The Colombian scientific diaspora: creating bridges of knowledge

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Abstract: This study analyzes the evolving role of the **scientific diaspora** in promoting **national development** within the specific context of Colombia. International mobility of highly skilled individuals has shifted from being viewed solely as "brain drain" to a potential source of "brain circulation" and capacity building. For Colombia, a country historically characterized by significant emigration, leveraging its skilled diaspora is increasingly recognized as an asset for enhancing its science, technology, and innovation (STI) ecosystem and international competitiveness.

Using a qualitative, descriptive, and exploratory methodology, this research employs a single-case study of Colombia, analyzing primary sources such as laws, strategic public policy documents, and semi-structured interviews. The study also incorporates statistical insights from the Growth Lab to characterize the demographic profile and commitment levels of the diaspora.

The findings indicate that while the Colombian government has acknowledged the strategic importance of the scientific diaspora and scientific diplomacy in its legal and policy frameworks, practical implementation remains inconsistent. Efforts are often poorly coordinated, lack continuity, and are hampered by institutional tensions between the Ministry of Science, Technology, and Innovation (MinCiencia) and the Ministry of Foreign Affairs (MRE).

The paper concludes that achieving a robust and reciprocal relationship between the state and its scientific diaspora requires a **clear, continuous, and integrated scientific diplomacy strategy.** This strategy must move beyond a focus on remittances to actively cultivate trust, promote diaspora associations, and establish permanent institutional mechanisms for their engagement in technical capacity building and foreign policy alignment.

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INDEX

1. Introduction 6
2. Review of the national and global literature 7
3. Methodology 9
4. Case specifications 10
5. Lesson and learning 14
6. Policy implications 16
References 19

TABLE INDEX

Table 1. Interview´s participant 10

1. Introduction

International mobility has become a central feature of 21st century dynamics. It is currently estimated that more than 215 million people live in a country other than their country of birth (Aikins & White, 2011). International mobility occurs not only in the education sector, but also in other sectors such as medicine, science, technology, innovation, and finance, among others.

As a result of armed conflict, Colombia has been characterized as a country that expels migrants, first to neighboring countries such as Venezuela and Ecuador, also to others such as the United States and Spain. During the first decade of the 21st century, Colombian students emigrated mainly to countries such as the United States, Spain, France, Germany, and Australia, making the country one of the largest suppliers of migrants to the OECD area of Latin America (OECD, 2012).

Currently, Colombia's migration profile has changed. It is estimated that approximately 5,000 Colombian students are pursuing tertiary education (master's and doctoral degrees) in OECD countries. After Venezuela, Colombia is the second country with the highest number of asylum applications (203,000 in 2023) and has become the fifth largest supplier of migrants in the OECD area (more than 200 new immigrants per year) (OECD, 2024). This picture reflects the fact that Colombia continues to have a growing diaspora population that is consolidating in various regions, such as Latin America, North America, and Western Europe (International Organization for Migration, 2021).

Highly skilled mobility has increased in strategic importance, not only for countries that receive tertiary education students or scientists who decide to carry out work and research activities in their destination countries, but also for their countries of origin. This is why the scientific diaspora has a dynamic value here, in the sense that it contributes to the incorporation of state and non-state individuals and the development of science, technology, and innovation (STI) in both the countries of origin and the receiving countries.

The migration of highly skilled individuals has undergone significant changes in recent decades, reflecting a dynamic relationship between various factors. In the 1950s, it was associated with brain drain and a loss of human capital for the usually less developed countries of origin (Robertson, 2006). Later, in the 1990s, because of policies aimed at stimulating human mobility, it was associated with a gain for countries that took advantage of the potential of the diaspora to promote the transfer of economic and technical resources. Currently, some link brain power, that is, the positive potential of a diaspora abroad to contribute to the development of their countries of origin, fostering a stable political environment, greater exchange in science, technology, and innovation (STI), and promoting access to better scientific infrastructure in developed countries (Echeverría-King, et al., 2022; Shin & Moon, 2018; Fangmeng, 2016).

Consequently, brain circulation becomes an added value for maintaining a constant flow of knowledge production between the host countries and countries of residence of the scientific diaspora, the emergence of companies, and the revitalization of foreign investment (Chand, 2019). Therefore, for states, regions, and cities alike, attracting talent is a necessary factor in maintaining or enhancing economic competitiveness.

Although geopolitical factors condition human mobility, the relationship between the latter and growth and development has been undeniable, permeating not only optimism but also strengthening the triple relationship between associativity and mobility, the return of national capacities, and commitment to the development of communities of origin (Chikanda, Crush, & Walton-Roberts, 2016). Additionally, opportunities are opening to disaggregate the role of the diaspora, and especially the scientific diaspora, in achieving the objectives.

