

Enabling conditions to foster cross-border services exports from Colombia: A benchmarking approach

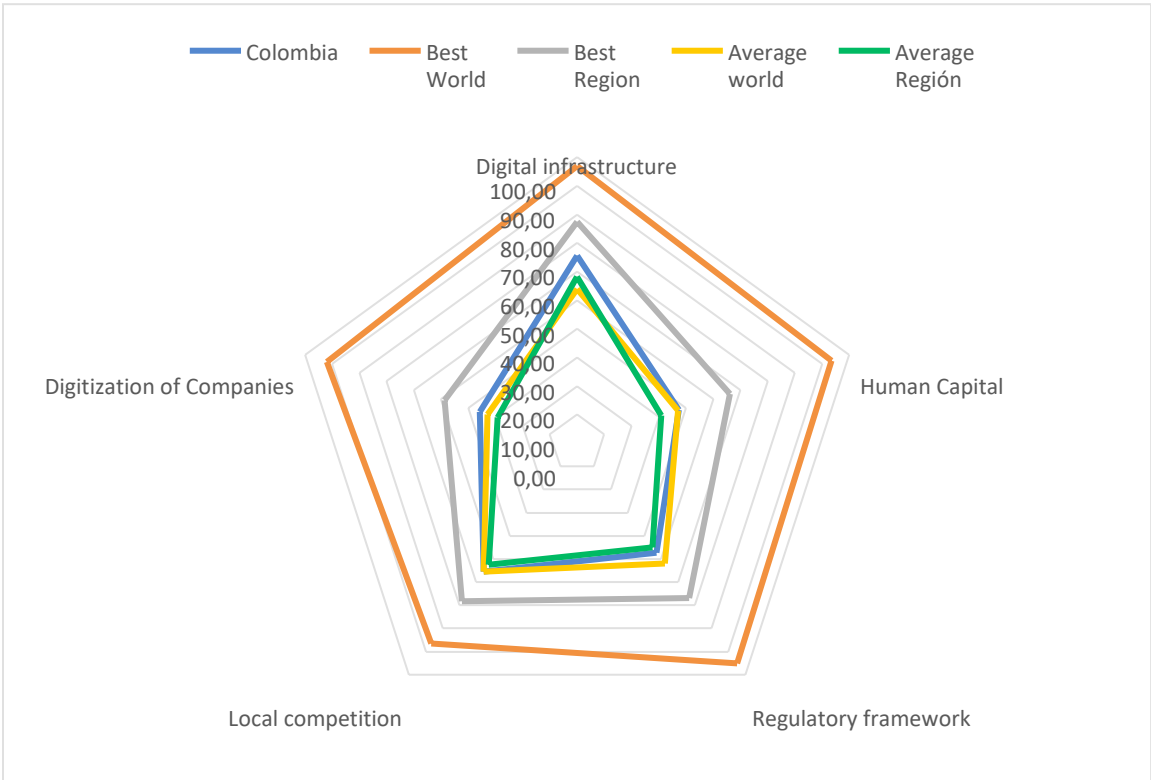
Authors/Collaborators

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This report seeks to review the bottlenecks that restrict cross-border trade in services in Colombia. As a basis for identifying cross-cutting problems, five dimensions explored by the World Trade Organization (WTO) in its 2018 Annual Trade Report provide the analysis structure.

This study is structured based on the review of eight indices¹ from which 45 variables are studied and grouped in the five dimensions for their analysis. It develops a benchmark analysis comparing Colombia's performance to the world's and region's best and averages. An overall summary of the average results in each of the five dimensions is shown in Figure 1.

FIGURE 1: ANALYSIS DIMENSIONS



¹ Global Services location Index - At Kearney; STRI Y DIGITAL STRI – OCDE; Services Globalization Index – Tholons; Global Competitiveness Report – WEF; Index Economic Freedom – Heritage; Human Capital Index - World Bank; Hays Global Skills Index; Global Innovation Index

Conclusions and Policy Recommendations

1. In all dimensions, there are challenges to be met; in none of them are we at the level of the best in the world or the best in Latin America. In some cases, we are at the level of the world average, as is the case of digital infrastructure; in any case, we are better in all dimensions than the regional average. This is an invitation to develop public policies that aim to improve conditions in all dimensions.
2. It is important to say that the methodology used to carry out this study was based on the conjunction of objective and perception variables, which are frequently used in Colombia to identify the priorities for action that influence public policy design. Validity and shortcomings are results of analyzing these variables and must complement a more detailed analysis of the dimensions and variables presented.
3. Colombia shows a lag in ICT development, similar to that of other developing countries. The indices show that there is a significant gap in access to internet services in the country and consequently in their use. These two variables of Internet access and use can significantly affect progress in the other dimensions studied. For example, they can be related to access to professional training opportunities or training in digital skills; they can also make it difficult for smaller companies to consider entering online markets as a space to market their services because they consider it expensive. Further, this situation shows that in the analysis presented, the two dimensions where the country has the most significant challenges are the digitalization of companies and training in ICT skills for the workforce.
4. In the digital infrastructure dimension, the Government's effort to facilitate citizen access to its services is evident. The digitalization of government services has had a positive response, reflected in the increase in participation. However, as explained in the previous conclusions in this dimension, it is essential to close access to internet service gaps.
5. Regarding the human capital dimension, we can conclude that in addition to the fact that internet access affects ICT skills training to some extent, it is also important to review the implementation of some policy measures that promote the learning of tools such as programming, software, digital marketing, etc., including from an earlier age. On the other hand, despite the Government's effort to offer some training programs to improve the adoption of a second language, bilingualism continues to be one of the most significant challenges facing the country in preparing human capital. We have not found the strategy to improve bilingualism levels, and perhaps, it would be worth betting on a much more ambitious and longer-term training model.
6. The Regulatory framework is the dimension where we find a more significant match between the identified bottlenecks and the measures that have begun to be taken in the country. These measures are those related to the strengthening of international cooperation for the implementation of international standards for protection against cybercrime, the proposed reforms to update the low-value payment system, and the updating of the policy for the protection of intellectual property rights and related rights. However, it is essential to consider the regulatory barriers identified in the barriers to trade in the services section of this study, which complement this benchmark analysis.

7. As mentioned in the section where the competence dimension is analyzed, the good rating that Colombia shows in international indices may be the result of including some perception variables in this study. These results should be complemented with a more exhaustive investigation of the competitive environment of the country.
8. In the dimension of digitalization and innovation in companies, the lowest scores are found in the international indices, especially those related to incentives and policies related to innovation and the recruitment of researchers in the business sector. It would be interesting to monitor these two issues' evolution to ensure that the public and private sectors take the necessary measures to improve the current situation.

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Introduction and Conceptual framework

This report seeks to review the bottlenecks that restrict cross-border trade in services in Colombia. As a basis for identifying cross-cutting problems, five dimensions explored by the World Trade Organization (WTO) in its 2018 Annual Trade Report provide the analysis structure.

In this Report, the WTO analyzes the actions taken by some governments to face the challenge posed by digital innovation and take advantage of the benefits that the growth of digital trade implies. Most of the strategies presented point to cross-cutting policies that facilitate access to digital technologies and promote more reliable electronic commercial exchange systems.

In this regard, the WTO states that “to fully realize the potential benefits of digital trade, most governments have adopted digital development strategies which involve cross-cutting policy measures aimed at improving infrastructure, establishing an adequate regulatory framework, reducing the cost of doing business and facilitating relevant skills development. These measures include investing in relevant infrastructure, improving the business and regulatory environment, encouraging private investment, and creating the right conditions and incentives for digital development. Ensuring adequate cybersecurity levels, competition, consumer protection, and data privacy are key to promoting digital trade.

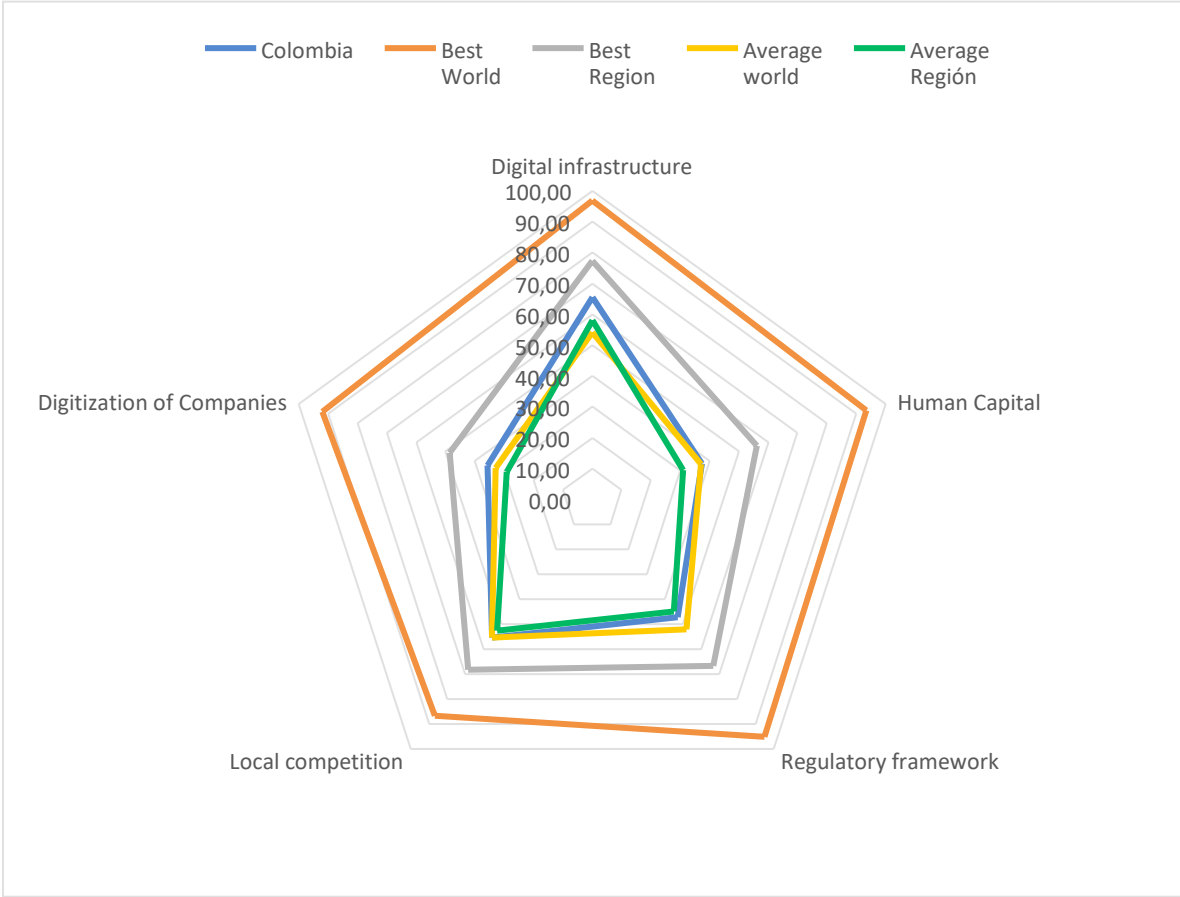
This analysis presented by the WTO and its recommendations are the basis that countries can use to identify bottlenecks and develop specific policies to boost cross-border trade in services, specifically those with intensive use of technologies that require regulatory improvements and new developments. In this sense, the dimensions determined for this analysis revolve around the development of digital infrastructure, human capital trained in digital skills, a regulatory framework favorable to digital business models, competition policy, and policies to promote service companies' digitalization.

