suggests that the countries and their governments in particular have to provide concrete strategies and public policies in order to strengthen their own digital ecosystems, with the goal of balancing the harmonic development of the structures, adoption of digital platforms and the institutional base that would allow to direct in an efficient manner the impacts of digital economy on the corporate and social fabric of the nations.

At the level of successful experiences in the adoption of digital strategies, the "Regional Digital Agenda" (e-LAC2018) stands out, whose mission is to develop a digital ecosystem in Latin America and the Caribbean that, through a process of regional integration and cooperation, would strengthen the policies that drive a society based on knowledge, inclusion and equality, innovation and environmental sustainability.

The objective of this document is to present a series of background information on the subject and to open a regional debate, in order to deepen the necessary actions to be developed by each country within the environment of the Digital Economy. It is expected that these actions would, at the same time, be aimed at strengthening intra-regional trade, making use of the digital improvements in the area of trade and transportation facilitation, in order to give more fluency to the value chains.

This document has been divided into six chapters. Chapter I presents the characteristics of the digital economy as a new element for competitiveness and economic and social integration. Chapter II focuses on presenting the main gaps of Latin American and Caribbean countries in the main macroeconomic components that measure the level of development of the digital ecosystem of the nations. Chapter III reviews the main economic technological enablers, and successful cases related to digital platforms and national and sector strategies to stimulate the digital transformation. Chapter IV presents a detailed proposal for complementary action to the Regional Digital Agenda, focused on the strengthening of the digital transformation of the intra-regional chains of value and the cross-sectional pillars, such as the Single Digital Market, a new emphasis on the formation in digital competences, from the universities, and the construction of a *Living Lab* network that would encourage the creation of innovation nodes and decentralized endeavours in the countries.

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Finally, a chapter with conclusions and recommendations is presented, divided into three parts: Recommendations for countries with a low level of development of digital economy, recommendations for countries with a medium level of development, and recommendations for coordinated action with a regional scope.

I. THE DIGITAL ECONOMY AS A NEW ELEMENT FOR COMPETITIVENESS AND INTEGRATION

The digital economy, many times understood as Internet economy, new economy or Web economy, refers to an economy (the way people and societies survive, thrive and function) based on digital technologies. The term was officially coined in 1995 in the Don Tapscott's book "The Digital Economy: Promise and Peril in the Age of Networked Intelligence," turned best-seller in 1996, and in which the author predicted all the aspects in which businesses, both traditional and future, would be transformed or enabled by the Internet. Today, there is full consensus in calling the new economy as the one that, while based on communication infrastructures and digital networks, provides goods and digital services in new disruptive-type ***global technological platforms***, where people, organizations, companies, governments, and, ultimately, things, interact, communicate, collaborate, create strategies and search for information.

The International Telecommunication Union (ITU) is very clear about the scope and projections of the use of the Internet in our evolution as a society. In a first phase, in the 1990s, fixed-line Internet connected 1 billion PC users. Then, on a second phase, in the decade of 2000, mobile Internet connected more than 2 billion users through smartphones, with a potential for a significant increase within the next five years. In a third phase, it is expected that the Internet of Things will connect 28 billion objects to the Internet by 2020, from personal consumer goods to industrial machinery, this last one also known as "Industrial revolution 4.0," in which manufacturing and products become smart.

The importance of analysing and measuring the implications for the nations of the whole world is evident, and particularly for our region. The Economic Commission for Latin America and the Caribbean (ECLAC), on a publication from 2013 on "Digital Economy for structural change and equality," establishes the importance of understanding its main elements, under a framework or model of ***"Ecosystem of Digital Economy,"*** which is comprised by the following elements:

1. Structures

Elements that according to their degree of development, capacity and complementarity determine the level of maturity of the digital ecosystem in each country:

- Broadband infrastructure: Determined by the international, national and local telecommunication networks, public access points and affordability of such services.
- ICT industry and innovation: Including all the corporate segment, dedicated to the production of software applications (including the integrators), production of components (networks infrastructure, electronics and equipment assembling) and of services provided by the ICTs (business processes, analytical or knowledge processes).
- Users: Defined as individuals, companies, governments and, ultimately, and in a decisive manner, of things (machines) that can be networked.

2. Global platforms

These are facilitating or enabling technologies with a global scope, some of them mature and others in their developing phase, including mobility, social networks, cloud computing, big data analysis, Internet of Things and content generation.

- ***Institutional basis:*** These are the complimentary factors of the ecosystems, including the economic environment of the country, infrastructure and its regulation, capabilities of the human resources and the national innovation system.
- ***Impacts:*** At the traditional economic level, the expected impacts will affect productivity, economic growth and employment. At the social level, the impacts on education, health, information access, public services, transparency and social participation and integration stand out.

The increase in the intensity of the flows of goods, services, financial assets, information, communications and people is mainly due to the economic growth of the nations, and to the massive adoption of digital technologies by the population. When carrying out an objective analysis of the annual series being monitored by the International Telecommunication Union (ITU), these reveal the depth of this phenomenon:

- In terms of connections, up to 2015 there were 4.7 billion mobile-phone subscribers (65% of the world population), 4.1 billion broadband subscribers, both fixed-line and mobile (58%); and 3.1 billion connected to the Internet (43%).
- In terms of volumes, monthly IP traffic reached 72,500 Petabytes, and a total of 179.6 billion app downloads; in other words, about 25 apps per capita.
- The smartphone adoption rate is 37% of the world population, and it is expected to reach 60% in 2020.

Such global coverage for access to digital communication and information networks by people and companies has transformed, or better said, "digitalized" the main economic flows. According to McKinsey's 2014 study, *Global Flow in a Digital Age*, the digitalization quotas advanced as follows from 2005 to 2013, in the following economic flows:

- Participation in digitally enabled services: From 50% to 63%.
- Quota in data and communications justified by the use of Skype for international calls: From 3% to 40%.
- Quota of electronic trade with respect to total trade of traded goods: From 2% to 12% during the period.

In practical terms, measuring the economic impact of digital technologies, and of the Internet in particular, as a positive contribution to the growth of the GDP, productivity and employment, is complicated, and the difficulty originates in the measuring of the value of the intangible goods and services, and the permeability of these technologies in all the activities of an economy.

For instance, the following table shows the economic importance of the companies that participate in the ICT industry, whose business models are based on pillars of the Digital Economy Ecosystem (software development, hardware, electronic commerce, social networks and search apps), on a total of 15 main American companies listed in the main stock markets of said country.

TABLE 1.1
List of 15 main companies with market capitalization to July 2017 in the U.S.

COMPANY	AREA	MARKET CAPITALIZATION 2017 IN BILLIONS OF USD	STOCK MARKET
Apple	Technology	***816***	Nasdaq / Dow Jones
Alphabet (Google)	Internet Searcher	***614***	Nasdaq
Microsoft	Technology	***572***	Nasdaq/Dow Jones
Amazon.com	e-Commerce	***472***	Nasdaq
Facebook	Social Networks	***435***	Nasdaq
Johnson & Johnson	Consumer goods	357	Dow Jones
Exxon Mobil	Energy	344	Dow Jones
JP Morgan Chase	Investments	327	Dow Jones
General Electric	Electronics	232	Dow Jones
Wal-Mart	Retail	230	Dow Jones
Procter & Gamble	Consumer goods	222	Dow Jones
Pfizer	Pharmaceutical	199	Dow Jones
Chevron Texaco	Energy	197	Dow Jones
Coca Cola	Food and beverages	190	Dow Jones
Home Depot	Retail	182	Dow Jones

Source: Prepared by the author, based on a consultation on the Web site www.expansion.com, 16 July 2017.

The first 5 companies with market valuation correspond to the ICT industry, the so-called ***"FAAAM"***, whose joint valuation reaches 3 billion dollars, that is, equal to 60% of the GDP of all Latin American and Caribbean countries together.

For developing countries, the Internet in 2010 represented between 1.7% and 6.3% of the GDP, a situation that has been evolving as the current leading companies in the ICT industry have been revalued, and new companies have been added to the real economy. At the same time, private consumption of Internet has the largest impact on the GDP, followed by private investment and public spending, which depends on a higher technological adoption by companies and governments.

The growing demand for apps and mobile digital services shows a similar pattern between those who have access to these technologies, both in developed and developing countries. The following table shows a distribution of the number of operations and subscribers of the most popular services, which is updated in real time at their portal.[1]

[1] www.internetlivestat.com.

TABLE 1.2
Volume of transactions by services and most popular Internet companies

SERVICE/COMPANY	VALUE	MEASUREMENT UNIT
E-mails	201 billion	Sends/day
WhatsApp	50 billion	Messages/day
YouTube	5.2 billion	Videos/day
Searches	4.5 billion	Searches/day
Skype	200 million	Calls/day
Tumblr	93 million	Posts/day
Instagram	58 million	Loading of images/day
Facebook	1.9 billion	Active users
Website	1.2 billion	Active Web pages
Google	531 million	Active users
Twitter	308 million	Active users

Source: Prepared by the author, based on information collected on 16 July 2017 at www.internetlivestat.com.

It is interesting to understand how digital economy evolved in such a short period of time. In its early stages, the industrial organization of the sectors of communications, telecommunications networks and content development operated in different chains of value and independently, with specific functions in content generation and distribution, on the one hand, (chain of value of content); and connectivity (chain of value of transportation/connectivity) on the other. The development of new digital technologies facilitated the innovation and interrelation between the existing companies, also incorporating new actors that in practice have created a new integrated configuration, called ***"chain of value of contents and digital services",*** or just global platforms, as indicated by ECLAC's ecosystem model for digital economy.

This new chain of value has allowed for the quick development of sub-segments that serve as foundations for the new consumption-oriented digital economy companies:

- App and digital services developers for other markets (plane tickets sales, taxi/urban mobility services, sales of temporary lodging and hotels, etc.)
- Communication apps developers (Skype and WhatsApp)
- Internet searchers (Google and Bing)
- High-penetration social networks (Facebook, Instagram and Twitter)

As a consequence of this evolution, in which mobile devices and Internet access terminals are already an integral part of the new chain of value of contents and digital services, a new trend of transformations has been added, linked to the development of smart solutions for the industry. This new environment poses the challenge of articulating a chain of value for ***"machine to machine (M2M)"*** integration, in which the connectivity platforms will also play a key role.

The impacts of innovations in apps and services of these new technological chains of value have not only affected consumption and the digitalization of economic sectors that drive the growth of a country. There have also been innovations that have affected social sectors, such as education, health, banking and agriculture. Particularly the chains of value of contents and digital services, based on the widespread increase of the access to mobile phones and the migration to smartphones, has driven a series of benefits in each of these social sectors:

- In Education, formal and informal education are being improved with frequently free solutions, through distance courses and new multimedia didactic material.
- In terms of Health, services are aimed at the remote monitoring of patients, thus reducing maternal and child mortality and infectious diseases.
- In agriculture, digital services foster access to information on markets, weather and technologies, thus making competitiveness more possible.
- In support of banking, huge steps forward have been taken for the implementation of mobile money, especially in low-income and emerging countries.

Also, the machine to machine (M2M) chain of value is promoting business models based on the connectivity of the objects and the Internet of Things (IoT), with domestic applications (domotics, security, smart appliances and monitoring) that already represent half of the total connections (Source: CISCO 2015). An important advance is expected in areas such as Health and Agriculture, as complimentary technologies are integrated to IoT protocols, such as cloud computing, big date analysis and content generation.

One of the economic sectors with the most impact associated to the evolution of the chains of value of content and digital services has been, without a doubt, e-commerce, whether deployed by 100% Web actors, such as Amazon.com or Alibaba; or retail or traditional SMEs. In general terms, e-commerce platforms are transforming the flow of goods and services as they hugely reduce transaction costs, with a reduction of the costs of search and the competitiveness effect on global prices. Also, these platforms are not limited to trade between business and consumers (B2C). Those that link companies (B2B) and people (P2P) are also being significantly used.