From an epistemological point of view, diaspora means sowing or spreading seeds (Epstein & Heizler, 2016). For Guarnizo, the diaspora is the group of people who live outside their country of origin but maintain and create networks and connections with it (Guarnizo, 2003). Other approaches give the diaspora the purpose of achieving specific objectives with the group of people who are outside the national territory, developing a particular and broad vision that contributes to the development and reintegration of members of the nation who were dispersed (Chikanda, Crush, & Walton-Roberts, 2016).

Furthermore, the scientific diaspora is a reflection of a bridge community (Echeverría-King, et al., 2022) between the place of origin and the destination, whose purpose is to produce mutual benefits among the stakeholders of international governance, i.e., the state, intergovernmental organizations, civil society, and business, to address common problems or contribute to the development of peoples and improve channels of international cooperation. This link between the diaspora as a bridge has also been interpreted as the ability to provide access to markets, sources of investment, experience, and capacity building (Kuznetsov, 2006).

Currently, for any country, regardless of its level of development or scientific capacity, working with the diaspora becomes a challenge insofar as it aspires to integrate a part of the population that, for various reasons, resides outside the national territory but wishes to maintain and promote ties, in this case scientific ties, with their place of origin. This requires "the identification of clear objectives, mapping of the geographical location and skills of the diaspora, the creation of relationships of trust between diaspora organizations or associations and the governments of origin and destination, and, finally, the mobilization of the diaspora to contribute to sustainable development" (International Organization for Migration, 2012, p. 23).

It can be said that promoting the study of the scientific diaspora has "become a prized object for states, as well as an integral part of the construction of hybrid identities of a collective and individual nature by compatriots who wish to foster a link with their country of origin" (Bamberger, Kim, & Rizvi, 2021, p. 503), through scientific knowledge, the construction of professional networks, and collective work. In the same vein, the diaspora implies attachment and association with a homeland and alludes to the generation of new identities, loyalties, and cultural practices (Brubaker, 2005).

Fostering the development of the diaspora also influences promoting intercultural skills, global competitiveness, and the development of networks (Bamberger, Kim, & Rizvi, 2021). In this sense, for states, promoting the inclusion of the scientific diaspora has also been seen as a means of simultaneously achieving three closely linked objectives: improving foreign policy relations with other states —especially host countries— and with communities of compatriots living abroad; seeking and promoting new areas of cooperation to foster economic growth and international competitiveness; and, finally, involving the scientific diaspora in the development of STI skills and capacities through access to infrastructure and knowledge ecosystems.

This document analyzes the case study of Colombia, pointing out that the scientific diaspora is becoming an increasingly important asset for the country's development. The participation of Colombian scientists abroad strengthens the exchange of scientific experiences and practices, improves access to cutting-edge technology and high-quality infrastructure, contributes to the development of new identities between the country of origin and the host country, and enhances exchange in the knowledge society and the international economy. Recently, the Colombian government has acted on various fronts with the aim of assessing the capacity of the scientific diaspora. However, these efforts remain poorly coordinated, lacking continuity and hampered by political and institutional problems that prevent the implementation of more precise actions to effectively utilize this significant number of Colombians abroad who wish to maintain ties with their country of origin.

2. Review of the national and global literature

When investigating the causes of skilled migration, Didou Aupetit and Gérard propose understanding them as the result of the difference between remaining in the place of origin and moving to a destination country that offers a more suitable environment for research and participation in knowledge networks with global reach (2009). (Didou Aupetit & Gérard, 2009). From this point of view, the formation of the scientific diaspora is conditioned by push and pull factors that, at certain times, determine the scientist's ability to remain in their place of origin or move to another destination in search of scientific and research opportunities with greater impact.

According to Butler, "diasporas consist of communities established in various places outside the country of origin, which maintain a certain degree of political and economic autonomy in the host country, while creating networks and links not only with their country of origin but also with other compatriots in other parts of the world (Butler K. D., 2001, p. 191). As manteining by Meyer, the conception of a network as a social contributor requires: problematizing its existence, that is, finding a defined purpose; developing an interest in the social bond between people who share the established purpose; registering members and mobilizing resources (human or financial) to achieve the proposed objectives (Meyer, 2007).

For other authors, scientific diasporas could also be called knowledge diasporas. These are understood as the group of professionals who migrate to places other than their country of origin, belonging to various areas of knowledge, organized in their places of residence with the intention of impacting the socioeconomic development of their countries of origin. In some ways, the formation of organizations or associations promotes identity as a transnational group (Kuznetsov, 2006).

