Collaboration for the Internationalization of Research and Development: Opportunities for Colombia in the Post-Pandemic Term

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Within the new world scenario, the internationalization of science, technology and innovation represents a fast track for the development of nations and the solution of the global challenges posed by the 2030 Agenda.

The above reflects on the importance of science and technology as determining factors to promote sustainable development and especially to overcome any scenario of health and economic crisis generated by the Covid-19 pandemic, which has promoted the creation of programs that are in favor of investment in human resources and infrastructure to strengthen local capacities, long-term financing for the development of scientific and technological projects, as well as the implementation of new mechanisms that favor the institutionalization of science, technology and innovation policies.

Keywords: international cooperation, science, technology, innovation, Covid-19 pandemic

INTRODUCTION

In higher education, the promotion of research, technological development and innovation have been promoted as government policies that foster sustainable development, economic growth, and social welfare in both developed and developing countries. For this reason, science is considered a relevant factor in building more equitable, inclusive, and sustainable societies.

In this sense, research contributes to the exchange and dissemination of knowledge and the quality of the processes carried out in higher education. However, the United Nations Educational, Scientific and Cultural Organization (2015) in the so-called UNESCO Report on Science: towards 2030, emphasizes the importance of increasing both public and private investment in R&D, which has been in decline due to budget cuts that prevent the financing of scientific and technological programs. On the other hand, the number of researchers in the world has been on the rise, resulting in greater scientific publications in collaboration with international peers from different geographical areas linked to cooperation programs and academic and scientific mobility that highlight the maturity of the research system in the world.

In the specific case of Colombia, the National Science, Technology, and Innovation Policy, in its document CONPES 3582 of 2009, focuses its efforts on promoting scientific and technological knowledge as a mechanism for the country's growth and development. Thus, its strategies are framed in favoring innovation scenarios in conjunction with the productive sector, strengthening human resources and public institutions that support research policies in the country, guaranteeing the social appropriation of knowledge to solve local and regional problems, and favoring the development of capacities in science, technology, and innovation (STI) (Departamento Nacional de Planeación, 2009). Hence, the need to promote an international strategy of strategic alliances between governments and institutions of higher education to promote the creation of interdisciplinary groups that take ownership of issues of global relevance that are of great interest to all countries and actors in the international system (Marconi et al., 2019). Even this policy, in its most recent version, CONPES 4069 of 2021, gestated, among other things, to counteract the challenges caused by the Covid-19 pandemic, seeks to enhance the knowledge economy based on the effective development of human talent in STI, the generation of new knowledge and its use and social appropriation, as well as the enhancers and dynamics of these dynamics such as the inclusion of a gender agenda for STI, the effective regionalization of science instruments and internationalization and scientific diplomacy, as well as the development of financing instruments (Departamento Nacional de Planeación, 2021).

In relation to this, the internationalization of science and technology in Colombia is recognized as a scenario that offers opportunities for high-level training, the formulation and implementation of research projects and the creation of platforms that favor innovation. Therefore, this study seeks to reflect on the potential of the internationalization of research as an axis of development for the Latin American region in the post-pandemic period, taking the case of Colombia as a reference.

THEORETICAL FRAMEWORK

The changing and interdependent global dynamics in which higher education institutions are immersed, highlights the need to transcend in internationalization strategies for the social benefit and dissemination of knowledge. In this sense, their integration with research is considered as a mechanism to increase the impact of science on society.

Three trends impact the internationalization of research: the introduction of excellence as an objective of national science policy; university visibility in world rankings; and performance-based research funding (Jacob and Hellström, 2014). To these can be added the massification in the use of information and communication technologies (ICT) that facilitate contact between researchers and joint work in turn the new social context requires further development of knowledge sharing and collective, interorganizational, and interdisciplinary reflection. These trends have led to increased cooperation and networking within higher education institutions to achieve these goals through joint efforts. In terms of obtaining external

resources, Woldegiyorgis et al. (2018) emphasize that the application in the framework of consortia of researchers or networks of institutions from different countries increases the probability of success.

Considering that scientific collaboration refers to the work developed jointly by researchers from different areas to obtain scientific products that respond to the need to make a problem known, at the national level, collaborative research becomes an alternative for the growth and development of countries through the universalization of knowledge and the exchange of good practices and resources. It is also positively correlated with productivity (Abramo et al. 2011) as it provides access to resources, funds, knowledge, experience and the learning of new techniques (Beaver, 2001).