This study is structured based on the review of eight indices² from which 45 variables are studied and grouped in the five dimensions for their analysis. It develops a benchmark analysis comparing

² Global Services location Index - At Kearney; STRI Y DIGITAL STRI – OCDE; Services Globalization Index – Tholons; Global Competitiveness Report – WEF; Index Economic Freedom – Heritage; Human Capital Index - World Bank; Hays Global Skills Index; Global Innovation Index

Colombia’s performance to the world’s and region’s best and averages. An overall summary of the average results in each of the five dimensions is shown in Figure 1.

FIGURE 1: ANALYSIS DIMENSIONS



Source: Own construction based on the conjunction of indicators; see annex 1

Digital infrastructure

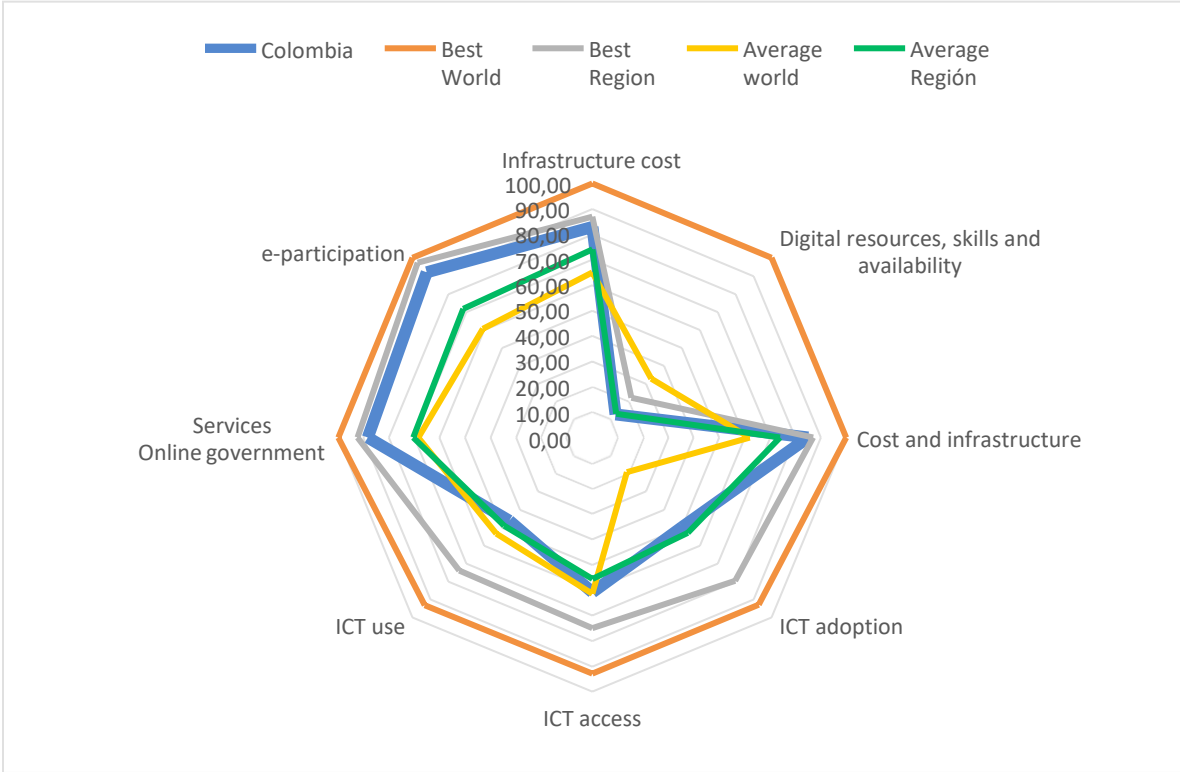
One of the most important aspects that need to be developed to improve the enabling conditions that drive trade in services is digital infrastructure. The WTO considers that it is the first goal that governments should aim for to facilitate the entry of their companies to new markets and the development of new services that can be provided remotely when it states that “One of the key prerequisites for reaping gains from digital trade is the availability of adequate infrastructure, physical as well as digital. The need for investment in infrastructure is more acute in developing countries, as they tend to lag behind developed economies in terms of the pace of digital innovation and the level of infrastructure required to facilitate the adoption and effective use of digital technologies”³.

³ Op. Cit. OMC, World Trade Report 2018

The analysis of this dimension is based on eight variables included in four indices (GSLI Kearney; SGI Tholons; WEF, Global Innovation Index, see Annex 1).

The indicators show that the countries that mark the frontier in digital infrastructure in the world are Korea, the United Kingdom, Denmark, and Finland. In Latin America, Uruguay, Mexico, and Brazil present better conditions than the rest of the Region's countries.

FIGURE 2: DIGITAL INFRASTRUCTURE



Source: Own construction based on the conjunction of indicators; see Annex 1

In terms of the adoption of digital infrastructure and ICT, Colombia lags behind the best in Latin America and the world. The best in the Region are Perú, Uruguay, México, and Brazil. In this regard, data on access to mobile and fixed broadband, subscriptions to cellular mobile phones, and, in general, internet access and digital resources are taken into account.

In ICT adoption, Colombia, with a score of 49,9, is well above the world average of 19,31, and very close to 53,06, the average of the Region. However, if compared to countries such as Korea or the United Kingdom, which are ranked as the best globally, the lag is larger than 40 points. Colombia ranks 87th in ICT adoption out of 141 countries included in the WEF index, 40th out of 50 countries measured by the infrastructure cost indicator of the Global Services Location Index - Kearney, and 53rd out of 131 countries included in the Global Innovation Index.

In the eight variables used to analyze this dimension, Colombia is always below the best in Latin America and the Caribbean but, in almost all cases, above the Region's average. Only for Digital

resources, skills and availability, and ICT adoption, Colombia shows scores below the regional average.

The indicators that show the best performance are the government's online services and electronic participation; that is, citizens' use of the government's online services. There is also an important advantage in the cost of digital infrastructures, such as bandwidth and access to physical and technological systems necessary to host service processes, an essential feature in the cross-border service delivery model.

The main bottlenecks identified are access to ICT for a large part of the citizens, which affects their use and the availability of highly trained personnel in ICT use⁴.

In this regard, Colombia has been implementing some digital transformation measures, mainly contained in the ICT Plan 2018-2022: We Are All Digital⁵. It presents four policy axes around which the route to close the gaps is framed, establishing ICT as an enabling instrument of entrepreneurship, legality, and equity. In this policy, the development of digital infrastructure and human capital qualification in ICT skills are presented as pillars for transforming the country towards a digital society.

Human capital

Technological advances have allowed more and more services to be provided digitally. Between 2005 and 2016, the growth of trade by mode 1 of the so-called ICT-enabled services doubled, mainly insurance and pension services, financial services, charges for intellectual property, telecommunications, computing and information services, other commercials, personal, cultural, and recreational services. "Technological advances in the foreseeable future have the potential to put most services marketed across borders. These developments can have revolutionary effects on the international trading system, national economies, and labor markets. The world production of services could be completely reorganized according to the comparative advantages of the countries"⁶.

Low levels of digital competence in the workforce are a significant obstacle to harnessing digital commerce's potential benefits. Many governments in developing and developed countries are making substantial investments in human capital through training and development of skills to facilitate the effective adoption and use of digital technologies.

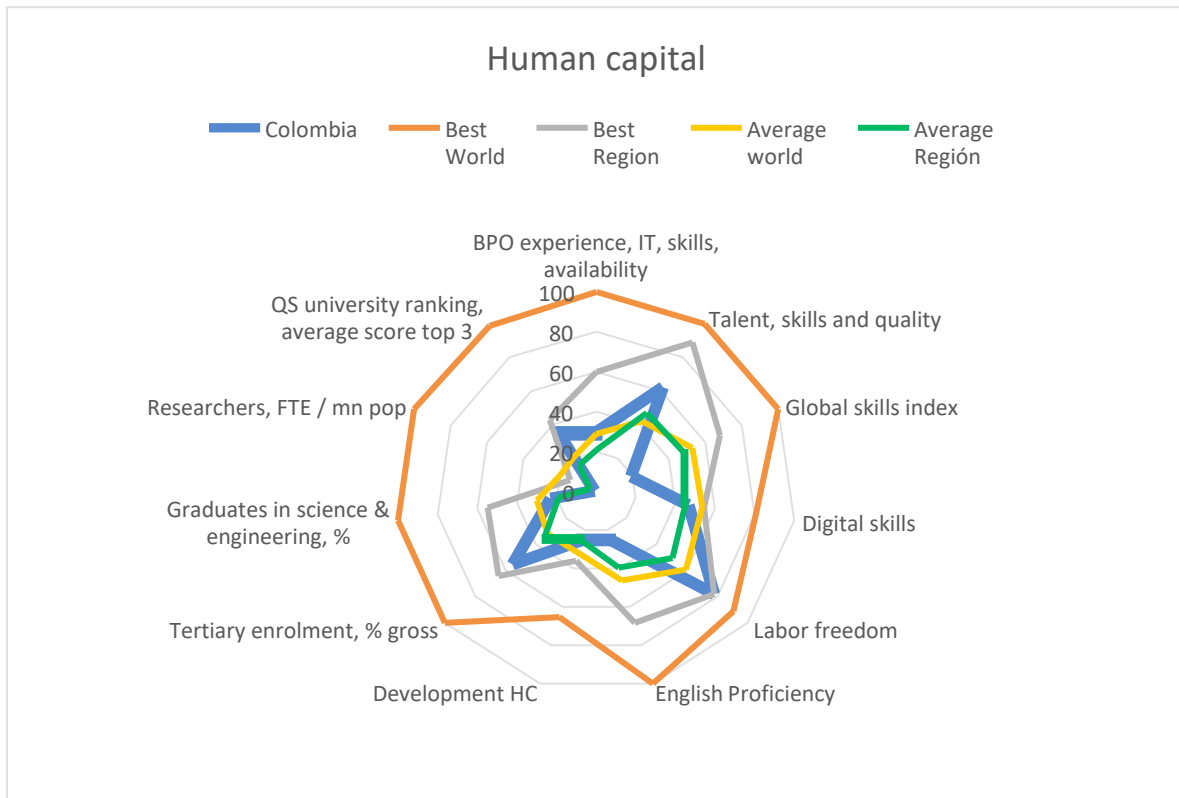
This dimension analysis is based on eleven variables included in seven indices (GSLI Kearney; SGI Tholons; IGHH - Hays; WEF; Economic Freedom Index; Global Innovation Index and the English Proficiency Index; see Annex 1).