In this regard, the creation of associations or networks of professionals in host countries that maintain professional, scientific, or socio-cultural links with countries of origin is essential for adequately addressing challenges such as economic growth and the climate crisis, among others, which require interaction between different participants with in international governance. The establishment of associations of nationals or professionals has a positive effect on the assimilation of migrants into the local community and on the prospects of linking other migrants in the construction of social fabrics of collective and cooperative work (Epstein & Heizler, 2016).

Scientific diaspora networks are defined as the connection that links people of a particular nationality or professional background in a host country (Butler, et al., 2022) and develop a particular form of governance or administration of financial, technical, and human resources. Joint projects between scientific associations even have added value in mitigating contemporary geopolitical tensions between the United States and China over food, energy, and drinking water supplies (Prieto & Scott, 2022).

Diaspora associations and organizations have strategic value in themselves, as they contribute in different ways to strengthening the relationship between actors of international governance in different multilevel and multi-actor scenarios. Thus, diaspora associations help strengthen the relationship between public and private actors, promote scientific development in their countries of origin, and contribute to access to high-level scientific networks (Echeverría-King, et al., 2022).

The complexity involved in strengthening relationships between key participants with the aim of improving competitiveness and knowledge-building capacity makes the diaspora an asset in building the knowledge society of the 21st century. In the words of Casalet Ravenna, the mobility of international migrants and the creation of diaspora networks abroad become "a critical asset for building a knowledge society, due to the potential for innovation and collaboration to find creative solutions to the complex problems of economic growth and competitiveness in developing countries" (Casalet Ravenna, 2008, p. 281).

Along the same lines, when recognizing the scientific diaspora as an evolving transnational community, it should be noted that among its main activities is the production and circulation of knowledge for the benefit of its countries of origin (Foray, 2004).

The use of the diaspora is a testament to the importance of international cooperation, reflected in diaspora networks as agents of development, demanding structures of opportunity and appropriate environments for their potential to be maximized (Tejada, 2012).

Additionally, the recognition of the diaspora as a transnational community requires observing reciprocal and permanent exchanges between those who left and those who remain in their place of origin, through dense social and symbolic exchanges across space and time (Tejada, 2012).

The benefits of properly utilizing and taking advantage of the diaspora have various implications. Four can be highlighted initially: first, through the transfer of monetary resources to the country of origin; second, the increase in the flow of trade in goods and services between the country of origin and the destination country; third, the diaspora is a vehicle for addressing technical or bureaucratic barriers that prevent the expansion of foreign direct investment flows; and last but not least, the diaspora contributes to the transfer of knowledge, technology, and innovation (Epstein & Heizler, 2016), that is, to the effective circulation of knowledge.

Some authors have even recently suggested that the inclusion of the diaspora can also be carried out remotely. This can be done through participation in consulting, auditing, and legal advisory services, or even through links to training programs, virtual education, and mentoring with local students to develop technical and professional skills (Blyde, Busso, & Ibáñez, 2020).

Under the proposal outlined here, the ability to adequately manage the scientific diaspora reflects the implementation of various mechanisms by the state that demonstrate a symbolic nature and

commitment to the state (Zapata, 2022), as well as institutional and public policy arrangements aimed at efficiently utilizing the potential and capacity of this important segment of the population that is abroad but wishes to remain connected to their country of origin.

3. Methodology

This document is based on the use of a qualitative, descriptive, and exploratory methodology, whose purpose is to understand the relationship between the scientific diaspora, the definition of science diplomacy, and public policy actions led by the state and its institutions at the central level, that is, at the highest institutional level. In this sense, the qualitative methodology allows us to understand the historical trajectory and the way in which actors interact over a given period of time (Mahoney & Goertz, 2006), in this case, the advances that have been made in the last two decades with the aim of linking the scientific diaspora as an actor in the achievement of objectives set by the State. This methodology allows us to understand both the characteristics and the results of the selected case (Mahoney & Goertz, 2006), that is, the Colombian case.

As a result of the above, a single case study, namely the Colombian experience, is used for this research. A case study is understood to be the analysis of the characteristics of a particular phenomenon selected for in-depth understanding (Vennesson, 2008). This means that the case study is the manifestation of the most notable features of a specific object, in this case, the actions of the Colombian case in terms of scientific diaspora and its relationship with the scientific diplomacy actions carried out by the State and its institutions.

The case study describes the interactions with specific examples and details, invites questions about how the phenomenon under study unfolds, and raises critical questions for the future development of the phenomenon analyzed (George & Bennett, 2005). Likewise, the case study is exploratory in that it generates hypotheses not previously considered or not considered in previous studies, with the aim of generating new questions for future developments (George & Bennett, 2005; Vennesson, 2008).