In this sense, the perception that countries have according to their scientific development in relation to international scientific collaboration and cooperation see it differently, the less developed see it as an option to strengthen their activities and seek funding while the more developed seek to generate collaborative initiatives and create links to international network programs (Sebastian, 2019), likewise smaller countries that have limited resources can form regional academic alliances to join forces and promote their participation in global science (Altbac, 2013; Franco and Pinho, 2018).

In turn, at the institutional level, some mechanisms for the development of the internationalization of research are mobility of actors, carrying out projects in consortia, networking (Nupia, 2014), the development of training programs and training of researchers, especially for doctoral level, the formulation of projects and languages, the establishment of interdisciplinary groups and scientific diplomacy (Colombia Challenge your Knowledge, 2015). Sebastián (2019) highlights international cooperation as one of the most important and complex due to the diversity of actors, funding sources and frameworks for its development. He also notes that part of the success of international cooperation depends on the relational capital of the researcher since project management can arise from formal relationships (covered within the framework of institutional agreements) and informal ones (based on interpersonal relationships).

Regarding the management of international projects, technology parks attached to universities are relevant for attracting external funds. Technology parks articulate research management with the government and the business sector, benefiting universities in several ways: facilitating the commercialization of research, increasing patents, publications, attracting funding and outstanding academics (Link and Scott, 2003; Truco and Gilabert, 2013). Another important mechanism is science diplomacy which emphasizes collaborative work as a mechanism for solving global challenges, in this tenor, universities can serve as centers for the development of national capacities through research, innovation and data collection and analysis (Echevarria et al., 2020). Echeverría et al. (2021) describe three approaches to science diplomacy in emerging countries: capacity building, partnership building to solve global challenges, and mobilization of STI resources. On the other hand, diasporas allow nations to resume contact with their migrant academics to develop joint projects, motivate investment and capacity building (Meyer and Wattiaux, 2006).

Antelo (2012) proposes a model for the internationalization of institutional research that considers internal and external factors. Among the internal factors, he highlights the articulation of the research team, institutional synergy, and strategic direction for project management. To which strategies for attracting global talent can be added, teaching qualification processes and the design of an incentive structure (Pohoryles and Cvijetic, 2002).

External factors include government policies that drive or inhibit the process and aspects of the national context that may influence the project (Antelo, 2012). Regarding the policy aspect Jones and Oleksiyenko (2010) found that universities can have elevated levels of research activity and international collaboration even without high levels of government support. In any case, the availability of internal or external funding is fundamental for the development of the internationalization of research. In this regard, Adapa (2013) states that, in most universities, the main source of funding comes from private sources.

In turn, scientific collaboration is a driving force for the internationalization of science and, therefore has a central role in the strategies and instruments of scientific policy of countries and institutions, as mentioned by Sebastián (2019), where he highlights the case of Latin America where no progress has been evidenced in the incorporation of international scientific cooperation as a preponderant part of national scientific policies, leaving in the background also the internationalization of research. In the specific case

of Colombia, progress has been made in this area, highlighting the Conpes 4069 of 2021 where the governmental intention to improve the scientific policies that have been established so far can be evidenced, highlighting several points to be improved: Among these is the low economic investment in the ACTI by both the government and the private sector, which would lead to very few people being aware of the ACTI developed within the country, this in turn evidences the weak communication of scientific and STI work, since very few publications are made known outside the academic spheres. This drives many researchers to seek international collaborations to obtain the resources and visibility desired for their work.

Likewise, there is evidence of low management of cooperation and internationalization of STI where it can be seen that very few researchers have participated or are part of international networks, as well as the international economic support to national projects has been really low in recent years giving almost always negative results, This leads to evidence an absence of mechanisms that serve to create and strengthen international ties, which in turn makes evident the following problem and is the great informality in the scientific sector, so it should seek greater international scientific collaboration to ensure intersectionality and dissemination of knowledge, information and ways to develop the activities associated with science, technology and innovation (ACTI).