⁴ These two indicators belong to the Infrastructure in Information & communication technologies (ICTs) pillar of the Global Innovation Index and to the dimension Use of digital resources, skills and staff availability of the Global Services Location Index - At Kearney

⁵ MinTIC, Plan TIC 2018-2022 *Todos Somos Digital*
https://micrositios.mintic.gov.co/plan_tic_2018_2022/pdf/plan_tic_2018_2022_20200107.pdf accessed 3 November 2020

⁶ Op Cit. OMC, World Trade Report 2018

FIGURE 3: HUMAN CAPITAL



Source: Own construction based on the conjunction of indicators; see annex 1

Regarding the expertise, skills, and availability of human resources in the BPO and IT sectors, the Kearney indicator shows that Colombia is above the average of the 50 countries included in the measurement. However, it is quite far from Brazil that ranks as the best in the region, and the United States that marks the highest border. The scores for each country are Colombia 30, Brazil 60, United States 100, average 29.

This variable shows the level of education related to the digital skills of the workers. The percentage of graduates from careers related to science, mathematics, and engineering in Colombia is below the world average (IIG 29,98) and countries in the Region such as Peru, Chile, Brazil, and Argentina.

The country with the highest number of full-time researchers per million inhabitants is Israel. In this variable, Colombia is well below the world average, which is 19,95, and Argentina is the best in the Region with a score of 14,2 and occupies position 50. While in Israel, it is reported that there are 8.341 researchers per million inhabitants, in Colombia, this figure is 88, and in Argentina, it is 1.192.

Regarding the relationship between total enrollment in tertiary education, regardless of age, over the population of the age group that officially corresponds to tertiary education, Colombia with 55,3 points is above the world average of 33, 83. However, it is still quite a long way from Greece,

which in this variable appears as the best in the world, and Chile, which with a score of 64,5, occupies the best position in Latin America and the Caribbean.

In Hays' digital skills index, Colombia lags behind Chile, the best in the Region, and the world average. Colombia's score for this index is 19; Chile is 68, the world average 53, and China is the world border with 100 points.

This indicator includes information on the flexibility of the education system to meet the needs of the labor market, the barriers generated by some government policies that restrict the local labor market, the gap between the skills sought by companies and the skills available in the labor market, wage pressure in highly-skilled industries. In that way, it indicates the level of abundance or shortage of sector-specific skills (such as engineering or technology).

One of the variables that demonstrated an evident strength for the country was the Labor Freedom of the Economic Freedom Index, which is related to the well-being and safety of the workforce measured by legislative aspects of the country's labor market; Colombia is the leader in the Region and 19th in the world.

The bottlenecks identified in this dimension of human capital are, on the one hand, the training of researchers, the percentage of graduates in careers related to mathematics. However, the relationship between these two variables and the development of digital skills is not clear. In general, the level of adoption of digital skills in the country's workforce is low, which indicates the need to redouble efforts to improve the possibilities of increasing exports of services.

Regarding the English skills of Colombian workers, the English Proficiency index was taken as a reference for the analysis. This index shows that Colombia has another significant challenge in training its workforce in English as a second language. Colombia's score is 24,72, while Argentina, the best-rated country in Latin America, reaches 68,27 points; Colombia is even below the average for the Region, which has 39,68.

English skills make it possible to access information and trends in world trade across borders. This index attempts to show that there is an important correlation between a country's English proficiency and other aspects such as the degree of qualification of workers, the per capitannumber of articles published in scientific and technical journals, the level of investment in R&D, both in terms of capital and human resources and of course, is directly related to the ease of establishing business relationships in international markets. The promotion of digital technologies represents a golden opportunity for Colombia in terms of services exports; however, it is necessary to commit greater efforts to bilingual education from basic education and adult education.

Regulatory framework

The third dimension that we wanted to include in this analysis of how prepared Colombia is to increase its exports of services is the regulatory framework. Again, the justification for this issue's inclusion is the WTO recommendations, which reiterates the importance of having a sufficiently strengthened and broad regulatory framework to support the diversity of aspects involved in trade

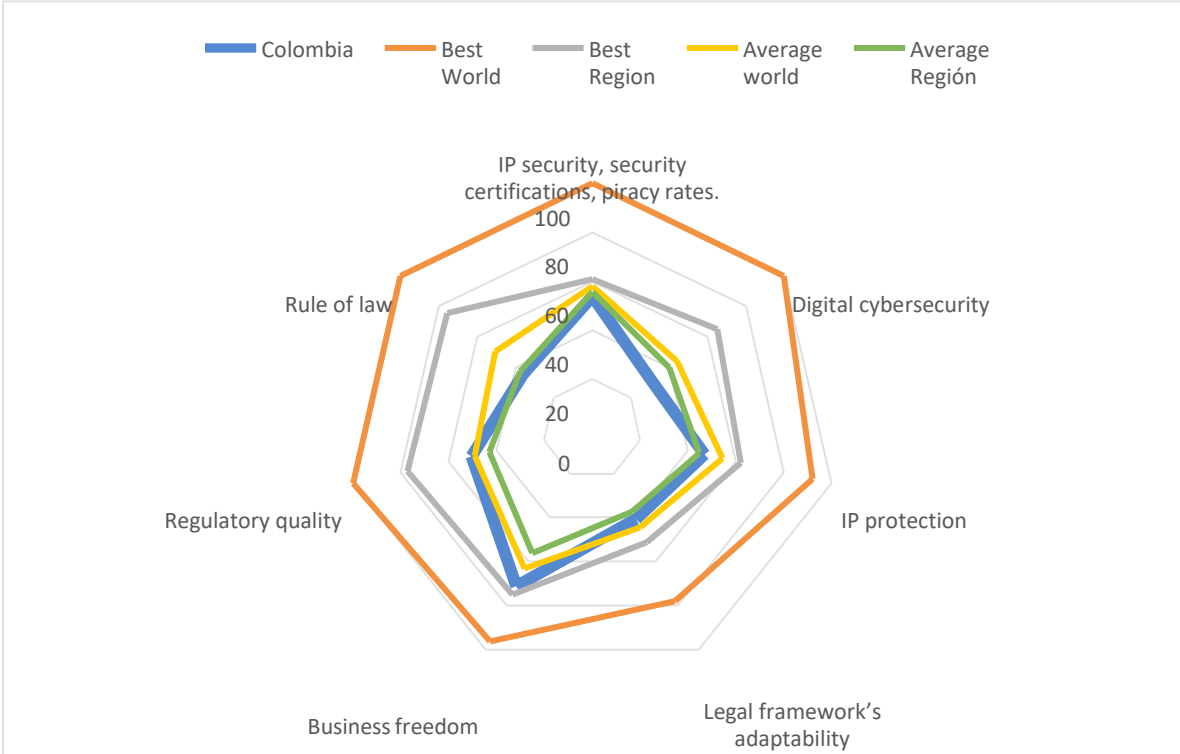
in digital services. In this regard, “Digital technologies raise concerns relating to the loss of privacy, consumer protection or security threats. In the context of digital trade, governments need to develop a domestic regulatory framework to achieve several legitimate public policy objectives such as consumer protection, cybersecurity, and data privacy in ways that are not more trade- distorting than necessary”.

“The lack of a robust legal and regulatory framework for the governance of digital trade can not only hinder technological advances; it can also pose serious challenges for consumers and businesses alike by increasing the risk of fraud, cybercrime, and abuse of privacy.”

For the analysis of the Colombian regulatory framework in the face of new digital business models, we consider seven variables included in five indices (GSLI Kearney; SGI Tholons; WEF, Global Innovation Index and Index Economic Freedom, see Annex 1).

The indicators show that in terms of regulatory quality, understood as the country's ability to formulate and implement sound policies and regulations that allow and promote the private sector's development, Colombia is slightly above the world average. It ranks in 55th place, but still far from Chile, which ranks 20th and is the best in the Region. The best in the world is Hong Kong.

FIGURE 4: REGULATORY FRAMEWORK



Source: Own construction based on the conjunction of indicators, see annex 1

Concerning perceptions on the degree to which citizens trust and abide by the rules of society, and in particular the quality of compliance with contracts, property rights, as well as the probability of

crime and violence, Colombia, with 36 points, is very far from Finland, the world frontier, from Chile the best in the Region (75,7) and is below the world average (50,52).

Regarding the protection of intellectual property, the country is at a disadvantage compared to the best in the world (Finland score 92,2) and the best in the Region (Uruguay score 62,1) with a score of 47.

The GSII Kearney Global Services Localization Index presents a variable related to the Business Environment environment that measures intellectual property security, information security certifications, and piracy rates. Although close but below the world average, Colombia is ten points below the Region's leading country, which corresponds to Uruguay. The scores in this indicator are Colombia 54, Uruguay 60, and the world average 58. The best in the world is New Zealand.

With the Tholons Services Globalization Index TSII, the situation is similar. The indicator is called Risk and quality of life - Digital cybersecurity. With a 31, Colombia's score is further away from the world average (44) and the best in the Region (Uruguay score 65). The best in the world is the United Arab Emirates.

The most important bottlenecks that we have identified in the regulatory framework dimension are, firstly, cybersecurity, followed by the rule of law and the adaptability of the legal framework to new digital models, and thirdly the protection of rights protected by intellectual property.

About the strengthening of measures related to cybersecurity, in March of this year, Colombia joined the Convention on Cybercrime adopted on November 23, 2001, in Budapest.⁷

The decision to join the Budapest Convention had several purposes⁸: i) Update and complement national legislation with international standards against cybercrime; ii) Formalize and streamline information exchange channels with the member countries of the Convention, to facilitate judicial investigations of transnational criminal acts; iii) Access projects and programs for the transfer of knowledge, research support, technological support, and joint bilateral and multilateral actions and; iv) Improve international judicial cooperation, advance digital evidence issues, and participate in joint strategies on cybercrime.

Another issue that should be included in discussions related to the regulatory framework and that has to do with the ability to respond to new technological dynamics is that of payment systems and their importance in the face of the barriers they can represent for the growth of cross-border trade. Traditionally, the financial system regulation has focused more on preserving the system's security and trust, protecting the consumer and their information, and preventing money laundering⁹. However, the growth in the number of electronic transactions, the entry of new actors in payment systems that seek to facilitate access to a growing number of users who prefer to purchase goods and services through digital channels have exposed the need to count with standards. These standards should: support the modernization of the financial system so that it provides technological tools in line with new business models, facilitate interoperability of

⁷ Congress approved it with Law 1928 of July 2018.

⁸ <https://www.cancilleria.gov.co/newsroom/news/colombia-adhiere-convenio-budapest-ciberdelincuencia>

⁹ Prieto, A., Torres J., Martínez E., Estudio sobre los sistemas de pago de bajo valor y su regulación, URF. Bogotá, julio 2018

payment systems, and reduce the costs of electronic transactions. At the same time, promote the system's efficiency, guarantee the consumer's protection and interests, promote access and transparency of operations, and preserve the system's stability and security.