As noted, this case study is descriptive in that it provides a systematic review of its constituent elements (Vennesson, 2008), based on an analysis of primary sources such as —laws, strategic documents, and interviews— and secondary sources (literature review), to discern the contours of public action on the scientific diaspora in Colombia. The descriptive case study delves into the need to understand the context and decision-making patterns among the actors involved (George & Bennett, 2005).

Text analysis was used in this single case study, particularly of the laws and strategic documents of the Ministry of Science and Technology and the Ministry of Foreign Affairs, as well as the National Planning Department, which form the basis of public policy. Additionally, semi-structured interviews were included, a flexible mechanism that facilitates understanding the experience of people who participated in the phenomenon under analysis, as well as their specific participation in the configuration of the policy (Gibbs, 2007). Semi-structured interviews also become a social interaction between interviewee and interviewer, in which the latter becomes an actor who probes, through open-ended or probing questions, issues that the former would not respond to in a focus group, or that they do not feel comfortable expressing through other mechanisms, but rather through a confidential and private meeting with the interviewer (Alles, Guilbaud, & Lagrange,

2018). The people interviewed, as shown in the table No. 1, reflect a diversified composition of profiles, with the purpose of their contributions being complementary.

Table No. 1
Interview´s participant

Participants	Expertise
Participant 1	Former leader of internationalization from the Ministry of Science, Technology and Innovation. Master's degree in international Affairs.
Participant 2	Ex-representative from Colombian alumnus in Columbia University (2022-24) Ex leader of Technology and communication from the Ministry of Communications
Participant 3	PhD holder, more than 15 years leaving in México, Representative of Red Académica y Científica de Colombia en México.
Participant 4	PhD, professor, also representative of Representative of Red Académica y Científica de Colombia en México.

Additionally, the analysis of the diaspora was complemented with information from Harvard University's interdisciplinary public policy program Growth Lab, which produces free and publicly available information on economic development and public policy for informed decision-making (Growth Lab, 2025).

4. Case specifications

For Latin America and the Caribbean (LAC), whose countries are developing, the relationship between migration, remittances, and development has been a common way of understanding the effect of migration and the diaspora on contributing to local development. Recently in South America, there has been a consolidation of diasporas, driven by the COVID-19 pandemic and an economic and social crisis in developed countries, which has contributed to South American diasporas becoming structural and participating in varying ways in the creation and development of public policies to connect with and encourage the participation of this population (International Organization for Migration, 2022).

In this regard, the skilled diaspora is even developing "new forms of cooperation in science, technology, and innovation, through virtual, temporary, and/or circular mechanisms, that is, devices for knowledge transfer through distance learning, agreements between research centers, and stays and exchanges of qualified personnel" (International Organization for Migration, 2022, p. 14).

At the South American level, a virtual survey was conducted in 2021 through the *idiaspora* platform, which collected more than 160,000 responses. In the survey, 51% of participants recognized that scientific and technological cooperation was among the most significant contributions of their compatriots abroad (International Organization for Migration, 2022).

Although Colombia has been characterized as a country of emigrants for the last three decades, there has recently been growing interest in broadening the view of the Colombian diaspora. Beyond a perspective that associates it with an economic perspective based on remittance transfers (Tejada, 2016), there is now a broader and more holistic view in which scientists abroad can contribute more to the country's development.

This situation is pressing, given that, according to the IOM, Colombian diaspora associations focus mainly on helping compatriots abroad (28%), promoting Colombian identity (24%), supporting social projects (17%), and supporting victims of the Colombian armed conflict (15%) (International Organization for Migration, 2022), among other things. Therefore, identifying and mapping the Colombian scientific diaspora is necessary to improve competitiveness and integration into global scientific knowledge networks, as well as to gain a more accurate understanding of the appropriate and necessary links for solving common and local problems.

Through the *Colombia nos Une*[1] program, the state has promoted the building of commitment and engagement among the diaspora by expanding social protection programs and services, facilitating the purchase of housing in Colombia from abroad, and building Colombian communities abroad, among other initiatives (Zapata, 2022). However, this program with an economic and social focus has not necessarily contributed to reducing the development gaps between Colombia and developed countries. This highlights the need to consider alternative models that contribute to strengthening the relationship between the diaspora and development, based on a more holistic approach.