All of the above triggered the search for effective solutions to the issues mentioned above, so that within the Conpes 4069 document, government entities committed themselves to design and implement internationalization policies together with a diplomatic agenda that promotes greater international scientific collaboration of researchers, giving them the possibility of being part of global networks and at the same time providing them with greater mobility, but mainly what they seek is to provide visibility to Colombian scientific work, where a constant exchange of experiences and good practices is also guaranteed. Likewise, these efforts must be redoubled by those institutions of higher education that wish to obtain greater visibility, considering that governmental actions do not usually have immediate results or that many times they do not go hand in hand with the thematic axes developed by each one.

METHODOLOGY

This paper seeks to reflect on the potential of the internationalization of research as an axis of development for the Latin American region in the post-pandemic period, taking the case of Colombia as a reference.

It lays its methodological foundations in the documentary review. For (Rizo, 2015) in documentary research, knowledge is constructed from the reading, analyzing and interpreting documents, reflections, publications taken from primary or secondary sources. In this sense, this paper takes as a reference publication on Colombia's strategies in science, technology and innovation and the effects of the pandemic caused by Covid-19.

RESULTS

Policies and Strategies for the Internationalization of STI in Colombia

Science, technology, and innovation stand out in the new world order as relevant instruments that respond to the different dynamics arising in political, economic, and social scenarios because of the effects of globalization and interdependence among countries. In the case of Colombia, such tools contribute to economic growth and the generation of social development based on knowledge (National Planning Department [DNP], 2009). Therefore, it is important to design and implement public policies to boost science, technology, and innovation activities with the participation of governmental, academic, and productive sector stakeholders. In this sense, the strengthening of the institutions that lead science and technology policies in the country has made it possible to strengthen the quality of research through the categorization of research groups; the accreditation process of academic programs guided by the National Accreditation Council; the mobilization of reimbursable and non-reimbursable cooperation from multilateral banks to promote research, development and high-level training; and the broad interaction of science and technology in Colombia with its international allies (Ordonez-Matamoros, 2008).

Given the importance of articulating all sectors of the country against the objectives of the National System of Science, Technology and Innovation, the government decided through Law 1951 of 2019 to move towards transforming Colciencias into the Ministry of Science, Technology, and Innovation. This means that Colombia is moving towards the modernization of a system that aims to generate greater competitiveness, high-level training, business sector innovation and relations with other countries through the establishment of policies for the internationalization of scientific and technological activities (Ministry of Science, Technology, and Innovation [Minciencias], 2021). Likewise, its efforts are focused on generating development and growth in the country, considering a prospective view of technological challenges and the construction of a more productive and equitable society and economy (Government of Colombia, 2019a). In this sense, the International Mission of Wise Men is born because of national and international cooperation and scientific diplomacy and became the navigation chart for the design and execution of policies within Minciencias.

This is a scenario that considers the background of the 1993 Science, Education, and Development Mission and the Colciencias Green Book document "Challenges for 2030", to draw the roadmap to boost science, technology and innovation in Colombia based on the recommendations of a group of national and international experts in various areas of knowledge (Government of Colombia, 2019b). Indeed, thirty high-impact projects are established that define three important challenges for Colombia. In the first instance, the Colombia Biodiversa challenge to take advantage of cultural and natural diversity to promote the bioeconomy and the creative economy with a sustainable approach; the second challenge of Colombia productiva to promote the circular economy in favor of environmental sustainability; and finally Colombia equitativa which focuses on improving the education and health system in such a way that it is reflected in the sustainable human development of the country (Government of Colombia, 2020).

In this regard, the installed capacity that the country has developed in terms of science, technology and innovation has driven the generation of internationalization strategies, whose purpose is to promote partnerships between the actors of the National System of Science, Technology and Innovation and international peers according to Colombia's geographic location and priorities. Hence, the aim is to promote the advancement of STI through participation in global scenarios, in addition to promoting the dissemination of knowledge and good innovation practices that contribute to the mobilization of financial resources and technical assistance because of international cooperation (Minciencias, 2021b).

Consequently, Table 1 lists the main actions and projects that Colombia has been conducting with its international strategic allies to strengthen the internationalization of research, based on international mobility programs, capacity building, high-level training, and social appropriation of knowledge:

TABLE 1
INTERNATIONAL COOPERATION FOR ST&I BY GEOGRAPHIC DESK

Geographic Desk	International Cooperation
Cooperation with Europe	Horizon 2020: Eighth EU framework program in research and innovation, benefiting European and associated countries through the generation and financing of projects, knowledge of international best practices, mobility, capacity building and networking. France: Development of the Conventions Industrielles de Formation par la REcherche (CIFRE) program, research, and scientific culture among young people through the Nexo Global program and calls for collaborative projects within the framework of ECOS-Nord, Math Amsud and Stic AmSud.