According to figures provided by e-Marketer in 2015, the global business volume for e-commerce doubled between 2011 and 2015; in other words, in just five years, the figures leaped from 850 million to 1.6 billion dollars. Experts indicate that the explosive increase in online sales has been precisely due to the support e-commerce has had from the other platforms comprising the chain of value of content and digital services, such as online advertisement, social networks and the automation of data-collection processes and its comparative presented to the final user, and the larger offer of platforms of this media with global or national reach.

This last aspect has been rising with a lot of force in support of small and medium-sized entrepreneurs in developing countries, which in platforms such as e-Bay, more than 90% of the traders sell their products abroad. A set of statistics made in Chile indicates that this corporate segment has sold products to a total of 28 countries, while traditional exporters have an average of three customer countries. The "atomization" phenomenon of the sales from SMEs has gone hand in hand with the improvement of the foreign trade logistics services, mainly by plane, where the volume of cargo by airport continues to increase at a rate higher than 7% per year. As indicated by ECLAC in 2016, SMEs that invest in digital technologies, such as websites, cloud computing and e-commerce solutions, show a higher growth in their incomes, employment and exporting and innovation capacity.

As the last background information to be presented, and as a derivation of digital economy, the so-called "collaborative economy" has begun to appear, which explodes global platforms based on the paradigm of block chains, and the main current use the cryptocurrencies, among them the famous Bitcoin, and that jointly promise to change the way in which the ecosystem of users of digital economy exchanges methods of payment (economic values) in a completely dematerialized, decentralized and, for the time being, with high standards of security.

II. GAPS IN TECHNOLOGY AND INNOVATION THAT CHARACTERIZE LATIN AMERICA AND THE CARIBBEAN

The need to generate sustainable growth and quality employment through trade is still an important political goal for many developing countries. According to the *International Trade Centre*, 80% of all global trade takes places inside the chains of value, and about 60% of such trade is of intermediate goods. The integration of value chains allows SMEs in developing countries to benefit from the participation in the world trade. The globalization phenomenon, jointly with the vertiginous advancement of the new technologies and their disruptive business models, present a series of challenges and opportunities for the internationalization of SMEs in a large scale, since the Bali agreements from 2014 will allow for game rules whose orientation is on better mechanisms for the facilitation of trade, transportation and global logistics services.

As mentioned in the UN and ECLAC joint document "Digital Agenda for Latin America and the Caribbean (e-LAC 2018)" stemming from the fifth ministerial conference on information society, in 2015, held in Mexico, as the ICTs and, especially, the Internet permeate all economic and Social areas, their relevance in terms of innovation, growth and development acquires a new dimension. After more than a decade of ICT policies, Latin America and the Caribbean are showing progress in the establishment of legal frameworks, coverage of telecommunications services (mobile telephony and Internet, mainly), implementation of programs in the social areas (especially in education and health), and the development of electronic government. However, the countries of the region continue moving at different speeds, with gaps inside and between them, as well as with differences compared to more developed economies.

The digital economy is one of the main pillars of the Regional Digital Agenda, which promotes the development of the ICT industry, economic growth based on innovation and productivity, the fostering of e-commerce in all its forms and the strengthening of the regional digital endeavouring.

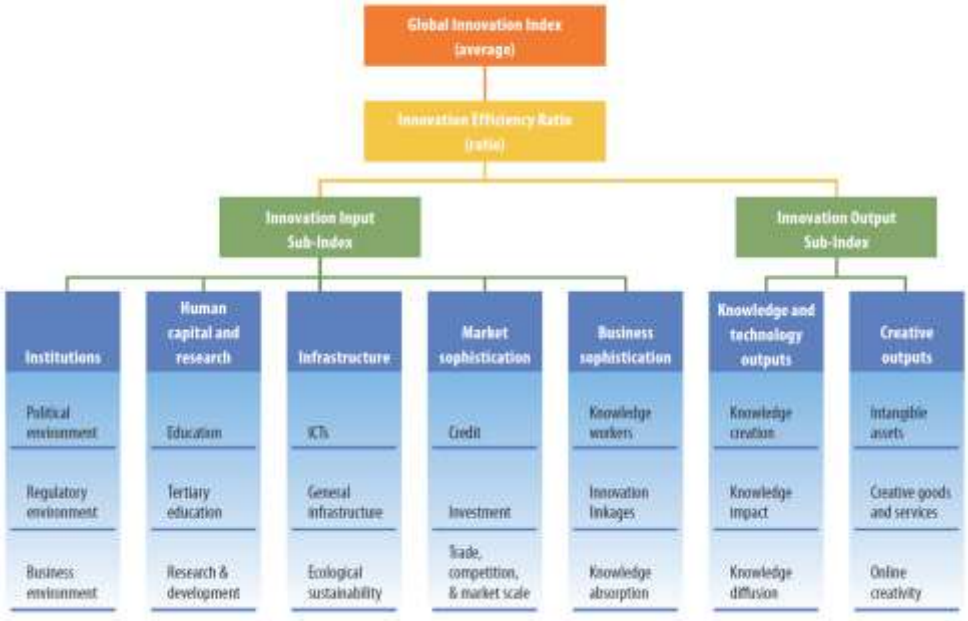
In view of the general guidelines on which the Regional Digital Agenda is based, this section presents a comparative analysis for a group of economies of the Latin American and the Caribbean region, referred to the global performance they have in the areas of (i) Innovation, (ii) Information Society with an emphasis on ICTs, and (iii) Digital economy with an emphasis on digital businesses. Among the many indexes made every year by a series of multilateral organizations, these three have been chosen because they best interpret global or support aspects of the digital economy (Global Innovation Index and the ICT Development Index), which are complemented by an emerging index made by the BBVA Bank, and that is exclusively focused on the analysis of the variables that drive the development and dynamics of the markets of digital economy of the countries.

1. Results of the Global Innovation Index (GII)

The Global Innovation Index (GII) is reported jointly by Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO). To this date, 10 reports have been published, the last of which was presented in 2017. The objective is to produce a comprehensive model of innovation that captures the complex nature of innovation, both in developed and developing economies.

The GII follows a calculation methodology in the frame of reference presented in the following figure. In summary, the GII represents a ratio called "Innovation Efficiency Ratio," which is calculated based on the sub-indexes of "innovation input" and "innovation output." Each of these sub-indexes has its own components, and in total adds up to 7. The innovation input sub-index considered 5 dimensions: (1) Institutions; (2) Human Capital and Research; (3) Infrastructure; (4) Markets sophistication; (5) Business sophistication. The innovation output sub-index has two 2 dimensions: (6) Results in Technologies and Knowledge; (7) Results in Creativity. In total, this index is built on the basis of 21 parameters that have to be gathered for each of the countries comprising the annual measuring of the GII.

CHART 2.1
Methodology of GII Index 2017



Source: GII 2017.

The score of the GII index is calculated in a 0-100 scale, in which the best result of all 127 countries was obtained by Switzerland, with 67.69; followed by Sweden, with 64.82; and Holland, with 63. In the region of Latin America and the Caribbean, the country with the best result was Chile, with 38.70, in the 46th position.

In order to analyse the evolution of the countries of the region in this index, the results of 2012 and 2017 were taken into account, and the difference in the scores, representing the percentage of evolution, was calculated. The following figure and table show the results.

CHART 2.2
Results of the GII index for LAC countries

Source: GII.

TABLE 2.1
Comparative GII results between 2012 and 2017 for LAC countries
Source: GII 2017 and GII 2012

COUNTRY	GII Score 2012	GII Score 2017	Delta %
CHILE	42.7	38.7	-9.4%
COSTA RICA	36.3	37.1	2.2%
MEXICO	32.9	35.8	8.8%
PANAMA	30.9	35	13.3%
COLOMBIA	35.5	34.8	-2.0%
URUGUAY	35.1	34.5	-1.7%
BRAZIL	36.6	33.1	-9.6%
PERU	34.1	32.9	-3.5%
ARGENTINA	34.4	32	-7.0%
DOMINICAN REPUBLIC	30.9	31.2	1.0%
JAMAICA	30.2	30.4	0.7%
PARAGUAY	31.6	30.3	-4.1%
TRINIDAD AND TOBAGO	32.5	29.7	-8.6%
ECUADOR	28.5	29.1	2.1%
GUATEMALA	28.4	27.9	-1.8%
EL SALVADOR	29.5	26.7	-9.5%
HONDURAS	26.3	26.4	0.4%
BOLIVIA	25.8	25.6	-0.8%

Source: Prepared by the author, based on of the GII indexes for 2012 and 2017.

The results of the GII index for Latin American and Caribbean countries show stagnation in the last 5 years, with an average downturn of 1.9%. Only 7 countries made progress in their index and 11 moved backwards. The countries with the highest drops are Chile, Brazil, El Salvador and Trinidad & Tobago, which is quite alarming given their privileged position in this index.

The country that experienced the highest growth, with 13.3% in its index, was Panama, followed by Mexico with 8.8%, which allows to extrapolate the good performance of their public policies and private innovations.

Table 2.2 below shows the results obtained for 18 Latin American and Caribbean countries (LAC), itemized in the 7 components of the index. Blue indicates the higher score for a country in a category. It is interesting to notice that when calculating the average of the best performances by pillar, the global score is 46.3, much higher than the best positioned LAC country in the GII index. This is a clear indication that there are countries with pillars that can be compared to the best in the world. In this sense, for instance, Chile's institutional pillar (70.3) stands out; as well as Panama's infrastructure (55.1), and Peru's market sophistication (54.8). This also allows to identify the best practices followed by the countries of the region, in such a way that it can guide the rest in the implementation.

TABLE 2.2
Results of the 7 pillars of the GII 2017 of the Latin American and Caribbean countries

COUNTRY	1. Institutions	2. Human Capital and Research	3. Infrastructure	4. Markets sophisticatio n	5. Business sophistication	6. Results in Technologies & Knowledge	7. Results in Creativity
ARGENTINA	46.4	42.6	46.6	37.7	33.6	17.6	27.6
BOLIVIA	29.8	25.8	35.3	46.2	26.0	15.6	21.7
BRAZIL	51.8	35.9	48.3	44.2	37.2	18.9	26.6
CHILE	70.3	32.8	52.1	49.8	36.5	26.0	32.1
COLOMBIA	58.5	31.7	52.5	53.1	32.9	19.1	28.6
COSTA RICA	66.0	32.7	47.6	38.4	35.2	22.1	38.3
DOMINICAN REPUBLIC	51.8	17.6	42.4	45.4	31.9	17.2	31.9
ECUADOR	43.3	22.8	43.4	45.8	25.1	14.3	30.1
EL SALVADOR	53.5	20.1	36.2	42.2	28.2	9.3	25.3
GUATEMALA	46.5	18.1	34.6	43.8	36.2	13.9	26.0
HONDURAS	43.2	19.7	33.8	45.9	31.3	12.4	23.5
JAMAICA	65.8	23.8	32.8	39.8	31.3	14.4	29.7
MEXICO	58.5	33.7	49.7	50.0	30.8	21.5	32.6
PANAMA	60.5	21.4	55.1	43.0	26.4	21.7	35.6
PARAGUAY	46.9	24.0	39.9	50.5	26.9	9.5	36.4
PERU	58.7	26.6	45.2	54.8	35.7	15.8	27.4
TRINIDAD AND TOBAGO	60.7	20.4	35.9	45.0	29.1	22.5	20.0
URUGUAY	69.0	33.5	52.7	36.5	25.6	20.3	30.9
LAC Best in the category	***70.3***	***42.6***	***55.1***	***54.8***	***37.2***	***26.0***	***38.3***