As a result, several strategic documents have taken note of this transformation. Firstly, the report by the Commission of Experts, Colombia towards a knowledge society, published in 2020, highlights that "the Colombian diaspora is an indispensable asset in expanding access to knowledge, quality scientific education, and peer publications and collaborations to inspire future generations of Colombian scientists" (Ministry of Science, Technology, and Innovation, 2020). Here we see a state intention to broaden the strategic vision of the diaspora in the 21st century, with the aim of effectively considering it a necessary link in the formation of an effective knowledge society in the 21st century.

This document also proposed the strengthening of an institutional structure, currently headed by the Ministry of Science, Technology, and Innovation (MinCiencias), capable of simultaneously managing both those Colombians who decide to return to their country of origin and those who have decided to remain in their host countries but maintain links with companies, universities, and think tanks in Colombia (Ministry of CTI, 2020). As it was mentioned by the participant No. 1 "Despite a clear mandate derived from strategic documents and the Ministry's mission, no structural action to support the Colombian diaspora has been implemented in practice. Changes in the administration's strategic perception impact the prioritization of the diaspora as an electoral asset, as a short-term response, but not as a strategic or long-term asset" (participant No. 1).

1 This program is a Program affiliated with the MRE, created by Resolution 3131 of 2004, whose purpose was to promote the study of the Colombian diaspora to understand its needs and design public policies that respond to its demands.

Previously, Law 1465 of 2011 established the National Migration System in Colombia, which makes mention of the Colombian diaspora. Article 3 establishes the general principles of this system, stating that the participation of the Colombian diaspora is essential to the country's future and that the exercise of active and passive voting rights must be guaranteed (Congress of the Republic, 2011). This highlights the relevance of the diaspora in terms of electoral needs (the right to vote) and economic needs, related to the transfer of remittances to the country.

A significant leap forward came 10 years later with the enactment of Law 2136 of 2021, also known as the *Comprehensive Migration Policy*. Article 3 recognizes migration as a multidimensional and multicausal reality that has led to the formation of a Colombian diaspora around the world (Congress of the Republic, 2021). Article 4 promotes the integration of migrants into society and culture as a principle, both for Colombian migrants and foreigners in Colombia. Similarly, Article 47 states that the *Colombia Nos Une* program will implement programs for the involvement and participation of the Colombian diaspora through business, cultural, academic, research, technological development, and innovation activities and projects, carried out by public and private entities throughout the country (Congress of the Republic, 2021).

According to the participant's perception, *Colombia nos Une* program is a key asset, but it has an insufficient action, in this regard "citizen services abroad do not consider the needs of the scientific diaspora. There is a clear intention to implement general, but not specific, actions on scientific development. Hence the importance of promoting Colombian organizations abroad" (Participant No. 3). Also, when you see for example the Mexican case, we understood that during the last decade there were an increase in the number of academic and student from Colombia. We try to connect a disperse and growing population" (Participant No. 4).

The law also makes explicit mention of the need to include science diplomacy and the diaspora as valuable assets in the future development of the country. Article 27 states that scientific diplomacy is the use of scientific collaborations to address common problems facing humanity, as well as to build constructive international alliances (Congress of the Republic, 2021). Additionally, Article 88 states that the MRE and MinCiencia will strengthen national scientific interests through diplomatic missions and foreign policy, enabling the creation of scientific networks and infrastructure, access to funding resources, the promotion of new scientific industries, knowledge exchange, and the governance of scientific diplomacy in accordance with the national science, technology, and innovation system (Congress of the Republic, 2021).

The *Comprehensive Migration Law* reflects a belated but significant advance in incorporating a perspective of the diaspora as a multidimensional and multicausal phenomenon, providing a conception that goes beyond the elements of economic attraction and contributes to the incipient development of a notion of scientific diplomacy, as well as to the joint development of actions by the MRE and MinCiencia to address, through policies and programs, the needs and interests of the large Colombian diaspora scattered across several countries but wishing to contribute to the country's development, either from their place of residence or by returning.

Through Planning Document Compes 4069, the National Policy on Science, Technology, and Innovation 2022-2031 was established, opening the door to further development of other state instruments related to the concept of scientific diaspora. In this regard, it is recognized that the country has low dynamism and insertion in transnational STI networks, including negative rates of funding flows, because of the absence of appropiate cooperation and coordination mechanisms,

as well as the informality and dispersion of the Colombian scientific diaspora (National Planning Department, 2021). This fact calls for concrete actions to correct the way in which public institutions relate to organizations of Colombian professionals and scientists abroad, through the creation of mechanisms appropriate to the needs of scientific communities and the cross-cutting challenges facing the country.