The WTO refers to the importance of facilitating electronic transactions in this context: "International organizations can play a crucial role in fostering technological innovation while mitigating such risk by helping countries develop a legal environment that promotes secure online business. United Nations Commission For International Commerce Law-UNCITRAL, which is responsible for formulating modern and harmonized rules on commercial transactions, has developed Model Laws on Electronic Commerce and Electronic Transferable Records, which now provide the basis for national legislation in over 150 jurisdictions across 70 countries. The UNCITRAL Model Law on Electronic Commerce was the first legislative text to adopt the fundamental principles of non-discrimination, technological neutrality, and functional equivalence widely regarded as the founding elements of modern electronic commerce law" (UNCITRAL, 2018).

Colombia, for its part, has been researching the subject. The Financial Regulation Unit - URF prepared in 2018 a study on the policies implemented in different countries to improve low-value payment systems and regulation¹⁰. This document gave rise to the proposed decree that seeks to "modernize the regulation of the system and define a new transversal architecture for the different payment methods that allow a more efficient operation of the transactional market."¹¹

For which this current normative proposal defines, among others, three important objectives. The first is to specify the system's activities, especially those recently configured thanks to the innovations of new digital services. Likewise, it seeks to recognize the new actors and their roles in the system. The second objective is to strengthen the system's governance, mostly due to the "appearance of non-financial operators, who are not part of the capital structure of the systems, but do offer services that directly affect the payment chain."¹²

The third objective refers to raising the standards of transparency and interoperability in the system, all this "framed in a policy vision under which, having efficient, modern and interoperable payment systems, is an indispensable financial infrastructure condition for the economic development of the country."¹³

Finally, we would like to highlight that the Country is making an effort to review and update the Intellectual Property policy that allows for a modern regulatory framework that includes the legal terms for the use and commercialization of goods and services protected by its intellectual property. This document was published in October to receive comments from citizens and is under review for publication.

¹⁰ Ibid, page 5

¹¹ Prieto, A., Torres J., Martinez E., Actualización normativa de los sistemas de pago de bajo valor, URF. Bogotá, julio 2018

http://www.urf.gov.co/webcenter/ShowProperty?nodeId=%2FConexionContent%2FWCC_CLUSTER-120899%2F%2FidcPrimaryFile&revision=latestreleased Accessed 9 November 2020

¹² Ibid, page 8

¹³ Ibid page 1

Local competition

The fourth dimension that we analyze in this document refers to how competitive the market is in Colombia and what policy measures the government can adopt to counteract the pressure exerted by large global technology companies and, in some way, guarantee equality conditions for smaller companies. This condition is fundamental because market concentration can determine the number of companies that enter to compete. However, these policy measures must also consider that competition in digital markets is different from the competition in traditional markets since it tends to be based on the capacity for innovation and not on price.

In this sense, several countries have established different measures to ensure that there is no unfair competition. For example, in France, a law was passed that establishes a fixed price for some electronic books published by national publishers, prohibiting the sending of free books and allowing retailers to participate in the market.

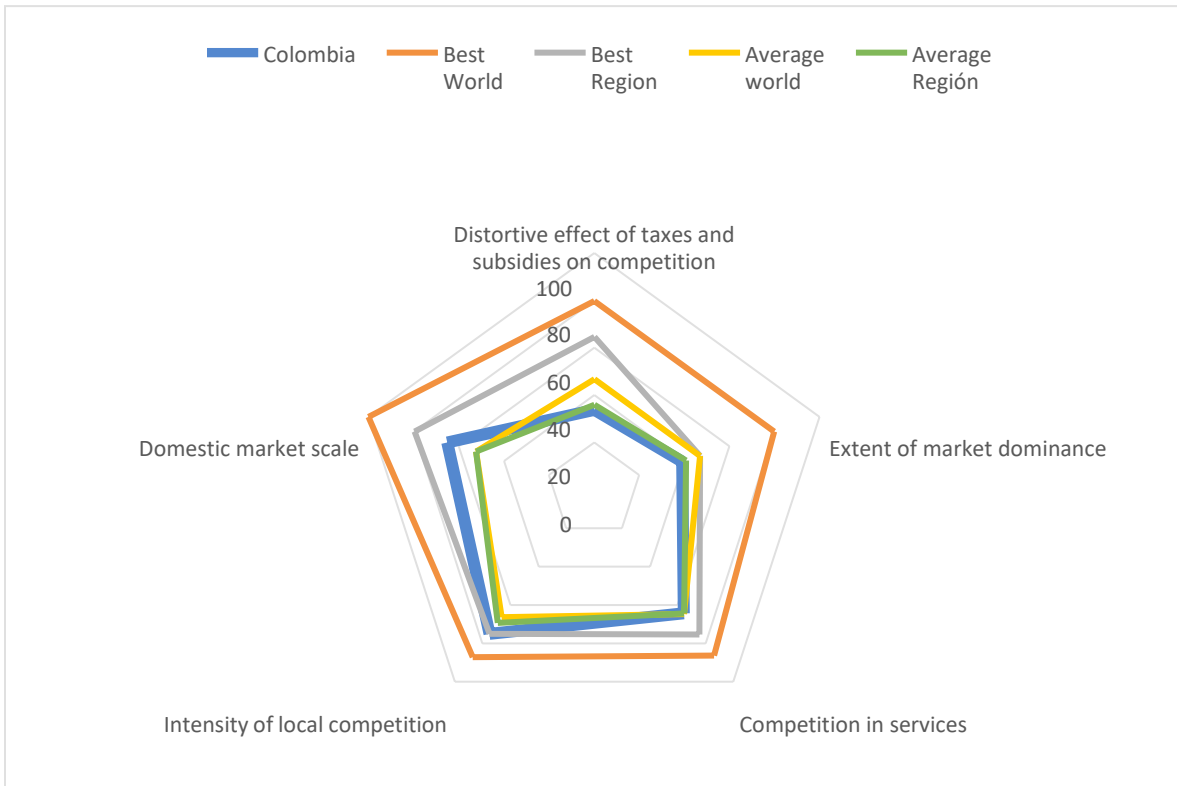
The German Monopoly Commission, in 2018, stated that digital changes require corresponding legal adjustments both for the benefit of consumers and for traditional and new providers. It proposes, among other measures, to systematically investigate the markets with prices based on algorithms to detect adverse effects on competition. Also, to permanently harmonize audiovisual media services' regulatory framework to avoid restrictions on public broadcasting organizations' online services of socially and culturally relevant content¹⁴. Another interesting case to deepen the investigation on measures to protect free competition is that of the Fairtrade Commission of Japan (2017) and its investigation on the risks of impending competition and harming consumers' interests, such as the concentration of big data in individual companies.

The analysis of this dimension related to competition in Colombia was based on five variables contained in two indices: WEF and Global Innovation Index (see Annex 1).

The countries with the most competitive markets in the world are China, the United States, Japan, Hong Kong, Switzerland, and Singapore, in that order. In Latin America, Brazil, Chile, Colombia, and Uruguay stand out.

¹⁴ Op Cit. OMC, World Trade Report 2018

FIGURE 5: LOCAL COMPETITION



Source: Own construction based on the conjunction of indicators; see annex 1

In this regard, Colombia is the best in the Region in the intensity of local competition with 75 points, almost ten points above the world average of 66,24 points and relatively close to Japan, which, being a world frontier, obtained 87,2 points. This variable should be analyzed with greater caution because although it is included in the global innovation index, the WEF index is the primary source. It answers the question: In your country, how intense is the competition in local markets? Being a variable measured by perception, the result may contain some bias depending on who answers the question.

Regarding the size of the market measured by GDP, Colombia is still above the world average but far from Brazil, which obtained 79,8, and China, the best in the world, with 100.

The competitiveness in the provision of services variable included in the WEF considers Professional Services, Telecommunications Services, Trade Services, and others. Colombia with a score of 64,3 is slightly below the world average of 64,59, 11 points below Chile, the best in the Region, and more than 20 points below Hong Kong, the best in the world.

Regarding the distorting effect of taxes and subsidies on competition, Colombia shows a marked disadvantage compared to Chile, which doubles it as the best in the Region, and Singapore, which reaches almost a score of 80 and appears as the world leader. These effects represent the biggest bottlenecks identified in the dimension of competition.

Another indicator taken from the WEF index is the extent of market dominance, which refers to how distributed or concentrated the market is. In this index, Colombia obtains a score below the world average, the best in the Region (Uruguay) and the best in the world (Switzerland). It contrasted with the Intensity of Local Competition indicator of the Global Innovation Index described earlier in this report, where Colombia ranks as the Region's best.

Digitalization and innovation in companies

The digital market is continually growing, taking more and more space from traditional markets, among other reasons, because it reduces searching and matching costs, reduces business costs, and facilitates cross-border transactions. Companies are then faced with a greater demand to implement specific innovations to enter online markets and create their niches. These innovations are related, for example, to access relevant information on consumer preferences, which allows companies to improve their marketing strategies to reach a more significant number of buyers.

The birth of online markets and the need for companies to adapt to new dynamics is generated by the increasing digitalization of consumer habits during the last decade and the global trend towards buying goods and services online. The widespread use of Internet-enabled devices, such as smartphones, tablets, and laptops, give consumers direct access to real-time information on a wide range of available goods and services and have revolutionized the way they identify, compare, and pay for their selected products.

Digitalization has not only altered the way consumers and businesses complete transactions; it has also altered the relationship between businesses and customers. For example, social media has allowed companies to promote their identities and establish new relationships with their customers. Some companies have also started using artificial intelligence techniques to deepen their understanding of consumer behavior, identify customer referrals, and tailor their products and services to build customer loyalty¹⁵.

Similarly, in the 2018 Report, the WTO sets out some of the measures implemented by different countries to enlighten others about the possible paths to follow: "The Malaysian government, in partnership with the Alibaba Group and Malaysia Digital Economy Corporation (MDEC), has launched the Digital Free Trade Zone, combining a physical zone and a virtual platform to connect MSMEs with potential export markets and facilitate cross-border e-commerce activities.

In another example, as a part of its budget for 2017, Singapore announced an elaborate program called "SMEs Go Digital" that aims to facilitate the adoption of digital technologies by MSMEs. The program offers specialist advice and consultancy services to help MSMEs with their digitalization requirements. Besides promoting skills development and lifelong learning for employees, the program also offers pre-approved digital solutions for MSMEs in the logistics and retail sectors.

Other governments, such as Brazil, Canada, Chile, and Switzerland, are undertaking programs to assist local MSMEs in tapping international markets, streamlining their business processes, developing digital marketing strategies, and improving their e-customer services. Along the same

¹⁵ Op Cit OMC 2018 page 35

lines, many governments, in addition to offering advisory services on e-marketplaces, are also facilitating training programs tailored for MSMEs to help improve their online export capabilities"¹⁶.

To analyze the dimension related to companies' digitalization, 14 variables included in three indices are into account: Services Globalization Index - Tholons, WEF, and Global Innovation Index (see Annex 1).

Israel is the country that most appears as a border in the world in the variables consulted. China, Japan, Korea, United Kingdom, Sweden, Italy, Hong Kong, Taiwan, and Singapore also appear.