Report GII 2017 recommends important elements for the improvement of the efficacy of public policies for LAC in terms of innovation. First, it expresses the importance of giving priority to more specific actions, in order to develop the innovation potential Latin American and Caribbean countries have. In this sense, it indicates that countries like Chile, Mexico and Brazil are important innovation actors, and Mexico stands out for being an active contributor to the global chains of value, including the high technology sectors. Thus, there are big opportunities for improvement in the region, both in terms of global performance and in more innovation like in scientific, research and development publications, as well as in patents. The report indicates that in the last few years and also in 2017, none of the economies in the region can be identified as an outstanding actor in these areas. As such, the region has faced important challenges in the last year, and Brazil shows a very slow emerging recovery from an economic recession and still has

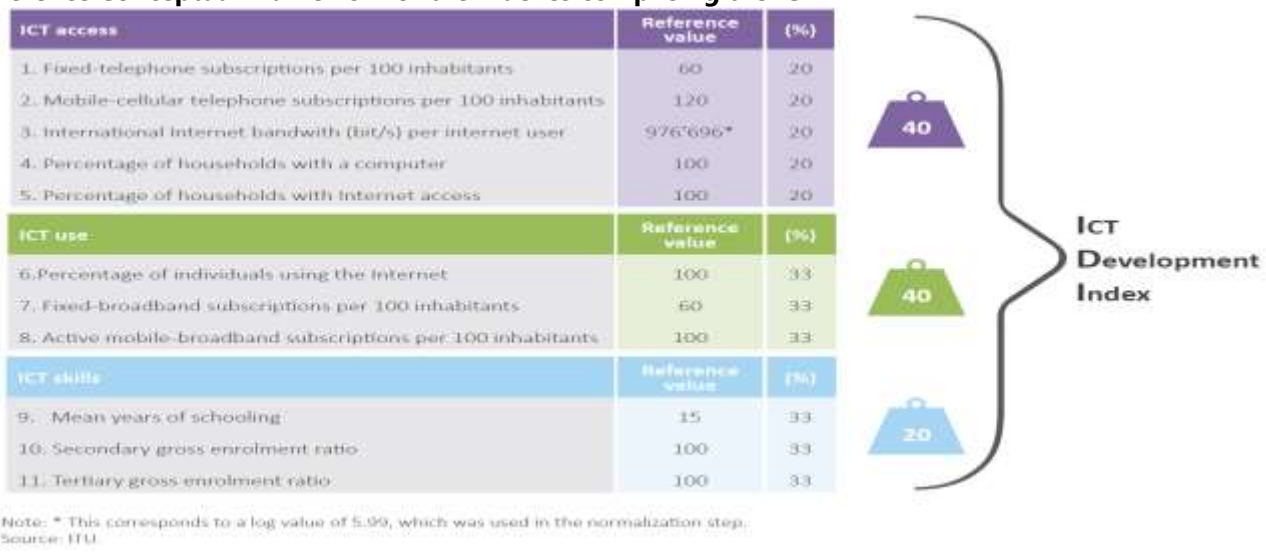
high levels of uncertainty. For this reason, sustained efforts are required to improve the investment in innovation and better coordinated innovation systems, as well as more R & D cooperation on a regional level, and better cooperation in innovation. All this is still absent when compared to other regions where the economies show a better performance in the GII and have been successful in innovation.

2. Results of the ICTs Development Index (IDI)

This index is calculated as part of the "Measuring the Information Society Report", which presents a global and regional view of the latest events related to ICTs, in order to stimulate the debate on public policies in the Member States of the International Telecommunication Union (ITU). The IDI was developed in 2008 in response to the requirements of the ITU member countries, in order to establish a general ICT index, and the first report was published in 2009. Since then, it generates an annual report and provides an objective evaluation on how the countries have been progressing in the development of ICTs, and also highlighting areas of opportunity for improvement.

The IDI combines 11 indicators grouped into three areas: (i) access and infrastructure for ICTs, (ii) intensity in the use of the ICTs, (iii) skills and capacities, as shown in the following chart.

CHART 2.3
Reference Conceptual Framework of the indexes comprising the ICI



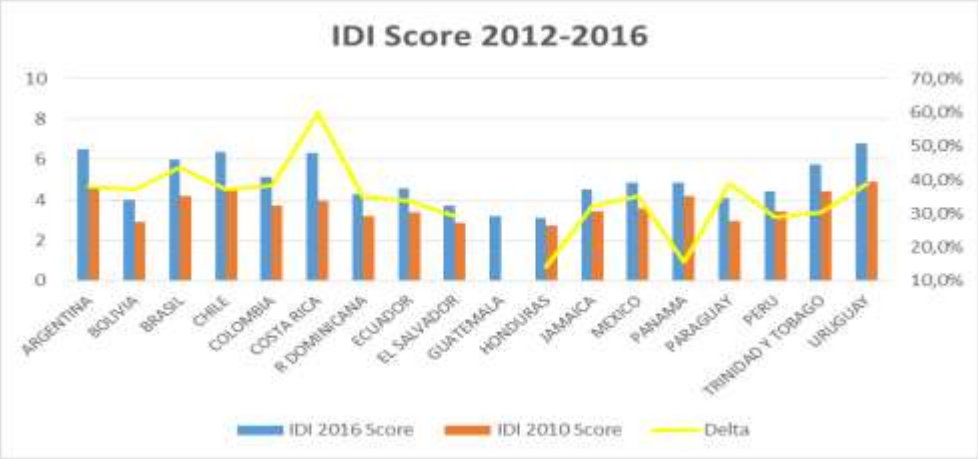
Source: ITU, 2016.

The IDI 2016 calculates a score between 1 and 10, and covered a total of 175 world economies, positioning the Republic of Korea in the first place in the ranking for the second year in a row. The Top 10 countries, including other two economies of the region of Asia and the Pacific and 7 European countries, reflect the high level of investment in innovation and ICT that takes place in high-income developed countries. Most high-performance countries have liberalized the ICT markets that promote innovation. They also have a population with relatively high incomes and the technical skills and capabilities that are necessary for the effective use of the ICTs.

In comparison, it also presents the results obtained by the IDI for a group of Latin American and Caribbean countries from the measurements taken in 2012 and 2016. Chart 2.4 shows the results

in the score during both periods, as well as the gap there was between both periods. It is worth noticing that the result of the 2012 period for Guatemala was not reported, and so it was not possible to estimate the gap. A positive value in the gap indicates an improvement in the value of the IDI in 2016 with respect to 2012, which can be observed for all countries.

CHART 2.4
Results of the IDI in Latin American countries. Comparative 2012-2016



Source: ITU, 2016

Uruguay shows the best regional performance in this index, with a score of 6.79; followed by Argentina with 6.52; and Chile with 6.35. The worst performances were those of Bolivia and Paraguay, with 4.02 and 4.08, respectively.

The average growth of the index in LAC over the last five years was 34.7%, which allows to extrapolate positive results for the next years in terms of ICT development. This progress in particular is explained by the heavy investments in telecommunication infrastructure made by all the countries, and that allowed to extend the services to a wide percentage of the population.

The country with the fastest growth in the period was Costa Rica, with 59.9%, reflecting the progress made in facilitation in public policies to the ICT sector. At the same time, Honduras showed the lowest growth, with 14%.

TABLE 2.3
IDI results for 2016 by sub-index and selected LAC countries

COUNTRY	IDI 2016 Score	IDI 2010 Score	Delta
ARGENTINA	6.52	4.72	38.1%
BOLIVIA	4.02	2.93	37.2%
BRAZIL	5.99	4.17	43.6%
CHILE	6.35	4.63	37.1%
COLOMBIA	5.16	3.73	38.3%
COSTA RICA	6.3	3.94	59.9%
DOMINICAN REP.	4.3	3.19	34.8%
ECUADOR	4.56	3.41	33.7%
EL SALVADOR	3.73	2.89	29.1%
GUATEMALA	3.2	n.a.	n.a.
HONDURAS	3.09	2.71	14.0%
JAMAICA	4.52	3.42	32.2%
MEXICO	4.87	3.6	35.3%
PANAMA	4.87	4.21	15.7%
PARAGUAY	4.08	2.94	38.8%
PERU	4.42	3.43	28.9%
TRINIDAD AND TOBAGO	5.76	4.42	30.3%
URUGUAY	6.79	4.89	38.9%
LAC BEST	***6.79***	***4.89***	***34.7%***

Source: ITU, 2016.

LAC countries show a better performance in the pillar of capabilities, with an average of 6.1; followed by accessibility with 5.5. Use gets a poor performance with 3.7, which indicates a significant gap in how the society is intensively using the technology available, and so this last pillar should be strengthened in order to increase the global evaluation of the index.

Table 2.4 presents the results of the scores obtained by the group of selected Latin American and Caribbean countries in the three sub-indexes.

TABLE 2.4
Results of the IDI 2016 sub-indexes for LAC countries

COUNTRY	Use (intensity)	Capabilities (Skills)	Accessibility (infrastructure, access)
ARGENTINA	5.45	8.18	6.77
BOLIVIA	2.72	5.89	4.37
BRAZIL	5.6	5.89	6.42
CHILE	4.91	8.3	6.81
COLOMBIA	3.85	6.44	5.83
COSTA RICA	5.8	7.04	6.44
DOMINICAN REP.	3.41	5.9	4.38
ECUADOR	3.31	6.37	4.9
EL SALVADOR	1.87	5.02	4.95
GUATEMALA	1.38	4.29	4.47
HONDURAS	1.4	4.36	4.17
JAMAICA	3.55	5.83	4.83
MEXICO	4.24	5.74	5.08
PANAMA	3.24	5.89	5.99
PARAGUAY	2.96	5.28	4.59
PERU	2.94	6.6	4.8
TRINIDAD AND TOBAGO	4.53	5.67	7.03
URUGUAY	6.2	7.02	7.25
BEST SCORE	6.2	8.3	7.25
AVERAGE	***3.7***	***6.1***	***5.5***
Deviation	***1.46***	***1.09***	***1.05***

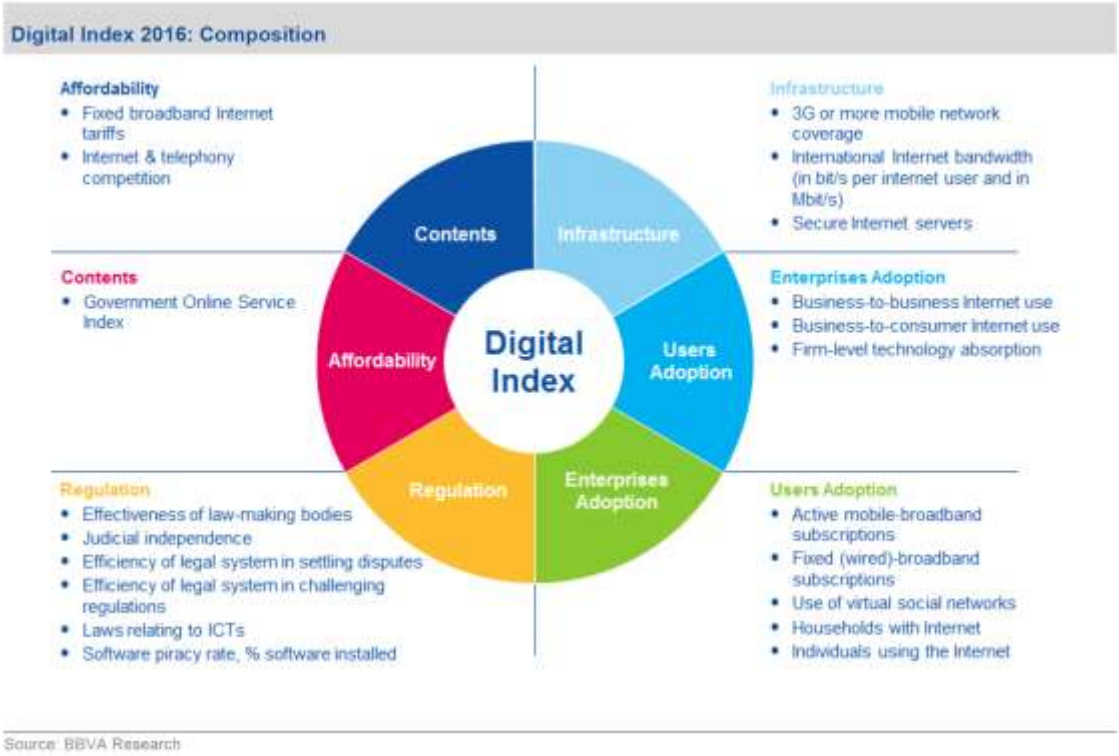
Source: ITU, 2016.