The document calls for the design of a joint strategy between various public entities to improve the country's scientific and technological performance. In this way, MinCiencias, the MRE, and the Presidential Agency for International Cooperation "will implement a policy of internationalization and scientific diplomacy that promotes scientific and technological cooperation on priority issues for the country" (National Planning Department, 2021, p. 63). This inter-institutional work is a priority and calls for the design and implementation of programs that require in-depth coordination with the aim of promoting researcher mobility, including national researchers in global knowledge networks, improving the exchange of experiences and practices in South-South and triangular cooperation, and making better use of the scientific diaspora (National Planning Department, 2021).

The document is influenced by current government policy, as it proposes that Mission-Oriented Policies can be promoted through the use of scientific diplomacy instruments and frameworks. This is considered a key tool for addressing the challenges of globalization. The text also urges MinCiencia to design an internationalization policy and a scientific diplomacy agenda that promotes scientific and technological cooperation on priority issues for the country (National Planning Department, 2021).

Another relevant strategic document is Conpes Document 4085, which establishes the internationalization policy for regional productive development. The document highlights two relevant elements: on the one hand, it recognizes the value that the Colombian scientific diaspora can have in facilitating the transfer of knowledge to society and the country's productive sector and, on the other hand, it recognizes certain milestones, such as the establishment of nine scientific diplomacy nodes, progress in the formulation of a public policy for the internationalization of STI and scientific diplomacy, and the launch of a call for Colombian doctoral students to spend time at the prioritized scientific diplomacy nodes (National Planning Department, 2022).

Additionally, in 2021, the IOM published the report *The Colombian Diaspora as an Agent of Sustainable Development*, which sought to highlight the importance and potential of this population to ensure the country's full development in the medium term. This document points out that, although there is no precise measurement, it is recognized that the Colombian diaspora accounts for approximately 10% of the population, scattered across five continents and originating from the most populated and prosperous areas of the country, such as Bogotá, Valle del Cauca, and Antioquia, the coffee-growing region, and the departments that make up the Caribbean coast (International Organization for Migration, 2021). This situation makes it more difficult to characterize the scientific diaspora and its contribution to the country's development.

Likewise, scientific and doctoral training has been a constant but weakly articulated concern within the scientific diaspora strategy. Colombia has implemented various programs, such as the *Red Caldas*, which operated between 1991 and 2006, coordinating scientific training and links to international research centers in Europe, America, and other regions, contributing to the graduation of more than 1,800 PhDs (International Organization for Migration, 2021). For some,

the *Red Caldas* had a mixed success, more successful for the officials who administered the network than for the users, although both groups agree that it created a sense of community, a real connection inside and outside the country, and a closer bond between users (Pellegrino, 2015).

Other programs have also been implemented. *Es tiempo de Volver* was executed in 2014 as a mechanism to promote the return of scientists with doctoral degrees to the country or to connect with those who maintain their residence abroad but want to maintain a relationship with the country. Finally, *Colombia Científica* has contributed to the doctoral training of young Colombians around the world since 2017 (International Organization for Migration, 2021). This initiative from the public policy has an initial attractiveness, but during the time it lost traction and capacity to fulfill their mission. In this sense, "The initiative had an almost personal push, but it has not been sustained over time due to budgetary difficulties and the interest of the constant changes that occur internally" (Participant No. 1).

5. Lesson and learning

The case study of Colombia provided insight into how the scientific diaspora has evolved, as well as the challenges that remain to be resolved in order to find an approach that is appropriate to the country's characteristics for the management of migration governance in general, and the scientific diaspora in particular. Colombia is currently a country with enormous potential due to its migration profile. According to the Migration Data Portal, as of June 2024, 3.6 million Colombians live abroad, or 5.8% of the population (Migration Data Portal, 2025). By 2023, remittances sent by Colombians abroad accounted for 2.8% of the national GDP and, according to the OECD, in 2022 more than 5,000 students left the country in search of tertiary education, thus constituting a transitory scientific diaspora (OECD, 2024).

Analysis of statistical information collected by Growth Lab indicates that the search for a better quality of life, integration into global knowledge networks, and better opportunities for education and professional development are the main motivations for leaving the country and wanting to remain abroad (Growth Lab, 2025).

It should also be noted that the Colombian scientific diaspora is a solid and well-established group. Fifty-one percent of the sample (341 responses) has lived abroad for more than five years and 43% for between three and five years, which shows that more than 90% intend to remain in foreign countries (Growth Lab, 2025). Furthermore, from a demographic point of view, 80% of the Colombian diaspora abroad is in the economically active population range, confirming that they can participate in strengthening socioeconomic ties between external and internal actors to improve the productivity and competitiveness of the national economy. Furthermore, 47% of the population surveyed has training in the areas of engineering, architecture, and international business (Growth Lab, 2025).