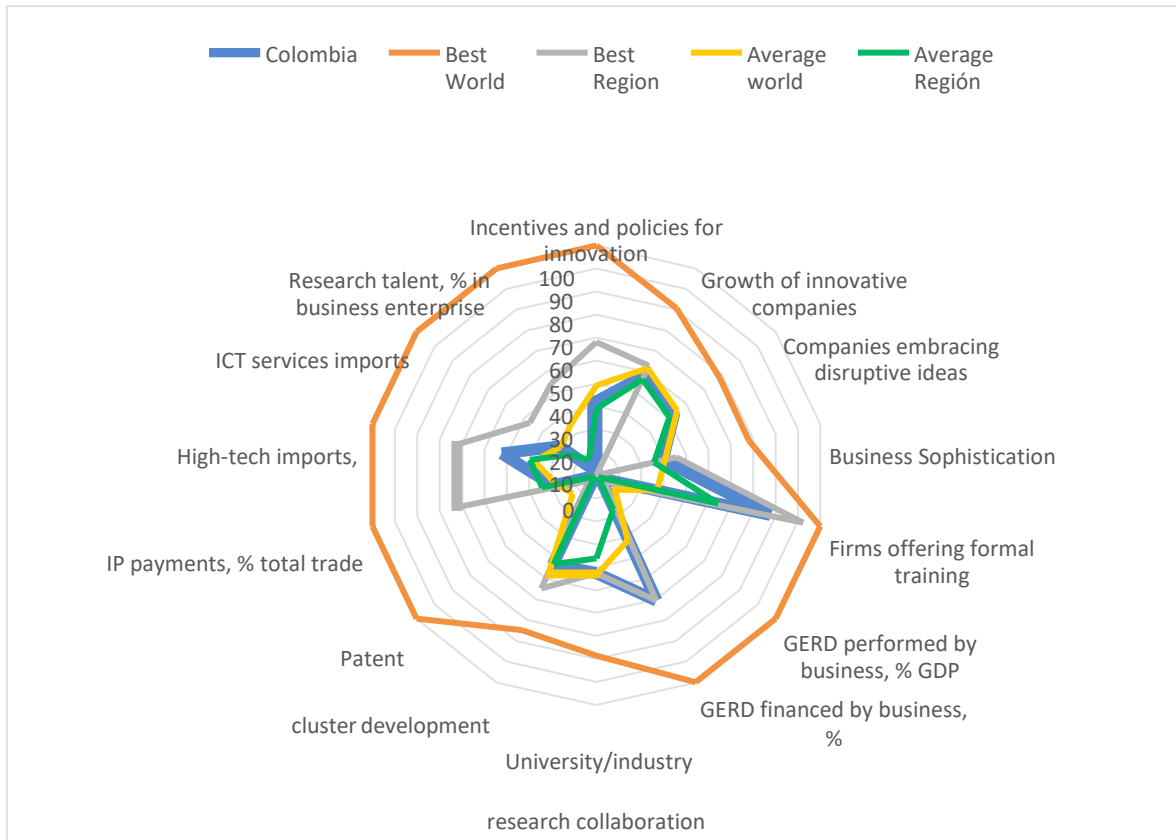
Colombia's best position is in the variable that measures research collaboration between industry and the academic sector. It ranks 61st out of 141 economies and is the best in the Region, although slightly below the world average. The best in the world in this regard is Israel.

Another variable in which Colombia achieves a good position is in the percentage of companies that offer support to their employees for formal education with a score of 77,9, well above the world average (27,18), but below China, the world's leader, and almost 15 points below Ecuador, the best in the Region.

The WEF measures two variables that have to do with how much the most innovative companies grow and to what extent the country's companies adopt disruptive ideas, which in some way generates greater business dynamism. Regarding these two variables, Colombia is very close to world averages and the best in the Region, respectively Chile and Brazil. The country with the best dynamism in its business sector is Israel.

¹⁶ Ibid,

FIGURE 6: DIGITALIZATION AND INNOVATION IN COMPANIES



Source: Own construction based on the conjunction of indicators; see annex 1

Another issue that has to do with this business dynamism is cluster development: how organized are the geographical concentrations of companies, suppliers, producers of related products and services, and specialized institutions in a particular field. Colombia appears almost 12 points below Mexico, the best in the Region, and very close to the world average. The scores are Colombia 43,2, Mexico 54,7, and the world average is 46,98. Italy appears as the best in the world on this issue.

The indicator of Charges for the use of intellectual property not included in other payments as a percentage of total trade refers to royalties or payments for the use of patents, trademarks, copyrights, designs, or industrial processes, among others. In this regard, Colombia shows a behavior very similar to the average for the rest of the world; however, it is well below other Latin American countries such as Costa Rica, which has the best position in the Region. Colombia's score is 19,3, and Costa Rica's 62,3, the world average is 17,76. The best country in the world is Ireland.

As a percentage of total trade, Imports of high technology services refer to imports of rawmaterials from aerospace, office equipment, electronic equipment, telecommunications, pharmacy, scientific instruments, electrical machinery, chemicals, non-electrical machinery, and weaponry. Colombia shows above the world average with a score of 42,2, but 20 points below Mexico, which has 61,1 and ranks first in the Region. Hong Kong is the country in the world that imports the most high-tech services.

Although the general expenditure on R&D Regarding the gross expenditure on R&D carried out by companies as a percentage of the total gross expenditure on R&D, Colombia is ranked 30 among 141 economies. The average world score is 31,6 and the world leader in Thailand. In contrast, the gross expenditure on R&D indicator, carried out by companies as a percentage of GDP, Colombia ranks 61 with a score of 2,4. Ecuador is the Regional leader with a score of 4,3, and Israel invests the most in R&D in relation to GDP, reaching a score of 100. The world average is also relatively low, with 10,39.

Another identified bottleneck is the number of full-time researchers in the business sector engaged in creating new knowledge, products, processes, methods, or systems. In this variable, Colombia obtains a score of 2,8, quite far from the world average (25,07), and Mexico, which appears the best in the Region with 44,5. Israel is again the one that marks the border, reaching a score of 100.

Conclusions and Policy Recommendations

1. In all dimensions, there are challenges to be met; in none of them are we at the level of the best in the world or the best in Latin America. In some cases, we are at the level of the world average, as is the case of digital infrastructure; in any case, we are better in all dimensions than the regional average. This is an invitation to develop public policies that aim to improve conditions in all dimensions.

2. It is important to say that the methodology used to carry out this study was based on the conjunction of objective and perception variables, which are frequently used in Colombia to identify the priorities for action that influence public policy design. Validity and shortcomings are results of analyzing these variables and must complement a more detailed analysis of the dimensions and variables presented.

3. Colombia shows a lag in ICT development, similar to that of other developing countries. The indices show that there is a significant gap in access to internet services in the country and consequently in their use. These two variables of Internet access and use can significantly affect progress in the other dimensions studied. For example, they can be related to access to professional training opportunities or training in digital skills; they can also make it difficult for smaller companies to consider entering online markets as a space to market their services because they consider it expensive. Further, this situation shows that in the analysis presented, the two dimensions where the country has the most significant challenges are the digitalization of companies and training in ICT skills for the workforce.

4. In the digital infrastructure dimension, the Government's effort to facilitate citizen access to its services is evident. The digitalization of government services has had a positive response, reflected in the increase in participation. However, as explained in the previous conclusions in this dimension, it is essential to close access to internet service gaps.

5. Regarding the human capital dimension, we can conclude that in addition to the fact that internet access affects ICT skills training to some extent, it is also important to review the implementation of some policy measures that promote the learning of tools such as programming,

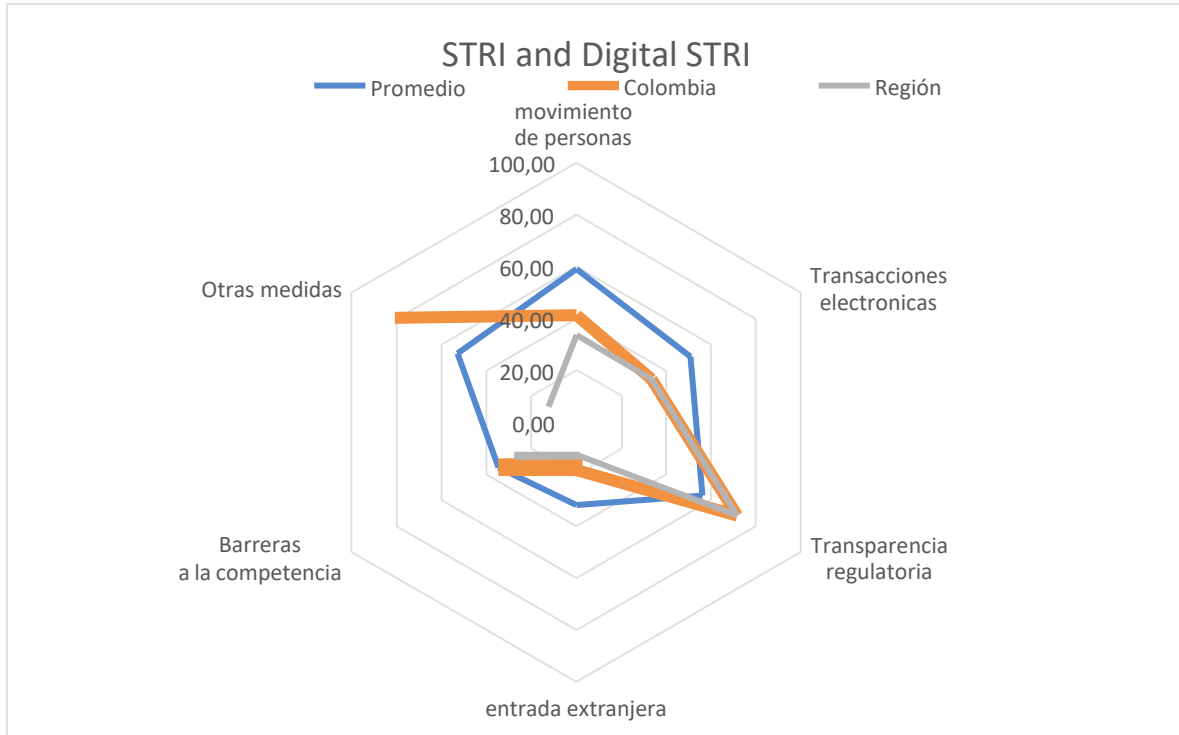
software, digital marketing, etc., including from an earlier age. On the other hand, despite the Government's effort to offer some training programs to improve the adoption of a second language, bilingualism continues to be one of the most significant challenges facing the country in preparing human capital. We have not found the strategy to improve bilingualism levels, and perhaps, it would be worth betting on a much more ambitious and longer-term training model.

6. The Regulatory framework is the dimension where we find a more significant match between the identified bottlenecks and the measures that have begun to be taken in the country. These measures are those related to the strengthening of international cooperation for the implementation of international standards for protection against cybercrime, the proposed reforms to update the low-value payment system, and the updating of the policy for the protection of intellectual property rights and related rights. However, it is essential to consider the regulatory barriers identified in the barriers to trade in the services section of this study, which complement this benchmark analysis.

7. As mentioned in the section where the competence dimension is analyzed, the good rating that Colombia shows in international indices may be the result of including some perception variables in this study. These results should be complemented with a more exhaustive investigation of the competitive environment of the country.