3. Digitalization Index Results (Digix)

The Digitalization Index (Digix) assesses the factors, agents' behaviour and institutions that enable a country to fully leverage Information and Communication Technologies (ICTs) for increased competitiveness and well-being. It is a composite index that summarizes relevant indicators on 100 countries' digital performance. The index is generated by the Research Team of the BBVA Bank (Cámara and Tuesta, 2017) and up to date it has done the measure of the 2016 data.

The DIGIX has a score ranging from 0 to 1 and it is structured around six main dimensions: (1) Infrastructure, (2) Households' adoption, (3) Enterprises' adoption, (4) Costs, (5) Regulation and (6) contents. Each dimension is in turn divided into a number of individual indicators, adding up to a total of 21. In the following figure we can observe the composition of such index with its dimensions and individual indicators.

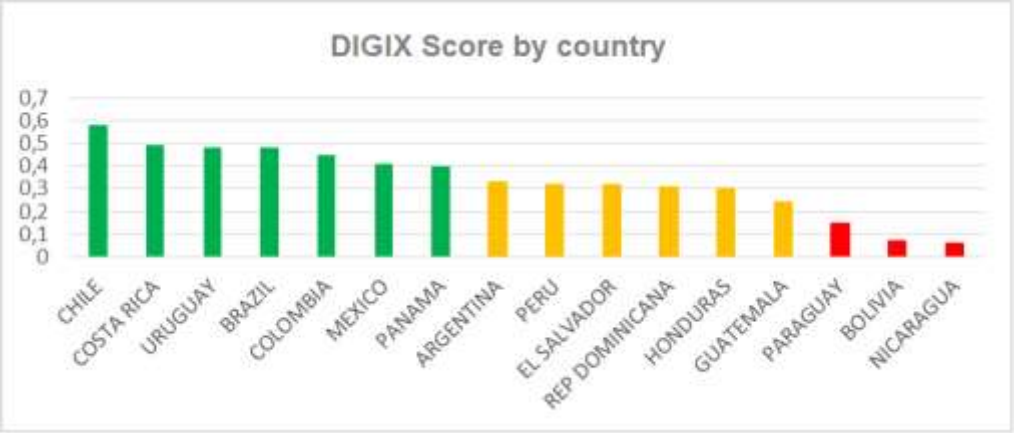
CHART 2.5.
Digix composition by dimensions and individual indicators



The DIGIX has as advantage, in its calculation, among others in literature: it assigns the weights endogenously, according to the functional data structure. Besides, the DIGIX is an index that captures a narrower concept of digitization and it is robust to redundant information.

Taking into account the last measure of the DIGIX (published on 2017), we present a comparative analysis for a group of Latin American countries. Figure 2.6 shows the results classifying countries by colour according to their performance: red, yellow and green. Those countries with an index less than 0.2 have been marked in red: Paraguay, Bolivia and Nicaragua. Countries with an index between 0.3 and 0.4 are in yellow. Countries with an index greater than 0.4 have been marked in green. Among them, Chile stands out with the best evaluation of 0.58.

CHART 2.6
DIGIX score results 2017 by Latin American countries



Source: BBVA Research.

Table 2.5 presents results of each country, with its score and its ranking position. For comparison, the three first economies that had the best performances in the index are presented: Luxembourg, United Kingdom and Hong Kong. Likewise, it is possible to identify the gap existing between the countries of Latin American region with respect to the rest of economies that had the best performance. For example, in the case of Chile, which was the country with the best performance in the region and obtained a score of 0.58 and reached the 34th place, the difference in relation to Luxembourg is of 0.32 in the ranking. On the other hand, countries like Bolivia and Nicaragua occupy the last positions in the ranking (97 and 98 respectively).

TABLE 2.5
DIGIX results, Score and Ranking 2017 - Latin America

COUNTRY	DIGIX	RANKING
LUXEMBOURG	1	1
UNITED KINGDOM	0.97	2
HONG KONG SAR	0.95	3
CHILE	0.58	34
COSTA RICA	0.49	39
URUGUAY	0.48	43
BRAZIL	0.48	44
COLOMBIA	0.45	50
MEXICO	0.41	59
PANAMA	0.4	63
ARGENTINA	0.33	75
PERU	0.32	77
EL SALVADOR	0.32	78
DOMINICAN REP.	0.31	80
HONDURAS	0.3	82
GUATEMALA	0.24	86
PARAGUAY	0.15	92
BOLIVIA	0.07	97
NICARAGUA	0.06	98

Source: BBVA Research.

4. Global Connectivity Index results

The Global Connectivity Index (GCI) is a measure which is done annually by the telecommunications multinational Huawei to assess the status of nations in adopting digital economics, highlighting the measure of the impact of the ICT Infrastructure investment and digital services. Among these 50 countries, there are only 7 from our region: Mexico, Venezuela, Colombia, Peru, Chile, Argentina and Brazil.

The importance of this index lies in two interesting attributes. On the one hand, the measure of indicators includes very recent elements related to investment done by countries in disruptive enabling technologies. And on the other hand, the index allows for classifying countries into three categories: Beginners, Adaptors and Advanced.

The conformation of indexes or indicators is organized by a matrix, where its rows mention fundamental aspects of investment (Fundamentals), and those investments are organized into 5 enabling technologies: (i) Broadband, (ii) Data centres, (iii) Cloud, (iv) Big data; and (v) Internet of things (IoT). The following four pillars sustaining the digital economy are mentioned in the columns.

a. Supply: It measures the supply levels or available offer in every country to offer the ICT products and services for digital transformation. The indicators are: ICT Investment, Telecom Investment, ICT Laws, International Internet Bandwidth, Fibre Optic, 4G Coverage, Data Centre Investment, Cloud Investment, Big Data Investment, and IoT Investment.
b. Demand: It measures the use level or demand for connectivity within the context of users and activities relating to digital transformation initiatives. The indicators are: app downloads, e-commerce transactions, smartphone penetration, computers in households, fixed broadband subscriptions, mobile broadband subscriptions, data centre equipment, cloud migration, analytics data creation, and IoT installed base.
c. Experience: It comprises variables for analysing the experience of connectivity for end users and organizations in today's digital economy. The experience indicators are: e-government services, telecom customer services, internet participation, broadband download speeds, fixed broadband affordability, mobile broadband affordability, data centre experience, big data experience, cloud computing experience, and IoT experience.
d. Potential: It comprises a forward looking set of indicators that point towards the future development of the digital economy. The potential indicators are: R&D expenditure, ICT patents, IT workforce, software developers, and market potential Index calculations for broadband, data centres, cloud services, big data, and IoT experience.

Chart 2.7
GCI Methodological Scheme. Relation between the 4 pillars and the 5 enabling technologies

Four Pillars

Five Technology Enablers	SUPPLY	DEMAND	EXPERIENCE	POTENTIAL
FUNDAMENTALS	ICT Investment Telecom Investment ICT Laws International Internet Bandwidth	App Downloads Smartphone Penetration eCommerce Transactions Computer Households	E-Government Service Telecom Customer Servce Internet Participation Broadband Download Speed	R&D Expenditure ICT Patents IT Workforce Software Developers
BROADBAND	Fiber Optic 4G Coverage	Fixed Broadband Subscriptions Mobile Broadband Subscriptions	Fixed Broadband Affordability Mobile Broadband Affordability	Broadband Potential Mobile Potential
DATA CENTERS	Data Center Investment	Data Center Equipments	Data Center Experience	Data Center Potential
CLOUD	Cloud Investment	Cloud Migration	Cloud Experience	Cloud Potential
BIG DATA	Big Data Investment	Analytics Data Creation	Big Data Experience	Big Data Potential
IoT	IoT Investment	IoT Installed Base	IoT Experience	IoT Potential

The contribution of this index in relation to others is that it allows to classify countries in terms of Starters, Adopters, and Frontrunners. Besides, it seeks to be a guide for the needed investment in the enabling technologies, prioritizing the Cloud computing as a catalyst.

The country occupying the first position in the ranking is the United States (with 77 points of rank) followed by Singapore (75) and Sweden (73). The last positions of the ranking are occupied by Nigeria, Bangladesh and Pakistan. In Latin America, only 7 countries were considered in this study. Of these six countries, Chile ranks first in this region and 25th in the world (with 46 points of rank). Then, there is Brazil ranking 30th (45 points), Mexico ranking 32nd (41 points), Colombia ranking 34th (39) and Argentina ranking 36 (37). After that, there is Peru ranking 37 (36), and Venezuela ranking 42 (33). Among Latin American countries, it is worth mentioning Argentina's and Chile's position since they moved up 3 places regarding the previous measure.

In the specific case of Chile, major improvements were made in its international broadband bandwidth, 4G coverage, fibre optic and Cloud services, as driven by priorities in its National Digital Plan and government collaboration with telecom services operators to expand coverage. As part of the plan to advance digitalization, the government is aiming for full e-procurement and e-invoicing for all companies and citizens by 2018. This enables companies to upload monthly documents to a government e-portal sitting on a government Cloud Service, creating a volume of valuable data and making Chile an attractive location for Big Data services. Besides, it is becoming an attractive base that helps create opportunities for local start-ups to develop apps and ICT solutions.

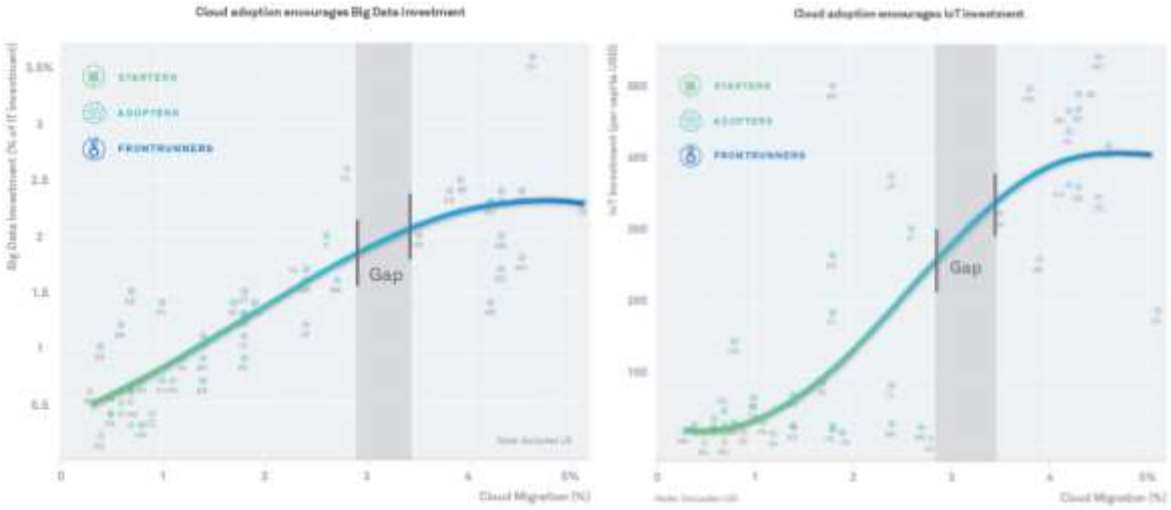
On the other hand, Argentina's broadband penetration is the second highest in Latin America after Chile. In 2017, its score in 4G coverage and broadband subscriptions, both mobile and fixed, increased significantly. It is highlighted that, Argentina is promoting ICT deployment across the

nation, with the goal of putting the state at the service of the people. In this way, it seeks to encourage agile public administration, where common paperwork for all citizens could be done through simple online procedures and so saving time and simplifying those processes. Besides, it is important to mention that multiple telecom service providers are investing in broadband for 1,200 rural communities to further strengthen the nation' s economic outlook through connectivity. Besides, ICT demand and experience aspects of Digital Transformation are central to Argentina' s national strategy. Argentina aims to allow its citizens to leverage open data, collective knowledge and collaboration through an open, transparent and accountable government.