It is interesting to note that when faced with the possibility of returning to or committing to their country of origin, the respondents' answers offer a mixed picture. In this regard, when asked about their level of commitment, respondents indicated that if they were to return to their country of origin, they would be inclined to start a business as the best option, while if they were to remain abroad, offering professional support, investing in Colombia, or mentoring younger people would

be the most representative options (Growth Lab, 2025). which shows that although few people who are settled abroad would like to return, this does not mean that those who wish to remain abroad cannot perform certain functions from there to contribute to the country's development.

Also, according to the participant No. 2, "in the US case, if you finished what you came to do, and you can stay as a professional, it is very unusual that you wanted to return to Colombia. The flexibility, the professional broad space that you could open, also the networking is the factor that made it very attractive in this highly competitive environment" (Participant No. 2). That reflection made room to another public policy debate, which means how to nurture the Colombian diaspora abroad. To some extent, "public programs must adapt to a complex and rapidly changing environment, not only locally, but also in the strategically external places, such as the US, Latin America and Europe, where migrations policies changes, social integration sensibilities and differences in domestic growth can affect the ability of national stayed and development a professional curriculum abroad" (Participant No. 4).

Regarding the actions that have been carried out in relation to the scientific diaspora, interesting lessons can be drawn that should contribute to strengthening Colombia's experience based on the actions implemented by the State. First, from an institutional perspective, Colombia has identified that the scientific diaspora has potential, which has been strengthened over the years but requires more consistent actions with the country's migratory reality. Although the strategic documents analyzed highlight the importance not only of the diaspora but also of scientific diplomacy, in practice there is a need to deepen and consolidate actions in both the Ministry of Science and the Ministry of Foreign Affairs.

In this regard, actions targeting the diaspora are relatively recent, as they have been in place for less than 10 years, indicating a delayed response by the State and requiring appropiate coordination within the ministerial structure, as well as among its working groups. The continuity of the State's actions over time becomes a central element in building trust among the different actors involved in migration governance and, with it, the incorporation of the scientific diaspora as an additional actor in promoting the growth and capacity development of the country of origin. Additionally, the participation of other instances, such as the private sector, civil society, and academia, has not been implicit in the actions implemented, resulting in a low level of citizen engagement and participation.

Secondly, legal advances have been noteworthy, but they must be more robust so that, at the highest level, there is a clear orientation of the public policies that the State intends to develop in the medium and long term. The establishment of the Migration Law, Science, Technology, and Innovation Policy are important steps forward, insofar as they incorporate some explicit provisions on science diplomacy, on the one hand, and the scientific diaspora, on the other. However, translating the mandate and institutional objectives into concrete and permanent actions within MinCiencia or the Ministry of Foreign Affairs has not been consolidated expeditiously. It is therefore necessary to create a permanent structure for analyzing the scientific diaspora, capable of managing and administering its interests, technical and financial needs, and its projection in sectoral and national policies, both in science, technology, and innovation and in foreign policy.

In addition while, MinCiencia leads STI policy and, with it, the implementation of a national scientific diplomacy strategy, the Ministry of Foreign Affairs is responsible for representing the State before third parties. This requires weaving a better collaborative understanding, with the aim of adequately structuring the joint interests between STI and foreign policy.

Thirdly, Colombia has made significant progress in understanding and applying the concept of science diplomacy. Various activities, mainly carried out by civil society, demonstrate greater ownership by different key participants. Keeping this in mind, public leadership is needed to weave together common and collective interests among those engaged that make up STI governance in order to consolidate medium- and long-term objectives. Building a science diplomacy strategy is a mandatory step for the progress of the scientific diaspora. Likewise, strengthening existing institutional channels for serving Colombians abroad, such as *Colombia nos Une*, or creating others that address the needs of the scientific diaspora, are also essential for leveraging the diaspora in actions that go beyond sending remittances.

Finally, as previously noted, building trust between the diaspora and the state is necessary for the former to contribute to the growth and capacity building of the latter. Therefore, the state must take an active role in promoting and developing actions that contribute to the consolidation of the scientific diaspora in the countries and regions of the world where it is most concentrated. In other words, public action must also consider the promotion and creation of scientific civil society organizations of Colombians abroad, with the aim of promoting the interests of these communities abroad and enabling them, in different ways, to contribute their experience, knowledge, and capacity to the development of their country of origin

6. Policy implications

The scientific diaspora can be a treasured asset for the development of LAC countries, but specific actions are required to translate its potential into concrete realities. Other countries in other latitudes have changed their position upon realizing the value and appeal of the diaspora, especially the scientific diaspora, when it is integrated as an additional contributor in migration governance and long-term relationships of mutual trust are cultivated.