8. In the dimension of digitalization and innovation in companies, the lowest scores are found in the international indices, especially those related to incentives and policies related to innovation and the recruitment of researchers in the business sector. It would be interesting to monitor these two issues' evolution to ensure that the public and private sectors take the necessary measures to improve the current situation.

Annex Services Trade Restrictiveness Index – STRI



Source: Own construction based on STRI

This index has five policy areas and includes 40 countries, the 34 OECD member countries and Brazil, the People's Republic of China, the Russian Federation, India, Indonesia, and South Africa. The 22 sectors included are computer services, construction, legal services, accounting services, architecture, engineering, telecommunications, distribution, broadcasting, film, sound recording, commercial banking, insurance, air transport, shipping, road transport, transport rail, courier, and logistics services (cargo handling, warehousing, and warehousing, freight forwarding, customs brokerage).

Policy measures are grouped into the same five policy areas in all sectors: Restrictions on the entry of foreigners, restrictions on the movement of people, other discriminatory measures, barriers to competition, and regulatory transparency.

This annex briefly analyses Colombia's data by STRI, for the average of the 22 sectors included, as a complement to the analysis of the document's five dimensions. As this index measures restrictions, the higher the score, the more barriers exist in the country, mainly concerning disciplines typically found in trade negotiations.

Regarding the restrictions on foreign entry, it is observed that it is the variable in which Colombia is best rated. His score of 18.24 is close to Chile with 12.31, the best in the Region. As a positive result, it is also more than 10 points below the world average.

Regarding Barriers to competition, although the score is higher than the best in Latin America, it is below the average for all countries. Colombia's score is 32.08, the best in the Region is Chile again with 26.42, and the average is 34.55.

The variable on electronic transactions covers topics such as discriminatory conditions for the issuance of licenses for electronic commerce activities, the possibility of online tax registration and declaration for non-resident companies, deviation from internationally accepted norms on electronic contracts, measures that inhibit the use of electronic authentication (such an electronic signature) and the lack of effective dispute resolution mechanisms. In this regard, Colombia and Mexico have the best score in the Region, both with 33.33. The average for the rest of the countries is 50.72.

The two bottlenecks identified for Colombia, according to the STRI, are those related to regulatory transparency and other discriminatory measures. The score obtained for Colombia is 71.74, and even though it is relatively high, it appears the best in the Region. The average for the rest of the countries is 56.17.

For the variable Other discriminatory measures, the score for Colombia is 80.9, the best in the Region is 12.36, and the average is 52.91.

Annex 1. Indices and variables used

In this annex, we make a brief description of each of the indices used in this study, followed by the variables that served as the basis for analyzing each of the defined dimensions.

WEF

The analysis presented in the Global Competitiveness Report presents information and data that is compiled and collected by the World Economic Forum. The 2019 version includes 141 economies and 103 indicators distributed in the 12 pillars that assign scores; the scale goes from 0 to 100, where 100 represents the best performance. They allow countries to monitor their absolute and relative progress over time.

The data used in the 2019 GCI 4.0 calculation represented the most recent available and was collected (March-July 2019). The data may have been updated or revised later.

For more details on this measurement, see at http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

Global Innovation Index 2020

The GII includes 131 economies in 2020; the methodology uses the most recent values from 2010 to 2019, for each indicator, with some exceptions. The year provided next to the indicator description corresponds to how data were most frequently available for economies. When considering more than one year, the period is indicated at the end of the indicator source in parentheses.

Of the 80 indicators included in the GII, 58 variables are hard data, 18 are indicators composed of third-party data providers, and 4 are questions from the World Economic Forum's Executive Opinion Survey (EOS).

Some indicators were adjusted through scaling during the calculation to ensure they were comparable across economies. The scaling was done using other comparable indicators or dividing by gross domestic product (GDP) in current US dollars, purchasing power parity GDP in international dollars (PPP \$ GDP), population, total exports, total trade, etc. In all cases, the scale factor used was the value that corresponded to the same year of the indicator.

For more details on this measurement, see at https://www.wipo.int/global_innovation_index/en/2020/

Global Services Location Index 2019

The GSLI has traditionally identified the best service providers in the information technology (IT), business process outsourcing (BPO), and services sectors.

The measure includes 50 countries in the 2019 Index selected based on corporate input, current remote services activity, and government initiatives to advance the sector, including digital readiness. Each country is evaluated based on 44 metrics that evaluate its financial attractiveness, skills, availability of people, business environment, and digital resonance. It is important to clarify that the information available for this indicator is the scores of the four previous dimensions, and we do not have access to the metrics and their composition.

The metrics used to assess the location's attractiveness were determined from responses to Kearney surveys, other industry questionnaires, and insights gained from customer engagements over the past five years.

The relative weights of each metric are based on their importance to the placement decision. The cost advantage is often the primary driver of placement decisions. Financial factors make up 35% of the total weight in the published Index. The skills and availability of people and the business environment make up 25% each of the total weight, and digital resonance, the new category in the Index this year, comprises 15%.

For more details on this measurement, see at <https://www.kearney.com/digital-transformation/gsli/2019-full-report>

Tholons Services Globalization Index 2020

Tholons Global Innovation Index is a measure used to compare accelerated digital technology, industry transformation, and services globally. The index assesses ranges and provides placement strategies for multinational companies, countries, governments, multilateral agencies, analysts, and investors.

The relative weights of each metric are based on their importance to the customer derived placement decision, experience surveys, and industry. The current TSGI 2020 report weighs traditional attributes of 60% and digital of 40%. The following metrics are taken into account to assess the location's attractiveness: Talent, Skills and Quality, Business catalyst, Cost and infrastructure, Risk and quality of life, Digital and Innovation.

For more details on this measurement, see at <http://tholons.com/Tholonstop100/TSGI2020Report.pdf>

Index Economic Freedom

The Index of Economic Freedom is calculated for 186 countries, as a simple average of 12 different freedoms grouped into four large groups, each vital for developing the prosperity of people and nations, assigning a score between 0 and 100, where higher values indicate higher levels of freedom. The 'freedoms' evaluated are the following:

Rule of Law: Property rights, Presence of corruption, Judicial effectiveness.

Limited government: Government spending, Tax burden, Fiscal freedom.

Regulatory efficiency: Freedom of business, freedom of work, freedom of money.

Trade openness: Trade freedom, Investment freedom, Financial freedom.

For more details on this measurement, see at

<https://www.heritage.org/index/about>

Hays Global Skills Index

The Hays Global Skills Index (the 'Index') is an annual assessment of the issues and trends impacting the skilled labour market, examining the dynamics at play across 34 markets and determining how easy or difficult it is for organizations to find the skilled professionals they need. In addition to the in-depth analysis of some of the world's largest labour markets, the report highlights several factors impacting economies globally, including wage stagnation and its

potential causes, the disappearance of mid-skilled jobs, and the effects of occupational gender segregation.

The Hays Global Skills Index provides information on the global professional job market, and the challenges companies face in their search for the most sought-after skilled talent. It provides information on employment and the economic situation of the 34 markets included in the report and offers information from Hays experts worldwide.

This index contains seven indicators that determine it: Education flexibility, Labor market participation, Labor market flexibility, Talent mismatch, Overall wage pressure, Wage pressure in high skill industries, Wage pressure in high skill occupations.

For more details on this measurement, see at <https://www.hays-index.com/>

English Proficiency Index

The EF EPI is based on test data from more than 2,200,000 test takers around the world who took the EF Standard English Test (EF SET) or one of our English placement tests in 2019.

The EF SET is an online, adaptive English test of reading and listening skills. It is a standardized, objectively scored test designed to classify test takers' language abilities into one of the six levels established by the Common European Framework of Reference (CEFR). The EF SET is available to any Internet user for free.

The information presented in the English Proficiency index is the result of the tests presented by young people who want to learn English or are curious about their English skills, it may have important biases because it is done online, that is, people who do not have internet access are excluded. It should be kept in mind that this sampling bias would tend to raise scores by excluding the poorest and least educated people.

For more details on this measurement, see at www.efset.org/about.

Variables and sources

Digital infrastructure

Variable 1. Financial Attractiveness – Infrastructure costs

The published report does not have a detailed description of the variables.

Source: Kearney Global Services Location Index 2019

Colombia position: 15 out of 50 countries, score 83

Best in the world: Sri Lanka

Best Region: Perú

Variable 2. Digital resonance – Digital resources

The published report does not have a detailed description of the variables.

Source: Kearney Global Services Location Index 2019

Colombia position: 40 out of 50 countries, score 13

Best in the world: United States

Best Region: Uruguay

Variable 3. Cost and infrastructure

Cost includes relevant payroll and non-payroll costs in a location. Real Estate cost, basic outsourcing industry salary costs are among the factors considered to generate the Cost Score. With the internet now being indispensable, the bandwidth cost has also been included. Infrastructure refers to the availability of physical and technological platforms/systems, which are required to host outsourcing operations from a location. This considers the availability of office space, number of special economic zones or IT parks, mass transports systems, number of leased line providers, Number of Hospitals, Number of Educational Institutes and airport Connectivity.

Scoring: 10 = Low cost and Capable infrastructure available 1 = High cost & Inadequate infrastructure

Source: Tholons Services Globalization Index 2020

Colombia position: 7 out of 50 countries, score 85

Best in the world: India

Best Region: Uruguay

Variable 4. ICT adoption

* Mobile-cellular telephone subscriptions. Number of mobile-cellular telephone subscriptions per 100 population, 2018 or most recent period available. This indicator includes post-paid subscriptions, active prepaid accounts (that have been active during the past three months) and all mobile-cellular subscriptions that offer voice communications.

* Mobile-broadband subscriptions. Number of active mobile-broadband subscriptions per 100 population, 2018 or most recent period available. This indicator includes standard mobile-broadband subscriptions and dedicated mobile-broadband data subscriptions to the public internet.

* Fixed-broadband internet subscriptions. Number of fixed-broadband internet subscriptions per 100 population, 2018 or most recent period available. This indicator refers to the number of subscriptions for high-speed access to the public internet (a TCP/IP connection), including cable modem, DSL, fibre, and other fixed (wired)-broadband technologies—such as Ethernet, LAN and broadband over powerline communications.

* Fibre internet subscriptions. Fibre-to-the-home/building internet subscriptions per 100 population, 2017 or most recent period available. This indicator refers to the number of internet subscriptions using fibre-to-the-home or fibre-to-the-building at downstream speeds equal to or greater than 256 kb/s. This should include subscriptions where fibre goes directly to the subscriber's premises or fibre-to-the-building subscriptions that terminate no more than twometres from an external wall of the building. Fibre-to-the-cabinet and fibre-to-the-node are excluded.

* Internet users. Percentage of individuals who used the internet from any location and for any purpose, irrespective of the device and network used, in the last three months, 2018 or most recent period available

Source: The Global Competitiveness Report 2019. World Economic Forum.