CHART 2.8
S-Curve marking countries' positioning

The figure above shows every country position in a Cartesian plane, where the axis shows the GCI Index rank versus countries' Per capita Income. Three areas are verified according to what was previously mentioned and reflects countries' evolution grade in digital transformation.

CHART 2.8
Identification of the Cloud component as the one with the greatest impact to leverage digital transformation



As mentioned before, the GCI data show that investment in ICT Infrastructure initiates a chain reaction leading to Digital Transformation. Cloud is a key catalyst in that chain and pave the way to the company benefits of Big Data and IoT. As with the fixed broadband and 4G, the GCI identify a turning point where Cloud will encourage Big Data and Iot use, as it is shown in the previous figures, and where a gap between those that have strongly invested in Cloud in contrast to those that have not done enough.

From the viewpoint of the Digital Economy enablers, we can conclude that GCI and IDI measure the performance of a country in terms of Global Innovation and ICTs deployment and coverage as a support public and private digital facilitation. At the same time, complementary indexes have started to gain position. They are directly focused to measure the countries' advance regarding digital business environment (DIGIX), as well as the impact of disruptive technologies investment (GCI) on the advance of nations in its economic development, measured by per capita income.

In general terms, the ICT capacities, such as accessibility and infrastructure show the best performance in Latin American countries, but clearly they face challenges when using that knowledge and technological services in aspects improving people's quality of life, such as digital governments, companies and means of payment.

Finally, as it is mentioned in the GCI index, the Cloud is one of the disruptive technologies having more impact in the companies and digital development, with which it is possible to speed up start-ups (enterprises and employment generation), as well as to increase the productivity of mature business.

III. TECHNOLOGICAL OPPORTUNITIES WITH REGIONAL IMPACT

As it is reflected in different global indicators about the state of situation of innovation, ICT industries and digital economy, the region is in a lagging stage regarding the most sophisticated uses of technologies by people, companies and governments. To reduce this gap, it is fundamental to understand and spread how disruptive technologies, digital enablers and their combinations in the so-called global platforms providing the digital economy are allowing to make a series of traditional activities under new standards of productivity and efficiency, resulting in an important group of population to access new public and private services that improve life quality.

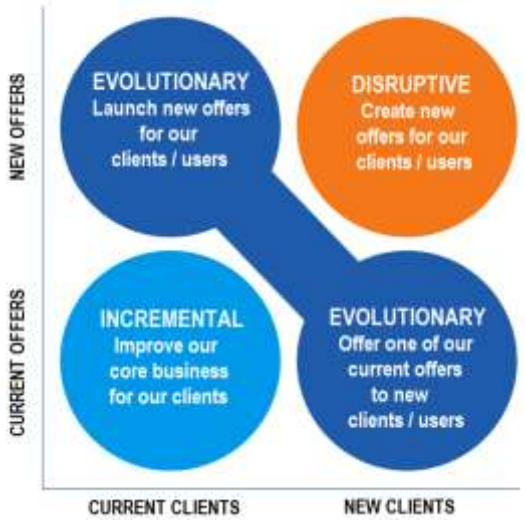
Specialists of Gartner – a research firm based in the United States, which provides opinions, advisory and data about global information technologies industries – have used the so-called Hype cycle since 1995 to define the overrated enthusiasm and the subsequent disillusionment usually occurring in the introduction of new technologies. Applying these cycles to the dot-com, we verify that the trigger was totally lost, since Internet was not leveraged or there were not enough media for the final client to adopt this innovation. Now, it seems to be the moment for an evolution of the companies, for a revolution of people to do the same things they do, but do it structurally, clearly and freely, also more quickly, at a lower cost and more reliably.

1. Technology enablers

To understand the change of paradigm being promoted by the current disruptive technologies based on the Internet, we should think that up to now we have lived the Internet of information, that is, that when sending an e-mail or a photo, the original is NOT being sent but a copy (data). Now, Internet will complement the data transmission, things such as money, financial assets such as stocks and bonds, contracts, intellectual property, music, art, a vote, in a unique manner and mathematically demonstrable, concretely with high-level cryptography, solving what the cryptographers call "double-spending", that makes that when sending, for example US$ 10, these cannot be used to make another sending or purchase.

As it is shown in the following chart, in all markets and industries where supplies (services) and clients work together, the use of disruptive technologies attempts to create new supplies for new clients and users, overcoming increasing and evolving classic stages.

CHART 3.1
Disruptive strategies



Source: CAF 2017.

There are three areas of technology adoption that allow to efficiently manage a competitive strategy based on a disruptive approach:

1. Increase of the reach, display and sophistication of integrated systems of Cloud computing, sensors and the Internet of Things (IoT);
2. A broader use of advanced artificial intelligence, particularly when display in the Cloud, which will let us tackle problems requiring high computing capacities;
3. A greater importance of security and risks either in physical domains or on the net (cyber) due to high availability and use of data on a large scale.

The increase of the power and convergence of capabilities of transmission, computing and storing, as well as permeability of digital technologies in the economy, are bringing about a transformational stage on the Internet of Things and Big data analytics. Commercial Internet of the 1990s and its expansion through the narrow band meant radical changes in the area of communication and access to the information, with e-mail applications and the proliferation of Web sites. Between 2005 and 2010, when Broadband allowed for higher speeds of data transmission, the convergence of networks, devices and contents became real. With the emergence of smartphones and tablets, the development of applications and solutions in the Cloud was eased and this enabled innovations in business models and services offer.

a. Cloud computing

Cloud computing has been identified as one of the most relevant elements since it provides scalable resources for computing and data storage available anywhere, and it eases the centralized control of systems, the analysis of sets of Big Data, solving problems on a big scale, and give systems greater intelligence. Cloud computing has the feature of interconnectivity, since it integrates not only data, but internet, mobile devices, remote communication, sensors and devices through the supply chain. The result is a basic structure reflecting the one used by humans for decision making and control. Besides, it allows algorithms able to perform analytic functions and send data to devices by internet. This structure is not new, but the speed and scalability change everything.

This merge of technologies is now referred to as cyber physical systems, which integrate computing process, network and physical aspects. Embedded computers and networks monitor and control the physical processes, usually with feedback loops where physical processes affect computations and vice versa. Another important element to highlight is that it delivers on demand computing resources – from applications to data centres – over the Internet, and scalable to meet the demand anytime, either for transferring a small amount of data in few minutes or solving a complex optimization problem with millions of variables.

The growth of Cloud computing is impressive. According to Forbes, the expenses on cloud services will grow from US$ 70 billion in the year 2015 to more than US$ 141 billion by the year 2019.

b. The Internet of Things (IoT)

The Internet of Things (IoT) is a concept that became popular in 1999 through the Auto-ID Centre at the Massachusetts Institute of Technology (MIT), where the first tests of machines, their sensors and the Internet network were done. The IoT is characterized by building a network of physical devices with embedded sensors communicating directly by Internet and between them,

as with the Cloud, and generating data with total availability for use. The concept has expanded to a great number of industrial sectors and applications. From drink dispenser machines, roads and autonomous vehicles, devises around the world are producing and sending a big amount of data through Internet that can be used by controllers of various kinds for decision-making and control. Generally, we can make a distinction between industrial applications of IoT (also known as industrial Internet) and applications for consumers (IoT solutions related to the consumer of products and services); and it includes at least three areas of development:

- Connectivity on Internet or telecommunications networks supporting IoT apps;
- The devices and connectivity of objects, such as intelligent sensors; and
- The semantics or the representativeness of obtained data, their storage, analysis and management.

c. Big data analytics

A trend combined with the previous ones is the techniques for managing big data bases with information in real time. Thanks to the high level of digitization and the use of IoT sensors, it is possible to capture a big volume of data from different sources. To take advantage of the value of these data and its availability in real time has a high potential, and because of that advanced algorithms of prediction and analytics to provide the decision makers with information in real time have emerged. This merges with the potential generated by Cloud computing that permits bigger capacities of computing for the problem solving of highly complex processes of prediction and optimization that require high capacities of computing (Arroyo, 2017).

d. Artificial intelligence

In addition, the development of auto-learning systems or "automatic learning" has become an enabler that will change the game, with a series of activities and optimization techniques based on complex algorithms. With a minimum/null human intervention, an auto-learning system will adapt and will improve its algorithms as it receives more data, improving results with the time. With the supervised or not supervised "training", the system recognizes and analyses patterns (for example, in voice and images) to add value in the different activities of decision when required.

Also, an important trend is the employment of robots and the process of automation. Encouraged by the rapid technology advances, robots of next generation and automated solutions support the productive process and of logistics, supporting the processes productivity. Robots, particularly, will adopt collaborative roles in the supply chain, helping workers with storing, transport and even last-mile delivery activities (Arroyo, 2017).

With the growth and evolution of the Cloud, communications and sensors technologies, we can see that in the next decades it will be very necessary to handle all the elements related to IoT. This will offer opportunities in all forms to achieve the advance in the technology impact and new forms of making business and improve the jobs.

For example, the use of sensors along with the use of predictive analytic techniques create opportunities for improving efficiency predicting potential failures, forecasts and can be a source of information for new markets and products. The potential use of IoT not only helps machinery work better and autonomously, but also support managers and decision makers with information in real time and recommendations to support decisions planning and resources programming.

e. Disruptive protocols for the exchange of value on Internet

The block chain technology is defined as a distributed data base, formed by block chains designed to avoid its modification once a datum have been published using a sealing of trustable time and joined to a previous block. For this reason, it is especially proper to increasingly store data organized in time and with no possibility of modification or revision.

In real economy, today we rely on big intermediaries such as banks, the government, big companies, credit cards, etc. to stablish trust in our economy. These intermediaries perform the function of authentication and people identification, and clear and settle value registries, but in a centralized way, letting them expose to attacks, data theft, and, what is the worst of all, excluding anyone not fulfilling certain requisites to enter this economic cycle. The cryptocurrencies, along with their corresponding block chains, allow stablish trust and make transaction without a third party, and they are the element that intrinsically transport the value and, besides, it lacks of central control such as a government, a state or a nation that issues or controls them.

2. Digital transformation strategies in the economies

When combined in global platforms, digital enablers have opened a number of possibilities and opportunities for the nations, industrial segments and companies. These are the three cases of initiatives and programs that have been based on the use of enablers and where their models of governance between private organizations and between private-public and academic fields are allowing them to advance in the digitalization of traditional services and industries.