	Germany: Implementation of joint scientific projects for the training and exchange of research groups and doctoral students through the DAAD and the Federal Ministry of Education and Research. United Kingdom: Development of cooperation strategies through the Newton Fund represented by the British Council in Colombia, for calls for researcher mobility (Researcher Links), financing of doctorates in the UK (Newton PhD. Programme) and funds for the Colombia Bio program. United States: Joint work with the Fulbright Commission for high-level training of Colombians at prestigious universities (Harvard University, Purdue University and Cornell University).
North American cooperation	Canada: Establishment of the CALDO consortium composed of 9 Canadian universities. This is a mobility agreement for doctoral students, to promote high-level training of Colombians in different areas of knowledge.
Cooperation with Asia, Africa, and Oceania	Japan: Development of the SAKURA program to promote exchanges of outstanding students in science and technology. Japan-Latin America and the Caribbean Exchange Program to promote understanding of Japan in terms of foreign policy, culture, and technology. Korea: Colombia's cooperation with the Korea Sharing Programme (KSP), the Korea Development Institute's main international collaboration program. Master Plan for Capacity Building in Science, Technology, and Innovation Parks, between KOICA and APC Colombia. Israel: Memorandum of Understanding to promote research, transfer of knowledge, technology, and exchange of researchers between the two countries. India: Science and Technology Cooperation Agreement to support joint projects in the areas of biotechnology, information technology and ICTs, climate change, nanotechnology, and renewable energy. Australia: Collaboration Agreement with joint funding for graduate studies between Minciencias and the Consortium of Universities of Australia. Australia-Americas Agreement for the development of research internships.
Cooperation with Ibero-America	Development of multilateral programs and projects with the Ibero-American General Secretariat (SEGIB), the Ibero-American Science and Technology for Development Program (CYTED), the Union of South American Nations (UNASUR)

	and the Amazon Cooperation Treaty Organization (OTCA), to promote the mobility of researchers, entrepreneurs, experts, and the generation of scientific projects. Bilateral actions with the ministries, councils and committees of science, technology and innovation of Spain, Argentina, Chile, Ecuador, Mexico, and Peru.

CONCLUSIONS AND RECOMMENDATIONS

This study highlights the importance of the internationalization of research and scientific collaboration, emphasizing the different dynamics and perspectives adopted in the international higher education scenario, as well as the policies and strategies established in Colombia to contribute to the internationalization of science, technology, and innovation. Therefore, the main milestones and phases that have allowed the evolution of this policy to promote the modernization of a more competitive system, high-level training, innovation in the productive sector, and relations with other countries through the formalization of strategic alliances and scientific and technological collaboration projects become relevant.

In this sense, the intrinsic relationship between research and internationalization is evident, considering that knowledge and science are global, and most countries face local challenges influenced by global effects. Therefore, the internationalization of research has become important in global visibility policies because it brings quality to the field of higher education, stimulates the creation of scenarios for the exchange, transfer, and dissemination of knowledge, constructs of academic, scientific, and technological networks that contribute to the challenges set out in the 2030 Agenda of the Sustainable Development Goals. Similarly, it is important to keep in mind international scientific collaboration, which also becomes a bridge to establish and strengthen ties with organizations or entities at the international level, facilitating national researchers interaction with recent technologies and a much more fluid exchange of ideas and knowledge.

Therefore, countries such as Colombia must continue to strengthen its science, technology, and innovation systems to make the most of the country's strengths in the internationalization of research, which are related to its geographical position, areas of great interest for generating impact research with a differential approach, and the relational capital that both researchers and higher education institutions have been promoting through science diplomacy scenarios. Similarly, it is relevant to explore the opportunities offered within the 2030 Agenda, the COVID-19 health crisis, and the need to leverage an STI policy that responds to local interests. In this sense, the internationalization of science and technology and international scientific collaboration become determining factors in responding to the effects generated by the pandemic and promote support for R&D projects, development of innovative scientific-technological bases, institutional actions linked to scientific advice, inter-institutional coordination, and participation from academia. It also helps emerging countries reduce social gaps and inequalities in income distribution, reinforces the long-term financing of local and global scientific capabilities, and enables regional collaboration to solve health, economic, social, and environmental problems.