Colombia position: 87 out of 141 countries, score 49,9

Best in the world: Korea

Best Region: Uruguay

Variable 5. The ICT access

Is a composite index that weights five ICT indicators (20% each): (1) Fixed telephone subscriptions per 100 inhabitants; (2) Mobile cellular telephone subscriptions per 100 inhabitants; (3)

International Internet bandwidth (bit/s) per Internet user; (4) Percentage of households with a computer; and (5) Percentage of households with Internet access. 2018 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 73 out of 131 countries, score 60,9

Best in the world: Luxembourg

Best Region: Uruguay

Variable 6. The ICT use

is a composite index that weights three ICT indicators (33% each): (1) Percentage of individuals using the Internet; (2) Fixed (wired)-broadband Internet subscriptions per 100 inhabitants; (3) Active mobile broad band subscriptions per 100 inhabitants. 2018 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 81 out of 131 countries, score 46,3

Best in the world: Denmark

Best Region: Uruguay

Variable 7. Government online service

The Online Services Index component of the E-Government Development Index is a composite indicator measuring the use of ICTs by governments in delivering public services at the national level. The 2018 Online Service Questionnaire (OSQ) consists of a list of 140 questions. To arrive at a set of Online Service Index values for 2018, a total of 206 online United Nations Volunteer (UNV) researchers from 89 countries covering 66 languages, assessed each country's national website in the native language, including the national portal, e- services portal and e-participation portal, as well as the websites of the related ministries of education, labor, social services, health, finance, and environment, as applicable. The total number of points scored by each country is normalized to a range of 0 to 1. The online index value for a given country is equal to the actual total scoreless the lowest total score divided by the range of total score values for all countries.

Note: The precise meaning of these values varies from one edition of the Survey to the next as understanding of the potential of e- government changes and the underlying technology evolves¹⁷. 2018 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 30 out of 131 countries, score 88,2

Best in the world: Denmark

Best Region: Mexico, Brazil

Variable 8. E-Participation

The E-Participation Index (EPI) is derived as a supplementary index to the United Nations E-Government Survey. It extends the dimension of the Survey by focusing on the government use of online services in providing information to its citizens or "e-information sharing", interacting with stakeholders or "e-consultation" and engaging in decision-making processes or "e-decisionmaking."

¹⁷See link below for more details:

[https://www.google.com/search?q=United+Nations+Public+Administration+Network%2C+e-Government+Survey+2018.+\(\(https%3A%2F%2Fpublicadministration.+un.org%2Fen%2Fresearch%2Fen-e-government-surveys\).&rlz=1C1CHBF_esCO885CO886&oq=United+Nations+Public+Administration+Network%2C+e-Government+Survey+2018.+\(\(https%3A%2F%2Fpublicadministration.+un.org%2Fen%2Fresearch%2Fen-e-government-surveys\)\).&aqs=chrome..69i57.1654j0j7&sourceid=chrome&ie=UTF-8](https://www.google.com/search?q=United+Nations+Public+Administration+Network%2C+e-Government+Survey+2018.+((https%3A%2F%2Fpublicadministration.+un.org%2Fen%2Fresearch%2Fen-e-government-surveys).&rlz=1C1CHBF_esCO885CO886&oq=United+Nations+Public+Administration+Network%2C+e-Government+Survey+2018.+((https%3A%2F%2Fpublicadministration.+un.org%2Fen%2Fresearch%2Fen-e-government-surveys)).&aqs=chrome..69i57.1654j0j7&sourceid=chrome&ie=UTF-8)

A country's EPI reflects the e-participation mechanisms that are deployed by the government as compared to all other countries. The purpose of this measure is not to prescribe any specific practice, but rather to offer insight into how different countries are using online tools in promoting interaction between the government and its citizens, as well as among the citizens, for the benefit of all. As the EPI is a qualitative assessment based on the availability and relevance of participatory services available on government websites, the comparative ranking of countries is for illustrative purposes and only serves as an indicator of the broad trends in promoting citizen engagement. As with the EGDI, the EPI is not intended as an absolute measurement of e- participation, but rather, as an attempt to capture the e-participation performance of counties relative to one another at a point in time. The index ranges from 0 to 1, with 1 showing greater e- participation. Mathematically, the EPI is normalized by taking the total score value for a given country, subtracting the lowest total score for any country in the Survey and dividing by the range of total score values for all countries. Note: The precise meaning of these values varies from one edition of the Survey to the next as understanding of the potential of e- government changes and the underlying technology evolves¹⁸. 2018 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 23 out of 131 countries, score 92,1

Best in the world: Finland

Best Region: Brazil

Human Capital

Variable 1. People skills and availability

The published report does not have a detailed description of the variables.

Source: Kearney Global Services Location Index 2019

Colombia position: 20 out of 50 countries, score 30

Best in the world: United States

Best Region: Brazil

Variable 2. Talent, skills and quality

Refers to the overall talent pool availability in a particular location and in relation to the capability of the labor pool to meet staffing demands and fulfil outsourced services from both scale and quality perspectives. Total population, demography, labor pool size, annual tertiary graduate output, both in technical and non-technical background and skills proficiencies were among the host of related components considered when generating the Talent, Skills and Quality Score.

Scoring: 10 = High scale and quality 1 = Low scale and quality

Source: Tholons Services Globalization Index 2020

Colombia position: 11 out of 50 countries, score 62

Best in the world: India

Best Region: Brazil

Variable 3. Global skills index

¹⁸ See the link provided for Government online service for more details.

This index is defined by the combination of the seven indicators: Education flexibility, Labor market participation, Labor market flexibility, Talent mismatch, Overall wage pressure, Wage pressure in high skill industries, Wage pressure in high skill occupations

Source: Hay's Global Skills Index 2019

Colombia position: 29 out of 34 countries, score 19

Best in the world: China

Best Region: Chile

Variable 4. Digital skills among active population

Response to the survey question "In your country, to what extent does the active population possess sufficient digital skills (e.g. computer skills, basic coding, digital reading)?" [1 = not all; 7 = to a great extent] | 2018–2019 weighted average or most recent period available

Source: The Global Competitiveness Report 2019. World Economic Forum.

Colombia position: 73 out of 141 countries, score 60,9

Best in the world: Finland

Best Region: Chile

Variable 5. Labor freedom

It is a quantitative measure that considers various aspects of the legal and regulatory framework of a country's labor market, including regulations, minimum wages, laws that inhibit layoffs, severance requirements and measurable regulations, restrictions on hiring, hours worked and the rate participation in the labor force as an indicator that measures employment opportunities in the labor market.

Seven quantitative sub-factors are weighted equally and each sub-factor is counted as one-seven.

- Relationship between the minimum wage and the average value added per worker.
- Impediment to hire additional workers.
- Rigidity of hours.
- Difficulty firing laid off employees.
- Notice period by legal mandate.
- Payment of compulsory compensation.
- Labor participation rate.

Source: Index Economic Freedom 2020

Colombia position: 19 out of 186 countries, score 78

Best in the world: Singapore

Best Region: Colombia

Variable 6. Human capital & research

This pillar attempts to measure the level of qualification of the human capital of the economies. It includes the measurement of Basic and Secondary Education, Tertiary education, Government expenditure on education. 2016–2018 weighted average or most recent period available

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 82 out of 131 countries, score 25,9

Best in the world: Korea

Best Region: Argentina

Variable 7. Tertiary enrolment (% gross)

The ratio of total tertiary enrolment, regardless of age, to the population of the age group that officially corresponds to the tertiary level of education. Tertiary education, whether or not at an

advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level. The school enrolment ratio can exceed 100% as a result of grade repetition and the inclusion of over-aged and under-aged students because of early or late entrants. 2017 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 50 out of 131 countries, score 55,3

Best in the world: Greece

Best Region: Chile

Variable 8. Graduates in science and engineering

Tertiary graduates in science, technology, engineering, and mathematics (% of total tertiary graduates). The share of all tertiary-level graduates in natural sciences, mathematics, statistics, information and technology, manufacturing, engineering, and construction as a percentage of all tertiary-level graduates. 2017 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 51 out of 131 countries, score 23,1

Best in the world: Oman

Best Region: Perú

Variable 9. Researchers FTE

Researchers per million population, FTE. Researchers in R&D are professionals engaged in the conception or creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned. Postgraduate PhD students (ISCED97 level 6) engaged in R&D are included. Data collected from UNESCO Institute for Statistics, Eurostat, and OECD Main Science and Technology Indicators. 2018 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 90 out of 131 countries, score 0,9

Best in the world: Israel

Best Region: Argentina

Variable 10. QS university ranking score of top 3 universities

Average score of the top 3 universities at the QS world university ranking.

If fewer than three universities are listed in the QS ranking of the global top 1000 universities, the sum of the scores of the listed universities is divided by three, thus implying a score of zero for the non-listed universities. 2019 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 33 out of 131 countries, score 34,1

Best in the world: United States

Best Region: Mexico

Variable 11. English Proficiency.

The EF SET is an online, adaptive English test of reading and listening skills. It is a standardized, objectively scored test designed to classify test takers' language abilities into one of the six levels established by the Common European Framework of Reference (CEFR).

The score is awarded according to the following table:

CEFR EF EPI Score	
Pre-A1	1-199

A1	200-299
A2	300-399
B1	400-499
B2	500-599
C1	600-699
C2	700-800

To make the analysis comparable with the other indices, the data was normalized so that the scores were from 1 to 100.

Source: English Proficiency Index.

Colombia position: 77 out of 100 countries, score 24,72

Best in the world: Netherlands

Best Region: Argentina

Regulatory framework

Variable 1. Business environment - Intellectual property security, information security certifications, piracy rates.

The published report does not have a detailed description of the variables.

Source: Kearney Global Services Location Index 2019

Colombia position: 28 out of 50 countries, score 54

Best in the world: New Zealand

Best Region: Uruguay

Variable 2. Risk and quality of life - Digital cybersecurity

Risk encapsulates the qualitative perceptions and measurable occurrences of natural and socio-political risks which in turn affect the quality of Life, where quality of life refers to non-operational considerations and ecosystem components that may affect living and working conditions. Risk is quantified according to the propensity of events to impact personal safety and the overall stability of a location to hosting business operations. The overall Risk and Quality of Life Score is generated from the identification of social infrastructure, non-work culture, and availability of leisure and recreational facilities, among others and from the identification of factors such as economic, political, natural, social and also cyber and digital risks in a location.

Scoring: 10 = Low risk & High quality of life 1 = High risk & low quality of life

Source: Tholons Services Globalization Index 2020

Colombia position: 38 out of 50 countries, score 31

Best in the world: United Arab Emirates

Best Region: Uruguay

Variable 3. Intellectual property protection

Response to the survey question "In your country, to what extent is intellectual property protected?" [1 = not at all; 7 = to a great extent] | 2018–2019 weighted average or most recent period available.

Source: The Global Competitiveness Report 2019. World Economic Forum.

Colombia position: 92 out of 141 countries, score 47,0

Best in the world: Finland

Best Region: Uruguay

Variable 4. Legal framework's adaptability to digital business models

Response to the survey question "In your country, how fast is the legal framework of your country adapting to digital business models (e.g. e-commerce, sharing economy, fintech, etc.)?" [1 = not fast at all; 7 = very fast] | 2018–2019 weighted average or most recent period available.