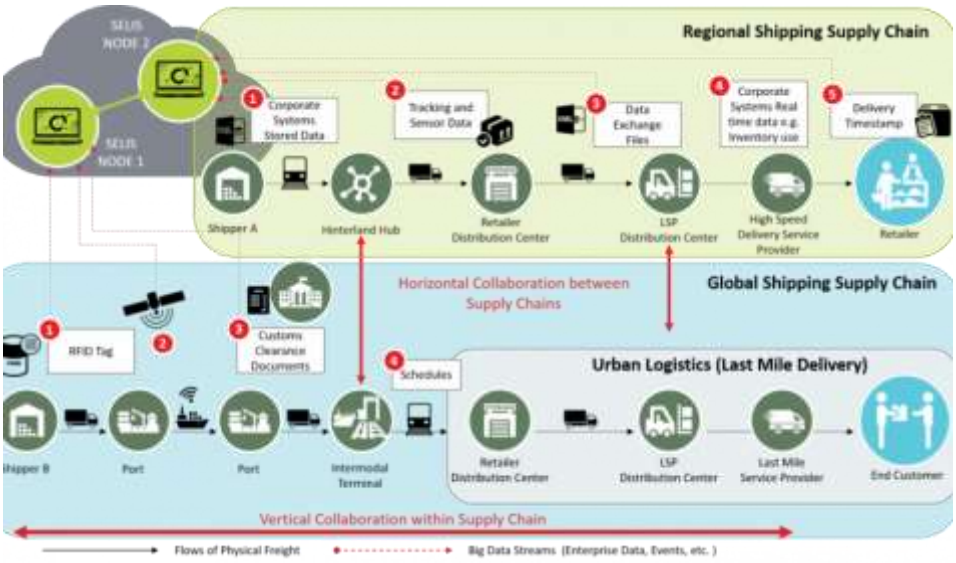
a. Digital platforms for the logistics sector

One interesting case for the analysis of the industrial segments is the construction of sustainable, cooperative and swift supply chains. The Shared European Logistics Intelligent Information Space (SELIS) are intelligent information spaces shared by certain logistic communities (called *SELIS community nodes*). The SELIS nodes are connected to their participants through secure technological infrastructures and provide information and tools for the use and acquisition of data through cooperation agreements. The connected nodes provide and distribute common communication and navigation platforms for pan-European logistic applications supporting various intelligent value chains.

The SELIS digital platform comprises a vast spectrum of logistic perspectives and creates a unified agenda for the operational and strategic business innovation for the pan-European green logistics. It establishes a consortium of logistic stockholders and ICT providers that take advantage of the EU IP with more than 40 projects for the development of common communications and navigation platforms on pan-European logistics applications, deployed in eight living labs (living labs innovation and development centres) that represent the main logistic communities.

The participating companies include DHL Supply Chain Iberia, a subsidiary of one of the main DHL global operators. DHL Supply Chain Iberia develops this project with their experience in Big Data and its application in the prediction of tendencies and behaviours. According to DHL Supply Chain, an improved demand prediction thanks to the data analysis has allowed a significant segment of the clients to reduce their stock by 20 to 30 percent, depending on the sector. The figure below shows an image of DHL's vision on the SELIS project of the European Union.

CHART 3.2
DHL in the SELIS project of the EU



Source: Warehousing and Maintenance 2017.

b. Digital Agenda and Industry 4.0 in Spain

The Internet of Things also has a connection to the so-called Industry 4.0, named after a strategic initiative of the German government and the academy. It is essentially the fourth industrial revolution, in which the centralized control of manufacture and production is performed through intelligent devises and a network favouring industrial production.

The Ministry of Economy, Industry and Competitiveness of Spain has created a strategy named Connected Industry 4.0, which includes an updating plan with master lines, governance model, training contents and successful cases.

The master lines of the program are four:

- Guarantee I4.0 knowledge and the development of competences
  - Awareness raising and communication
  - Academic and work training
- Encourage multidiscipline collaboration
  - Cooperative environments and platforms
- Promote the development of a portfolio of enablers
  - Promoting the development of digital enablers
  - Support technology companies
- Promote the necessary actions to launch I4.0
  - Support the adoption of I4.0
  - Regulatory framework and standardization
  - I4.0 projects

Approved in the Council of Ministers on 11 July 2014, this initiative is in line with two local initiatives and is complementary with them: The Digital Agenda and the Agenda for the Strengthening of the Industrial Sector in Spain. In an initial stage, it has defined the strategy or the strategy master lines, including performance master lines and governance model for its eventual implementation.

The ultimate objectives of the Spanish Connected Industry 4.0 program are as follows:

1. To increase industrial value added and qualified employment in the industrial sector.
2. To favour a future-oriented industrial model for the Spanish industry, aiming at strengthening the future-looking sectors of the economy and increasing their growing potential by developing local offers of digital solutions.
3. To develop differentiated competitive levers to strengthen the Spanish industry and encourage exports.

The program of the Spanish government relies on the technical cooperation with companies such as INDRA (information technology), TELEFÓNICA (communications) and SANTANDER (banking).

c. Latin American experiences in industrial digitalization

The government of Chile presented the 2020 Digital Agenda in 2015, with 60 specific measures for advancing in the digital development of the country. In the field of digital economy, Measure 42 refers to the strategic program of intelligent industries.

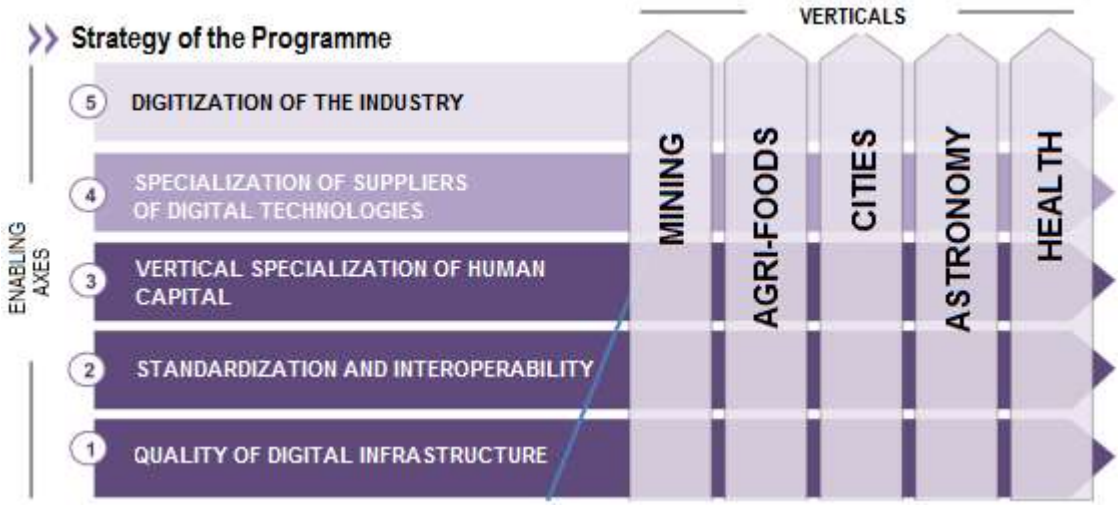
The term *intelligent industries* refers to the digital transformation of the traditional productive sectors through the adoption of information and communication technologies for the analysis and processing of data in production processes. This transformation aims as making such processes adaptable and efficient in the use of resources and highly integrated among them. The term comes from the so-called fourth industrial revolution, which implies what has been called *digital transformation* of production and services in the traditional sectors. It also comprises changes in the business model and new ways to offer services.

With the objective of encouraging this digital transformation, Chile implemented the National Strategic Program as an instance of coordination between the private sector, the academy and the research centres, the government and the community, encouraged by CORFO. The objective is to encourage the competitive improvement of the country as an enabling platform that become the engine of the digitalization of the industry in a vertical manner, that is, focusing in the particular problems and conditions of each productive sector.

The program is aimed at identifying production, human capital, technological and coordination gaps, which transform themselves into the common denominator to decisions regarding financing, investment and development of competences, norms, etc., and attempting to mitigate or solve market and coordination failures. Such gaps have been identified through a diagnosis, on which it builds an agreed-upon road map in the short, medium and long terms. To define these road maps, four technical work groups were formed and 64 stockholders employed 312 hours per men with experts in workshops. Twenty-six interviews with experts were conducted and 49 institutions participated. The conclusion was the definition of 25 initiatives and 183 clusters of ideas.

The program, additionally, seeks to support the development of the technology industry through the establishment of standards, open and interoperable platforms and protocols: The development of technical capacities and human capital, and the specialization of supplier, enabling the delivery of applications and systems and sophisticated solutions facing the challenges of the production sectors that are essential to the country. The chart below wraps up the five vertical axes of the program and their relation to the five enabling axes as base for the creating intelligent industries.

CHART 3.3
Scope of the National Strategic Program of Intelligent Industries



Source: CORFO.

In the first stage, the program is focused on the application of pilot activities in the priority industries in order to develop the capacities and generate learning that can be reproduced. Labs are proposed at two levels: Solving problems related to technology and solving problems related to business processes and management. In a second stage, learning and skills produced should be consolidated in order to shape a transversal platform and extend pilot projects to other productive sectors and scale solution, leading the digital transition of the country.

Under the Program of Intelligent Industries, the governance includes an executive president, a program team and a public-private board of directors, with representatives of various organizations committed to the technological development of the country. The board comprises a participation of 30 percent from the public sector, 30 percent from the science and technology sector, and 40 percent, as illustrated in the chart below.

CHART 3.4
Board of Directors of the Strategic National Program of Intelligent Industry of Chile

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Interestingly, this program has opted for digitalizing part of its traditional productive matrix, that is, it does no opt for creating new chains of industrial values but profits from the installed capacity on companies, to implement innovative projects securing the technological adoption and sustainability of such economic fields already settled in the Chilean economy.

IV. STRATEGIES TO MANAGE THE CHANGES POSED BY THE DIGITAL ECONOMY

The global setting shows that the digital transformation is leading our society to incorporate technological tools beyond the areas of trade and consumer use, but rather it is being confirmed significant changes in manufacturing and movement of persons and goods. The nations with larger capacities of resources, human as well as finance, have wagered to implement investment aimed at extending coverage of infrastructure and telecommunications, achieving in this way the promotion of creation of solutions based on disruptive technologies and constant innovations in business models.

The challenge identified by the indicators is a growing and accelerated gap between the more developed countries with those less developed. This difference could have serious consequences in the long term for the nations that are left behind in the development and growth of the digital ecosystem that enables Digital Transformation and access to a better quality of life.

As global economies evolution by adopting to digital transformation, the dependency on ICT infrastructure will be increasingly greater, since these are also evolution from support systems to be converted into platforms that allow better decision making and inspire new models. It is expected that the impact on the quality of life of the individuals is seen to be significantly improved in productivity, innovation and economic benefits.

According to ECLAC, based on the current productive structure of Latin America and the Caribbean, the adoption and implementation of the principle digital tools seem to be a complicated task, at least for a large majority of companies, but the actions that are implemented in this regard are those that will determine the conditions for competitiveness and, as such, the generation of employment over the next decades. The lessons resulting from having delayed the adoption of the previous technology revolution are clear: not adapting to a digital revolution leads to falling behind in economic growth and social development.

In this aspect regarding future proposals, it is good to bear in mind the objectives and path of actions that promote the Regional Digital Agenda e-LAC 2018, proposal by the council of ministers of ECLAC in 2015 and in this regard, focus on a strategic effort of technical cooperation aimed at strengthening the Digital Economy in the region.

The proposal of a digital agenda for Latin America and the Caribbean (eLAC2018), puts forwards as its mission to develop a digital ecosystem in Latin America and the Caribbean which, through a regional integration and cooperation process, strengthens the policies that drive a society based on knowledge, inclusion and equity, innovation and environmental sustainability. Through a series of specific objectives (23), it is sought to consolidate a set of actions with a regional vision, which should focus within the framework of 5 areas of action: i) access and infrastructure; ii) digital economy, innovation and competitiveness; iii) electronic government and citizen; iv) sustainable development and inclusion, and v) government.