Finally, the national government must guarantee efforts focused not only on investment to strengthen scientific collaboration and the internationalization of research but also on the creation of spaces for the visibility of STIs carried out within the country, one of the most important of which is the creation and improvement of norms and regulations that foster these spaces, bearing in mind that collaboration in science and the internationalization of research are now essential not only in transforming the internal processes of the knowledge-generating communities but perhaps most importantly in allowing knowledge to be disseminated and discussed in a much broader context.

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REFERENCES

Abramo, G., D'Angelo, C.A., & Solazzi, M. (2011). The relationship between scientists' research performance and the degree of internationalization of their research. *Scientometrics*, *86*(3), 629–643.

Adapa, P.K. (2013). *Strategies and factors effecting internationalization of university research and education.* Global Institute for Water Security University of Saskatchewan.

Altbac, P.G. (2013). Advancing the national and global knowledge economy: The role of research universities in developing countries. *Studies in Higher Education*, *38*(3), 316–330. https://doi.org/10.1080/03075079.2013.773222

Antelo, A. (2012). Internationalization of Research. *Journal of International Education and Leadership*, *2*(1), 1–6. Retrieved from https://eric.ed.gov/?id=EJ1136068

Beaver, D. (2001). Reflections on scientific collaboration (and its study): Past, present, and future. *Scientometrics*, *52*(3), 365–377. Retrieved from https://link.springer.com/article/10.1023/A:1014254214337

Colciencias. (2017). *Convocatoria para la conformación de un banco de proyectos de investigación para generar y transferir conocimientos sobre la paz sostenible en Colombia.* Retrieved from https://minciencias.gov.co/sites/default/files/upload/convocatoria/terminos-de-referencia-firmados_2.pdf

Colombia C.Y.K. (2015). *Internacionalización de la investigación*. Guías para la internacionalización de la Educación Superior: Internacionalización de la investigación. Retrieved from http://www.ccyk.com.co/wp-content/uploads/2019/06/De-la-Investigaci%C3%B3n.pdf

Departamento Nacional de Planeación. (2009, April 27). *Política nacional de Ciencia, Tecnología e Innovación de Colombia*. CONPES 3582. Retrieved from https://minciencias.gov.co/sites/default/files/upload/reglamentacion/conpes-3582-2009.pdf

Departamento Nacional de Planeación. (2021, December 27). *CONPES aprobó política de ciencia, tecnología e innovación (CTI).* Retrieved from https://www.dnp.gov.co/Paginas/CONPES-aprobo-politica-de-ciencia-tecnologia-e-innovacion-CTI.aspx

Echeverría King, L.F., González, D.A., & Andrade-Sastoque, E. (2021) Science Diplomacy in Emerging Economies: A Phenomenological Analysis of the Colombian Case. *Front. Res. Metr. Anal. 6*(636538). doi: 10.3389/frma.2021.636538

Echeverria, L.F., Aquino Valle, K.E., & Widmaier Muller, C.N. (2020). Science diplomacy and South-South cooperation for emergency response: The case of COVID-19 pandemic in Latin America. *Jurnal Sosial Politik*, *6*(2), 167–181. Retrieved from https://ejournal.umm.ac.id/index.php/sospol/article/view/11647

Europea, C. (2014). *Horizon 2020 en breve. El Programa Marco de Investigación e Innovación de la Unión Europea.* Retrieved from https://ec.europa.eu/programmes/horizon2020/sites/default/files/H2020_ES_KI0213413ESN.pdf

Franco, M., & Pinho, C. (2018). A case study about cooperation between University Research Centres: Knowledge transfer perspective. *Journal of Innovation & Knowledge*, *4*(1), 62–69. https://doi.org/10.1016/j.jik.2018.03.003

Gobierno de Colombia. (2019a). *Misión de Sabios, Presidencia de la República.* Retrieved from https://minciencias.gov.co/sites/default/files/libro_mision_de_sabios_digital_1_2_0.pdf

Gobierno de Colombia. (2019b, January 24). *Por la cual se crea el Ministerio de Ciencia, Tecnología e Innovación, se fortalece el sistema nacional de ciencia, tecnología e innovación y se dictan otras disposiciones*, Ley 1951 de 2019, Congreso de Colombia, Bogotá. Retrieved from https://dapre.presidencia.gov.co/normativa/normativa/LEY%201951%20DEL%2024%20DE%20ENERO%20DE%202019.pdf