Source: The Global Competitiveness Report 2019. World Economic Forum.

Colombia position: 84 out of 141 countries, score 41,0

Best in the world: United States

Best Region: Chile

Variable 5. Business freedom

The commercial freedom component measures the degree to which structural environments limit the efficient operation of companies. The quantitative score is derived from a number of factors that affect the ease of starting, operating, and closing a business. The trade freedom score for each country is a number between 0 and 100, with 100 dictating the freest business environment. The score is based on 13 sub-factors, all of which are weighted equally, using data from the World Bank's Doing Business report:

- Starting a business: procedures (number);
- Opening a business: time (days);
- Starting a business: cost (% of income per capita);
- Starting a business: minimum capital (% of income per capita);
- Obtain a license: procedures (number);
- Obtain a license: time (days);
- Obtain a license: cost (% of income per capita);
- Closing a business: time (years);
- Closing of a company: cost (% of equity);
- Closing a business: payback rate (cents on the dollar);
- Obtaining electricity: procedures (number);
- Get electricity: time (days);
- Obtain electricity: cost (% of income per capita).

Source: Index Economic Freedom 2020

Colombia position: 19 out of 186 countries, score 78

Best in the world: Hong Kong

Best Region: Chile

Variable 6. Regulatory quality

Index that reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development. Scores are standardized. 2018 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 55 out of 131 countries, score 50,4

Best in the world: Hong Kong

Best Region: Chile

Variable 7. Rule of law

Index that reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police,

and the courts, as well as the likelihood of crime and violence. Scores are standardized. 2018 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 87 out of 131 countries, score 36,6

Best in the world: Finland

Best Region: Chile

Local competition

Variable 1. Distortive effect of taxes and subsidies on competition

Response to the survey question “In your country, to what extent do fiscal measures (subsidies, tax breaks, etc.) distort competition?” [1 = distort competition to a great extent; 7 = do not distort competition at all] | 2018–2019 weighted average or most recent period available.

Source: The Global Competitiveness Report 2019. World Economic Forum.

Colombia position: 126 out of 141 countries, score 33,8

Best in the world: Singapore

Best Region: Chile

Variable 2. Extent of market dominance

Response to the survey question “In your country, how do you characterize corporate activity?” [1 = dominated by a few business groups; 7 = spread among many firms]. | 2018–2019 weighted average or most recent period available.

Source: The Global Competitiveness Report 2019. World Economic Forum.

Colombia position: 102 out of 141 countries, score 39,0

Best in the world: Switzerland

Best Region: Uruguay

Variable 3. Competition in services

Average of the scores of the three components of the following Executive Opinion Survey question: “In your country, how competitive is the provision of the following services: professional services (legal services, accounting, engineering, etc.); retail services; and network sector (telecommunications, utilities, postal, transport, etc.)?” In each case, the answer ranges from 1 (not at all competitive) to 7 (extremely competitive). | 2018–2019 weighted average or most recent period available.

Source: The Global Competitiveness Report 2019. World Economic Forum.

Colombia position: 78 out of 141 countries, score 64,3

Best in the world: Hong Kong

Best Region: Chile

Variable 4. Intensity of local competition

Average answer to the survey question: In your country, how intense is competition in the local markets? [1 = not intense at all; 7 = extremely intense], 2019 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 28 out of 131 countries, score 75,0

Best in the world: Japan

Best Region: Colombia

Variable 5. Domestic market scale as measured by GDP, bn PPP\$

The domestic market size is measured by gross domestic product (GDP) based on the purchasing-power-parity (PPP) valuation of country GDP, in current international dollars (billions). 2019 recent period available

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 31 out of 131 countries, score 65,2

Best in the world: China

Best Region: Brazil

Digitalization and innovation in companies

Variable 1. Incentives and policies for innovation

Digital and Innovation is the lifeline of today's businesses. Businesses must embrace digital technologies and platforms like social media, mobile technology, cognitive computing, cloud and artificial intelligence to cater to the changing demands.

The parameters considered for Digital and Innovation are open innovation ecosystem, number of startups, startup diversity and maturity, innovative policies and incentives, unicorns, cyber security, global digital competitiveness, digital literacy rate i.e. the number of people using internet, digital evolution, digital talent and high tech patent grants, business agility, usage of RPA/AI/cloud, investors.

Scoring: 10 = High digital and innovation 1 = Low digital and innovation

Source: Tholons Services Globalization Index 2020

Colombia position: 30 out of 50 countries, score 32

Best in the world: Taiwan, UK

Best Region: Chile

Variable 2. Growth of innovative companies

Response to the survey question "In your country, to what extent do new companies with innovative ideas grow rapidly?" [1 = not at all; 7 = to a great extent] | 2018–2019 weighted average or most recent period available.

Source: The Global Competitiveness Report 2019. World Economic Forum.

Colombia position: 87 out of 141 countries, score 47,9

Best in the world: Israel

Best Region: Chile

Variable 3. Companies embracing disruptive ideas

Response to the survey question "In your country, to what extent do companies embrace risky or disruptive business ideas?" [1 = not at all; 7 = to a great extent] | 2018–2019 weighted average or most recent period available.

Source: The Global Competitiveness Report 2019. World Economic Forum.

Colombia position: 72 out of 141 countries, score 43,7

Best in the world: Israel

Best Region: Brazil

Variable 4. Business sophistication

This pillar attempts to capture the level of business sophistication to assess how conducive companies are to innovation. It has three Sub-indices: Knowledge Workers, Innovation Linkages and Knowledge Absorption

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 52 out of 131 countries, score 29,8

Best in the world: Sweden

Best Region: Brazil

Variable 5. Firms offering formal training (% of firms)

The percentage of firms offering formal training programs for their permanent, full-time employees in the sample of firms in the World Bank's Enterprise Survey in each country. 2018 recent period available. Botswana, Chile, Costa Rica, Jamaica, Mexico, Paraguay, and Trinidad and Tobago use data for 2009.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 6 out of 131 countries, score 77,9

Best in the world: China

Best Region: Ecuador

Variable 6. GERD performed by business enterprise (% of GDP)

Gross expenditure on R&D performed by business enterprise as a percentage of GDP. For the definition of GERD see indicator 2.3.2. 2018 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 61 out of 131 countries, score 2,4

Best in the world: Israel

Best Region: Ecuador

Variable 7. GERD financed by business enterprise (% of total GERD)

Gross expenditure on R&D financed by business enterprise as a percentage of total gross expenditure on R&D. For the definition of GERD see indicator 2.3.2. 2017 recent period available, the Plurinational State of Bolivia and Burkina Faso use data for 2009.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 30 out of 131 countries, score 60,7

Best in the world: Thailand

Best Region: Colombia

Variable 8. University/industry research collaboration

Average answer to the survey question: In your country, to what extent do businesses and universities collaborate on research and development (R&D)? [1 = do not collaborate at all; 7 = collaborate extensively] a 2019

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 61 out of 131 countries, score 42,6

Best in the world: Israel

Best Region: Colombia

Variable 9. State of cluster development

Average answer to the survey question on the role of clusters in the economy: In your country, how widespread are well-developed and deep clusters (geographic concentrations of firms,

suppliers, producers of related products and services, and specialized institutions in a particular field)? [1 = non-existent; 7 = widespread in many fields] a 2019

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 83 out of 131 countries, score 43,2

Best in the world: Italy

Best Region: Mexico

Variable 10. Patent families filed in two offices

Number of patent families in at least two offices (per billion PPP\$ GDP)

A “patent family” is a set of interrelated patent applications filed in one or more countries or jurisdictions to protect the same invention. Patent families containing applications filed in at least two different offices is a subset of patent families where protection of the same invention is sought in at least two different countries. In this report, “patent families data” refers to patent families containing applications filed in at least two IP offices; the data are scaled by PPP\$ GDP (billions). A “patent” is a set of exclusive rights granted by law to applicants for inventions that are new, non-obvious, and industrially applicable. A patent is valid for a limited period of time (generally 20 years) and within a limited territory. The patent system is designed to encourage innovation by providing innovators with time-limited exclusive legal rights, thus enabling them to appropriate the returns from their innovative activity. 2016 recent period available.

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 73 out of 131 countries, score 0,6

Best in the world: Japan

Best Region: Panama

Variable 11. Intellectual property payments

Charges for the use of intellectual property not included elsewhere payments (% of total trade), average of three most recent years or available data. Value according to the Extended Balance of Payments Services Classification EBOPS 2010—that is, code SH charges for the use of intellectual property not included elsewhere as a percentage of total trade. “Total trade” is defined as the sum of total imports code G goods and code SOX commercial services (excluding government goods and services not included elsewhere) plus total exports of code G goods and code SOX commercial services (excluding government goods and services not included elsewhere), divided by 2. According to the sixth edition of the International Monetary Fund’s Balance of Payments Manual, the item “Goods” covers general merchandise, net exports of goods under merchanting, and non-monetary gold. The “commercial services” category is defined as being equal to “services” minus “government goods and services not included elsewhere”. Receipts are between residents and non-residents for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes and designs including trade secrets, franchises), and for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works, and sound recordings) and related rights (such as for live performances and television, cable, or satellite broadcast). 2018 recent period available. Data for Azerbaijan is for (2010-12), Guinea (2010-12), Islamic Republic of Iran (2014-16), Mali (2009, 2019), Niger (2009), Rwanda (2009), Tajikistan (2009, 2017, 2018), and Yemen (2014-16).

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 43 out of 131 countries, score 19,3

Best in the world: Ireland

Best Region: Costa Rica

Variable 12. High-tech imports (% of total trade)

High-technology exports and imports contain technical products with a high intensity of R&D, defined by the Eurostat classification, which is based on Standard International Trade Classification (SITC) Revision 4 and the Organization for Economic Co-operation and Development (OECD) definition. Commodities belong to the following sectors: aerospace; computers & office machines; electronics; telecommunications; pharmacy; scientific instruments; electrical machinery; chemistry; non-electrical machinery; and armament. 2018 recent period available

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 17 out of 131 countries, score 42,2

Best in the world: Hong Kong, Philippines

Best Region: Mexico

Variable 13. ICT services imports (% of total trade) | 2018

Telecommunications, computer and information services as a percentage of total trade according to the Organization for Economic Co-operation and Development (OECD)'s Extended Balance of Payments Services Classification EBOPS 2010, coded SI: Telecommunications, computer and information services. 2018 recent period available

Source: The Global Innovation Index 2019. Cornell University, INSEAD, WIPO.

Colombia position: 51 out of 131 countries, score 20,3

Best in the world: Cyprus

Best Region: Uruguay

Variable 14. Research talent in business enterprise per thousand population (%) “Full-time equivalent (FTE) researchers in the business enterprise sector” refers to researchers as professionals engaged in the conception or creation of new knowledge, products, processes, methods, and systems, as well as in the management of these projects, broken down by the sectors in which they are employed (business enterprise, government, higher education, and private non-profit organizations). In the context of R&D statistics, the business enterprise sector includes all firms, organizations, and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price, and the private non-profit institutions mainly serving them; the core of this sector is made up of private enterprises. This also includes public enterprises. 2018 recent period available