Area ii) digital economy proposes the following objectives:

Table 4.1
Description of specific objectives for the development of the digital economy

Objectives	Description
N° 6	Develop and promote the industry of the Traditional ***ICT as well as the emerging sectors***, for the production of content, goods and digital services; likewise, promote the ecosystems of digital economy and public-private interaction, with emphasis on the creation of higher aggregate value, the increase in qualified work and the ***formation of human resources*** to increase productivity and competitiveness in the region.
N° 7	Increase productivity, growth and innovation in the ***productive sectors*** by using the ICT, and encourage digital transformation of the micro, small and medium companies, bearing in mind the technological and productive trajectories and the development of capacities.
N° 8	Strengthen digital economy and ***electronic trade locally and regionally***, adopting the regulations for consumer protection in the digital spectrum and coordinating fiscal aspects, logistic and transport, methods of payment and protection of personal information, providing judicial security to promote investment in the ecosystem.
N° 9	Promote policies aimed at strengthening the ecosystem of regional ***digital ventures***, encouraging the adoption, development and transfer of new technologies and generating capacities and options for Access to them.

Source: ECLAC Fifth Ministerial Conference on the Society of Information of LAC. 2015.

Another background to consider in preparing an integral strategy for strengthening digital economy in our region has to do with the status of the situation of intraregional foreign trade, which is important that it be strengthened since it has an impact on a significant number of companies, services, territories and population, and where the impact of digitalization of processes, products and business models will be crucial for the sustainability in the medium and long term.

In this connection, and according to the statistics prepared by ECLAC for the year 2016, reflected in the following table and explanatory chart per economic block, intra-regional trade represented 16.3% of total exports and 15.4% of imports.

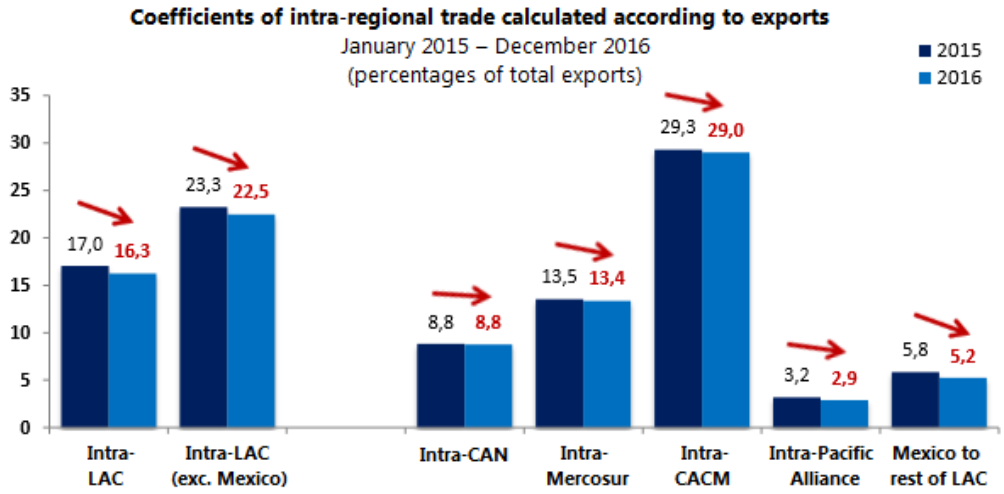
TABLE 4.2
Foreign Trade of ALC with main trading partners

Main trade partners	Exports 2016 US$ millions	%	Variation over 2015	Imports 2016 US$ millions	%	Variation over 2015
World	871,567	100.0%	-3.6%	898,443	100.0%	-9.3%
LAC	***141,733***	***16.3%***	***-8.0%***	***138,414***	***15.4%***	***-10.1%***
USA	392,651	45.1%	-2.7%	287,657	32.0%	-6.9%
EU 28	93,785	10.8%	-2.0%	123,922	13.8%	-4.7%
Asia	159,503	18.3%	-0.6%	279,438	31.1%	-7.5%
Rest of the world	83,895	9.6%	-6.6%	68,946	7.7%	-28.0%

Source: Statistic bulletin of trade of goods LAC fourth quarter 2016. ECLAC.

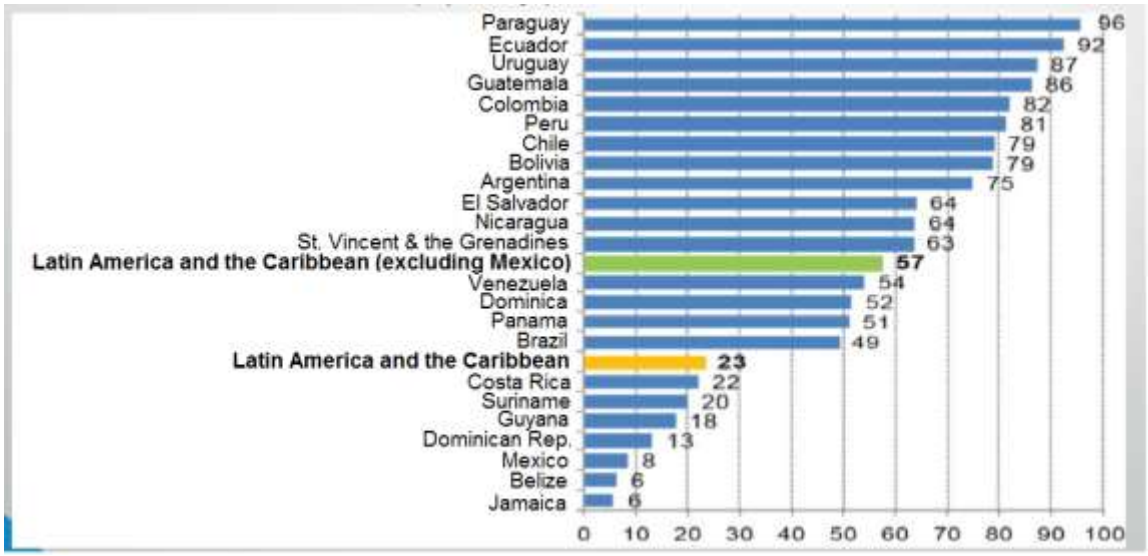
What is concerning in the figures indicated is the drop between 8 and 10% of exports and imports respectively compared to 2015. The following chart represents the level of intra-block exports, highlighting trade in the common market of Central America with 29%, but yet low performance in CAN, Pacific Alliance and Mexico with the rest of LAC, which are below average in the region.

CHART 4
Coefficients of intra-regional trade calculated according to exports
January 2015 – December 2016



The positive side of these statistics consists in the analysis of the exporting value chains with higher sophistication or grade of incorporated manufacture. One statistic prepared also by ECLAC in 2012 shows that, without Mexico, the regional market is the principal destination for manufacturing exports of Latin America and the Caribbean, the average of which is at 57%.

CHART 4.2
Proportion of manufacturers with medium and high technology aimed at the regional market. 2012



Source: ECLAC 2016.

Considering the interacting role of the regional Digital Agenda with respect to strengthening the digital economy, and also the need to increase and modernise our intraregional trade, an integral strategy is proposed with three levels of action:

a. Regional Level
b. National Level
c. Transversal Level to governments, private and academic sectors

CHART 4.3
Scheme of integrated strategies for strengthening the Digital Economy

a. Digital Economy Strategy at the regional level

Regionally, a proposal has been made to advance with the ii) area of action of the Regional Digital Agenda promoted by ECLAC, which would hold in 2018 in Colombia a review of its advance status, and will propose the challenges for 2020.

This aspect proposes the development of a complementary strategy to the Regional Digital Agenda, with a collaborative nature, which allows for the creation of a strategic alliance involving the strengthening of the intelligent intra-regional value chains, with emphasis on the sectors that involve a significant number of SMEs.

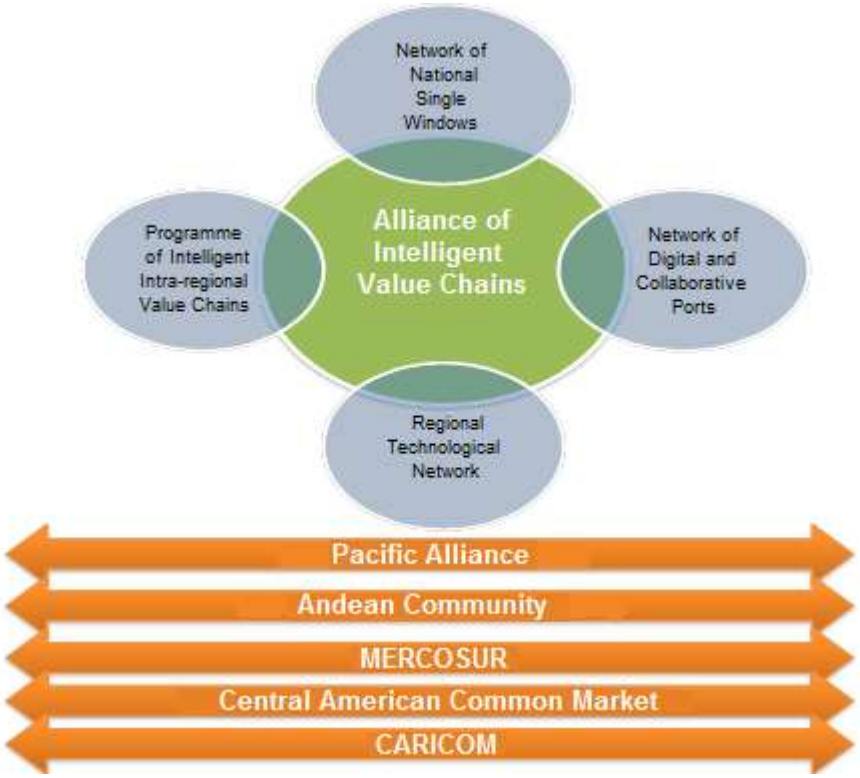
An intelligent value chain is defined as those international supply chains involving suppliers, producers, logistic service networks, distributors and final consumers that have reached a level of interchange of information based on digital tools and which permit them to reduce their response time on the market, to take advantage of shared resources, to minimize the carbon print of their operations and continuously improve their products in bidirectional collaboration with the final client.

The multilateral institutions supporting trade and investment play a principal role in enabling the internalization of the SMEs in the intra-regional value chains and their efficient integration in the ecosystem of digital economy and disruptive technologies. For this purpose, it is necessary to

carry out technical cooperation works focused on spreading the best global practices on matters of regional integration of value chains, promote sectoral and transnational governance that integrate the ICT industry, innovation and business ventures to the current and future needs of the internationalized SMEs and finally strengthen public policies to promote these collaborative actions.

What is interesting on this type of programme of international technical cooperation is that the permanent conditions must be created for a "Strategic Alliance" among the different initiatives existing in the region and that they will support the intelligent intra-regional value chains. These initiatives today are scattered within the public or government sectors (e.g. the Network of Foreign Trade Single Windows[2]), and public-private (e.g. the Network of Digital and Collaborative Ports of Latin America and the Caribbean[3]). Both initiatives have the decisive participation of SELA, and as such this institution could be called on to coordinate the strategic alliance required to undertake a programme of intelligent intra-regional value chains.

CHART 4.4
Scheme of collaboration among the regional initiatives and the economic blocs



At the same time, and to provide an institutional framework to the initiatives of intelligent intraregional value chains, the different economic blocks of the region must select those value chains that are better adjusted to the objectives of this type of programme. The following table summarises the link between the programme and the rest of the initiatives, clearly indicating that the "Strategic Alliance" must materialize with the support of enablement at the government level and at the level of logistic service chains, initiating from the ports in the region.

[2] http://redvuce.org/.
[3] www.sela.org/redpuertos.

In reality, these types of initiatives intend to have a positive impact on the three levels of process, product and business model associated with the value chains. At the level of processes, there are challenges that affect the components, whether totally or in one of the links of the value chain (design, manufacture, logistics and distribution, client attention and post-sale services). At the level of product, adapting them to the new tendencies implies a challenge, where personalization or digitalization could mean an advance that would have to be faced to have a more competitive offer. Finally, at the level of business models, where the combination of the challenges described above could give way to the generation of new business models and opportunities of opening up new markets.

b. Strategy for the digital economy at the national level

The countries have begun to adopt to the general guidelines of the Regional Digital Agenda, where one of the goals is to achieve an efficient integration between the ICT industry with the traditional and incipient economic sectors.