Gobierno de Colombia. (2020). *Informe de gestión al congreso 2019* - Junio 2020, Bogotá, Minciencias. Retrieved from https://minciencias.gov.co/sites/default/files/upload/planeacion/informe_de_gestion_y_resultados_minciencias_2020-08-10.pdf

Jacob, M., & Hellström, T. (2014). Opportunity from crisis: A common agenda for higher education and science, technology, and innovation policy research. *Studies in Higher Education*, *39*(8), 1321–1331. https://doi.org/10.1080/03075079.2014.949531

Jones, G., & Oleksiyenko, A. (2010). The internationalization of Canadian university research: A global higher education matrix analysis of multi-level governance. *Higher Education*, *61*, 41–57. https://doi.org/10.1007/s10734-010-9324-8

Link, A., & Scott, J. (2003). U.S. science parks: The diffusion of an innovation and its effects on the academic missions of universities. *International Journal of Industrial Organization*, *29*(9), 1324–1356.

Marconi, C., Torrens, G., de Mello, M.C.B., Comerlato, N., Spadaro, P. (2019). Buenas prácticas de internacionalización de la educación superior en Brasil. In J. Gacel-Ávila (Coord.), *Buenas prácticas de internacionalización universitaria en América Latina y el Caribe* (pp. 41–72). RIESAL – Programa Erasmus +. Retrieved from http://grupomontevideo.org/publicaciones/wp-content/uploads/2019/10/Buenas-Practicas-de-Internacionalizaci%C3%B3n.pdf

Meyer, J.B., & Wattiaux, J.P. (2006). Diaspora knowledge networks: Vanishing doubts and increasing evidence. *International Journal on Multicultural Societies*, *8*(1), 4–24. Retrieved from www.unesco.org/shs/ijms/vol8/issue1/art1

Ministerio de Ciencia, Tecnología e Innovación. (2021, April 20). *Colombia tendrá por primera vez en su historia un Ministerio de Ciencia, Tecnología e Innovación.* Retrieved from https://minciencias.gov.co/sala_de_prensa/colombia-tendra-por-primera-vez-en-su-historia-un-ministerio-ciencia-tecnologia-e

Nupia, C. (2014). Internacionalización e investigación: Conceptos, políticas y medición en Colombia. *En Reflexiones para la política de internacionalización de educación superior en Colombia* (pp.193–220). Ministerio de Educación nacional y Observatorio Colombiano de Ciencia y Tecnología.

Ordonez-Matamoros, G. (2008). *International research collaboration, research team performance, and scientific and technological capabilities in Colombia: A bottom-up perspective* [Tesis doctoral, Georgia State University]. Public Management and Policy Dissertations. Retrieved from https://ris.utwente.nl/ws/portalfiles/portal/5140919/ordonez+international+research+collaboration+dissertation.pdf

Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura. (2015). *Informe de la UNESCO sobre la ciencia: Hacia 2030.* https://pep.unc.edu.ar/wp-content/uploads/sites/46/2017/02/Informe-de-Unesco-sobre-la-Ciencia-Hacia-2030.pdf

Pohoryles, J., & Cvijetic, S. (2002) Internationalization of Research. *Innovation: The European Journal of Social Science Research*, *15*(4), 381–388. DOI: 10.1080/1351161022000042598

Rizo, J. (2015). *Técnicas de investigación documental.* Universidad Nacional Autónoma de Nicaragua.

Sebastian, J. (2019). La cooperación como motor de la internacionalización de la investigación en América Latina. *Revista CTS*, *14*(42), 79–97. Retrieved from http://ojs.revistacts.net/index.php/CTS/article/view/134

Truco, M., & Gilabert, C. (2013). Las alianzas como factor clave de internacionalización en la investigación universitaria. *Encuentros Multidisciplinares*, (44), 1–6. Retrieved from http://hdl.handle.net/10486/678750

Woldegiyorgis, A., Proctor, D., & de Wit, H. (2018). Internationalization of research: Key considerations and concerns. *Journal of Studies in International Education*, *22*(2), 161–176. https://doi.org/10.1177/1028315318762804