First, the Colombian case showed a delayed institutional response to the needs of a population group that has grown over the years. On the one hand, *Colombia nos Une*, which is run by the Ministry of Foreign Affairs, has become the most important instrument for assisting migrants abroad.

However, it does not have a specific component to address the needs or interests of the Colombian scientific diaspora abroad. On the other hand, the training programs abroad undertaken by MinCiencias have not been continuous or regular over time and, therefore remain dependent on the political will of the moment or the ability of those responsible for managing budgetary resources at the institutional level to interact. Although there was the experience of the Caldas Network, as well as other programs that even predate the formation of the Ministry of STI, there has been no adequate continuity or regularity, which has led to a loss of confidence on the part of the diaspora in the actions that the State intends to implement.

In this regards, to fulfill the requirements not only of Colombian diaspora, but scientific diaspora, Colombia will need to nurture a new governance for migration inside and outside with a differentiated perspective. It must consider “that the needs of Colombian professionals in the United States, for example, are not the same as those of that population in Latin America or Europe” (Participant No. 1).

For this reason, structural work is needed to link existing programs with new trends in assistance, support, and the development of joint and collaborative work between the State and the Colombian scientific diaspora. In this sense, institutional tensions and the lack of harmonization between programs impact the ability to understand and utilize the capacity of the Colombian scientific diaspora in various ways.

Second, the definition of a clear scientific diplomacy strategy precedes a more precise focus on the scientific diaspora. As noted, various strategic documents and laws of the republic recognize the need to create and implement a link between the scientific diaspora and the processes of technical capacity building, foreign policy interests, and contributing to the country's development beyond the sending of remittances. However, in practice, scientific diplomacy actions have been intermittent at the institutional level on the part of the State, influencing the recognition of scientific diplomacy as a priority issue that impacts the development agenda and governance of STI on a multilevel and multi-actor scale, but without achieving depth and structural links between the various actors in the STI ecosystem.

In this regard, for Colombian professional organizations abroad, "the foreign affairs objectives are not well documented or publicly encouraged by the embassies. So, if the state communicates better, organizations may eventually gain interest in participating. It's difficult for embassies to present political or scientific priorities, so they can't expect us to participate in something we don't understand" (Participant No. 3).

In this view, public policy has historically lacked its focus, meaning that, in the words of one participant, "there is no perception in the US of attention to scientific or professional needs, but rather a general focus on citizens. A genuine public policy approach needs to be developed because it doesn't exist for the scientific community established here" (Participant No. 2).

In fact, initiatives such as the creation of the Intersectoral Roundtable on Science Diplomacy (MIDICI, in Spanish) in 2021 have been led by universities, research centers, diplomatic delegations accredited in Colombia, and other civil society organizations, with the aim of discussing, fostering, and developing science diplomacy actions. Although MinCiencia and the Ministry of Foreign Affairs participate institutionally, their work has not taken the needed lead in promoting more profound and structural initiatives, such as effective characterization, regional understanding of their concerns, promoting the association of Colombian professionals abroad, or establishing scientific attachés abroad, which would generate a basis on which to begin to understand and manage the interests and needs of the scientific diaspora.

Third, the appropriation of the diaspora as a dynamic individual in sustainable development and in overcoming common and cross-cutting problems such as adaptation to the climate crisis and strengthening scientific capacities, among others, in a developing country such as Colombia is still a work in progress. In this regard, existing mechanisms must be flexibly adapted to the changing needs of the diaspora and the needs of the country. Strengthening remote links through capacity-building or mentoring programs helps to strengthen the link between the scientific diaspora and development.

In this regard, public leadership must focus on two aspects: on the one hand, continuing to develop the appropriate institutions and mechanisms that generate opportunities and contribute to strengthening the relationship between the state, businesses, and civil society; on the other

hand, both internally and externally, reducing financial and technical barriers and obstacles to the development of joint capacities between Colombian scientists and their counterparts abroad. The link between Colombian nationals internally and externally remains weak.

Finally, the scientific diaspora is a cross-cutting issue for various public policies, such as science, technology, innovation, education, and foreign policy. However, there is no institutional or political instrument that evaluates the effectiveness of both scientific diplomacy and the scientific diaspora, in terms of their contribution to the achievement of the public policy objectives. In other words, in order to expand the role of the scientific diaspora as a strategic participant in the development of different sectors at the domestic level, a cross-cutting and holistic evaluation of the programs implemented is required, in which the successes, errors, and omissions of public action are assessed with the aim of strengthening the available instruments.

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