For a start, each country must promote its own Digital Agenda, in a way that it allows the country to create a path in respect of lines of actions, and the first activity, which is to diagnose the status of national condition and to be concern with dealing with the gaps in functioning, which annually are measured in the indexes such as GII, IDI and DIGIX.

Once the National Digital Agenda has been coordinated, its execution must be ensured in a vertical and horizontal manner. From a vertical point of view, it is proposed the creation of programmes focused on intelligent industries, following the path proposed by Chile and the national strategic programmes that involves this aspect for its traditional industries and for world class ones such as mining, farm products and astronomy. These types of programmes based on a public-private-academic management and with the decisive technical and financial support of the government, have as objective to create an ecosystem of integration between ICT suppliers, investigation and innovation centres, in strategic alliance with traditional industries.

From a horizontal point of view, it is proposed to create a Digitalization Guide for SME´s that promotes simply between the business structures on a smaller scale nationally, the massive use of technology based services for their different processes, as well as supplies, human capital, production, commercialization, banking and relations with public services. As an example, mention was made of the initiative of the Centre for Studies of Digital Economy of the Chamber of Commerce of Santiago de Chile, which in strategic alliance with the Faculty of Communications of the Catholic University of Chile, prepared in 2017 the Guide for Digitalization in SMEs, which developed in its chapters concepts such as: External communication, Marketing 2.0 and the role of social network, the relevance of Web traffic, e-trade for SMEs and tools for digitalization step by step.

c. Pillars for strengthening the regional digital ecosystem transversally

There are three transversal and regional pillars that must be constructed with a transnational view, and which together allow the insertion of the countries of the region into the global digital ecosystem.

The first pillar is associated with the search for conditions to implement in Latin America and the Caribbean a “Single digital market”. As indicated in the above paragraphs, the countries in the

region are at a disadvantage in respect of infrastructure, industry, individuals and content. These frictions obstruct the exploitation of cross-border synergies that could be reached thanks to an institutional framework and uniform regulations. A common bloc or digital market could significantly support the regional efforts to expand digital economy. In fact, according to indications by ECLAC and a recent study by CAF, telecommunications operators have also identified benefits that scale economies, the reduction of complex regulations and the elimination of duplications of functions can have on the companies.

The second pillar is related to the search for new development models by means of an adjustment in the base of educational formation, where it is becoming more and more relevant the role of science, technology and innovation such as inductors of the digital economy, which demands more and more specialized professional profiles in this field and, as such, is resulting in a transformation of the educational degree, where more universities are waging for this type of degrees. This is a new and dynamic sector where there a few references and therefore there is difficulty for its design and start-up.

It is proposed to strengthen this pillar, to follow the recommendations proposed in the "***Libro Blanco para el Diseño de las Titulaciones Universitarias en el Marco de la Economía Digital"***, which proposes the following objectives:

- Improve the dialogue between the industry and the university, exercising the General Administration of the State the intermediate role, with the ultimate objective that the profiles of job seekers are adequate for the requirements demanded by the market.
- Enable the design and evaluation of the degree titles related to the Digital Economy sector.
- Achieve an effective incentive with respect to the universities that have not introduced these types of degree titles.

Added to the challenge of formation of new human capital capable of adapting to the needs of digital economy, comes the need to create ecosystems that are based on innovation on the models of reference that have been followed by countries leading the index of global innovation. In this regard, the importance of the regional clusters for inventive activity is essential for the development of national innovation systems.

The *Living Lab* model has been fundamental for several countries that have expanded the knowledge of their human capital in alliance with businesses and governments. The concept is based on a systematic focus of co-creation of users that integrate the processes of investigation and innovation. These are integrated through the co-creation, exploration, experimentation and evaluation of innovative ideas, scenarios, concepts and technology artefacts related in cases of use in real life. Such cases of use involved communities of users, not only as subjects of observers but also as a source of creation. This focus allows all parties involved to simultaneously consider global performance of a product or service as well as its possible adoption by the users. This consideration could be used in the previous stage of investigation and development and in all the elements of the life cycle of the product, from its design up to recycling.

An example of success of this type of initiative is the Network of Living Lab in Australia. Its founding members were the Western Sydney University, Swinburne University of Technology, Data61, SustainSA, Action Foresight, Stretton Institute and Enkell Collective. One of their living lab led by Data 61 was for transport and logistics, which was able to create a cluster of innovation

to create, demonstrate and test new technologies to optimize the resources in this Australian economic sector.

CHART 4.5
Members of the Australian *Living Lab* for Transport and Logistics

Source: Australian Living Lab innovation network. Web site: https://openlivinglabs.net.au/.

V. CONCLUSIONS

As proposed by the Chinese President, Xi Jinping last July, within the framework of the G-20, the countries should build a friendly digital economy for growth and employment: "*We should adapt actively to the digital evolution, impulse new economic engines, advance in structural reforms and promote the integrated development of digital economy and real economy".* The G-20 has as initiatives the Development and Cooperation of Digital Economy and the Action Plan for the New Industrial Revolution, both adopted in the summit last year in Hangzhou, China. The Chinese President also asked all parties to create a favourable international environment for the development of digital economy, integrate better their strategies of respective development, and improve, in a joint manner, the level of digital application. *"We must promote the construction of a cybernetic space, pacific, safe, open and cooperative, and explore the ways to build multilateral trade regulations, transparent and inclusive in the digital sectors",* Xi added.[4]

China, together with the developed and developing Asian economies, has assimilated importantly the opportunities that are being offered by the digital economy. Proof of this is that the majority of Asian countries obtain outstanding figures in their indexes for innovation, ICT industry and digital adoption. However, the Chinese President has insisted in continuing working and expanding the digital adoption under high standards of opening-up and transparency. One of the reflections of technology adoption to digital economy in the Asian countries, together with improvement in the productivity of their value chains and logistics system, is that their intra-regional trade is already above 45% of their foreign trade, which means that this part of the world is less dependent on the foreign economic blocs and their internal demand begins to be more important for their value chains.

Our region still has a long way to go, given the cultural restrictions, poverty, inequality and low technology adoption to processes and complex activities at the level of persons, companies and government. In this context, the regional market plays a key role in aspiring an improved development, since for most of the countries of Latin America and the Caribbean, intra-regional trade is qualitatively superior than exports destined to other markets; it is the most favourable for diversified exporter, since it absorbs the largest number of exporting products; it is the most important for exports of manufactures and potential intra-industrial; it is the most important for most exporting companies, particularly the SMEs; it is a natural space for growth of the multi-Latin companies; and finally for the creation of multi-national productive chains.

Intra-regional value chains contain a series of opportunities, which if taken advantage of to the maximum given the opportunity of technology tools, would allow the nations to take a highly significant qualitative leap. To achieve this, the appropriate conditions must be created for intra- and inter-country collaboration, strategically aligned regionally and nationally to the Digital Agenda defined by the ministerial committee of ECLAC, with an emphasis on strengthening the digital economy, aimed at fostering the main intra-regional value chains, in addition to strengthening the pillars of the digital ecosystem such as the Digital Single Market, human capital required for digital economy and the implementation of an innovative ecosystem from *Living Lab* applied to different aspects of tasks of individuals, companies and government, with the purpose of building and strengthening a culture of business venture and innovation.

[4] http://www.europapress.es/economia/noticia-nadal-apoya-g20-despliegue-infraestructuras-motor-economia-digital-20170407144347.html.

VI. RECOMMENDATIONS FOR ACTION

The recommendations for the actions take into consideration the advance status of digital transformation of our nations (low level and intermediate level), and also the recommendations resulting from the review of the global indicators of ICT infrastructure, innovation, digital businesses and impact of the disruptive digital tools. Additionally, a third area of recommendations is created, of the regional type, and which summarises the proposals submitted extensively under Chapter 4 of this report.

1. Recommendations for countries with low level Digital Economy development

- *Continue with the deployment of joint efforts for developing the ICT infrastructure through public-private partnerships in the long-term planning:* The nations must consider fundamentally a focus on public-private partnerships (PPP) for long term planning, such that those responsible for creating policies should aspire on implementing the ICT initiatives with the efforts for new civil works; for example, the deployment of broad band connections on the electricity network. This focus unlocks the bottlenecks of financing frequently faced by governments in general.

- *Promote connectivity at a basic level and digitalization for the existing industries and SMEs:* Develop coverage of sufficient broad band, as well as provide Cloud platforms to improve productivity and efficiency of the existing industries and the SMEs. Consider financial and consulting cooperation with the programmes for donations from non-governmental organisations (NGOs) or inter-governmental organisations (IGOs);

- *Improve basic digital literacy in secondary education as well as in universities, and also in permanent labour training:* Focus on improving digital literacy, labour perfection and labour adaptation to guarantee an inclusive employment and reduce the excess labour from loss of job posts that the digital transformation would inevitably leave as a result. The basic digital competence must be generalized in the labour force and the access to digital literacy must be easy and accessible, including up to becoming a right for individuals.

- *Increase the exposure to ICTs through subsidized campaigns for the acquisition of devices:* On subsidizing the computer devices at basic level (for example, laptops and intelligent telephones), individuals are first exposed to the Internet. This aspect could be extended to companies that begin working in the incorporation of sensors for their digital transformation in manufacturing and transport.

2. Recommendations for countries with intermediate level in digital economy development

- *Extend coverage of broad band through the introduction of incentive programmes and a policy of interchange on the existing civil infrastructure:* Establish incentive programmes and policies of interchange in the civil infrastructure between public and private entities to create synergy for the implementation of broad band. This policy needs to perfect an orchestration through different public ministries and private sectors at the national level.

- *Establish a favourable public environment based on a solid foundation of understanding the specific needs of the key industries in the country:* Work with the principal leaders in the industry to obtain a basic understanding of what is specifically needed for the structural and digital transformation of their value chains. Based on the specific needs of the industry, establish policies and regulations that create a favourable environment for the innovative transformer, competitiveness and future productivity. This recommendation comprises initiatives such as Industry 4.0 (Spain) or intelligent industries (Chile).

- *Centralise ICT resources for local business venture and business innovation through the digital centres:* Establish digital centres or technology parks and incubation programmes to enable growth of new companies and concentrate on access to services of high quality broad band. The universities are fundamental for development of these digital centres, whether vertical (by an industry) or horizontal (by a set of industries).

- *Promote "digital-first" education:* With a focus on education in science, technology, engineering and mathematics, to give priority to the competences and the advanced codification of ICTs in the programmes of fundamental study.

- *Build advanced human capital and inclusive local digital contents:* Provide workers with the basic training needed for a digital work site through the creation of training programmes in digital skills, which would allow the creation of value and content for the local economy. With the evolution of the adoption towards a digital economy, there is the possibility of shaping the participants from the beginning. The creation of training programmes ensures that there has been an appropriate representation and consultation of the respective groups, including but not limited to, the organisations for women, disabled and elderly persons.

3. Recommendations for a joint regional effort

- *Establish a regional programme to promote intelligent intra-regional value chains:* Supported by inter-governmental organisations, and in collaboration with regional initiatives such as the Foreign Trade Single Window and the digital and collaborative ports program, which allow for incorporating commercial, logistics and productive elements.

- *Establish a system of own indicators for the Digital Economy:* As part of a collaborative work and centred on the best international practices, a proposal is made to create indexes that allow for an in-depth analysis of the gaps in advancing towards the digital transformation in our countries and carry out in this regard a benchmarking to improve the public policies regarding the digital agendas of each country.

- *Establish a programme for the creation and strengthening of Living Lab*: This type of specialised digital centre will concentrate on ITC knowledge in transversal industries to the reality of the region, such as Information and Communications Technology (ICTs), Transport and Renewable Energies.

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