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The history of Brazil's policies for its scientific and technological diaspora [1]

A história das políticas do Brasil para sua diáspora científica e tecnológica

La historia de las políticas de Brasil para su diáspora científica y tecnológica

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Abstract: In recent decades, an increasing number of developing countries have considered their highly qualified nationals living abroad as a potential asset for national development. This article aims to analyze the history of Brazilian state policies for its scientific and technological diaspora. These are approached based mainly on: documentary research; consult the websites of public bodies; and, bibliographic research. It is argued that Brazil has traditionally interpreted skilled emigration from the perspective of "brain drain" and, therefore, has been slow to look at the scientific and technological diaspora as an eventual source of resources. This paradigm shift only occurred in the 2010s. However, policies for the scientific and technological diaspora were not part of a unitary and coordinated state strategy and almost all of them were discontinued after a few years of being in effect.

Keywords*:* Brazil; Qualified emigration; Brain circulation; Emigration policies; Scientific and technological diaspora.

Resumo: Nas últimas décadas, um número crescente de países em desenvolvimento tem considerado seus nacionais altamente qualificados que vivem no exterior como um potencial ativo para o desenvolvimento nacional. O presente artigo tem como objetivo analisar a história das políticas do Estado brasileiro para sua diáspora científica e tecnológica. Essas são abordadas com base, principalmente, em: pesquisa documental; consulta a sites de órgãos públicos; e, pesquisa bibliográfica. Argumenta-se que o Brasil tradicionalmente tem interpretado a emigração qualificada sob a perspectiva de "fuga de cérebros" e, portanto, demorou a olhar para a diáspora científica e tecnológica como uma eventual fonte de recursos. Essa mudança de paradigma ocorreu apenas nos anos 2010. No entanto, as políticas para a diáspora científica e tecnológica não fizeram parte de uma estratégia estatal unitária e coordenada e quase todas foram descontinuadas após poucos anos de vigência.

Palavras-chave*:* Brasil; Emigração qualificada; Circulação de cérebros; Políticas de emigração; Diáspora científica e tecnológica.

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Resumen: En las últimas décadas, un número cada vez mayor de países en desarrollo ha considerado a sus nacionales altamente calificados que viven en el extranjero como un activo potencial para el desarrollo nacional. Este artículo tiene como objetivo analizar la historia de las políticas del Estado brasileño para su diáspora científica y tecnológica. Estos se abordan con base principalmente en: investigación documental; consulta de sitios web de los organismos públicos; y, investigación bibliográfica. Se argumenta que Brasil ha interpretado tradicionalmente la emigración calificada desde la perspectiva de la "fuga de cerebros" y, por lo tanto, ha tardado en mirar a la diáspora científica y tecnológica como una eventual fuente de recursos. Este cambio de paradigma solo ocurrió en la década de 2010. Sin embargo, las políticas para la diáspora científica y tecnológica no formaron parte de una estrategia estatal unitaria y coordinada y casi todas fueron descontinuadas luego de algunos años de vigencia.

Palabras clave: Brasil; Emigración cualificada; Circulación de cerebros; Políticas de emigración; Diáspora científica y tecnológica.

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Introduction

Modern society has been characterized as a knowledge society (SILVA, BAFFA FILHO, 2000), driven by advancements in communication and information technologies (LASTRES, ALBAGLI, 1999). Science has played a central role in generating modern knowledge and is seen as an explanatory factor for the different production capacities among countries and crucial for the social and economic development of nations, given that knowledge production remains concentrated in a few countries (OLIVEIRA, 2019; SILVA, BAFFA FILHO, 2000). In other words, presently, the global economy is knowledge-based and increasingly reliant on skills in science and technology (S&T) (MEYER, BROWN, 1999).

Since the 1990s, globalization has heightened international migratory flows, particularly of skilled labor (IREDALE, 2001; MARSH, OYELERE, 2018), commonly defined as individuals with a university degree or equivalent experience in a specific field (IREDALE, 2001). Skilled emigrants send different types of economic and non-economic remittances back to their home societies. Among the latter are "technical remittances", referring to the flows of knowledge, skills, and technology derived from migration (KSHETRI, ROJAS-TORRES, ACEVEDO, 2015).

In recent decades, there has been an increasingly intense competition for these individuals, especially in the fields of Science, Technology, Engineering, and Mathematics (STEM), where industrial demand continues to outstrip supply (COHEN,

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2013; MARSH, OYELERE, 2018). As a consequence, a growing number of states have begun devising strategies to mobilize them (COHEN, 2013). Overall, the process of securing the "best minds" differs among countries based on their stage of development: while developed countries aim to retain national talents and recruit others from abroad, developing nations seek to encourage the return and/or engagement of their highly skilled emigrants (MARSH, OYELERE, 2018).

This article aims to analyze the history of Brazilian state policies regarding its scientific and technological diaspora until the middle of the year 2023. It's important to note that only policies targeting these migrants as the primary audience are addressed. Therefore, the focus of this work is not to discuss initiatives that indirectly impact the scientific and technological diaspora, such as dual nationality grants and investment in S&T.

In Brazil, the emigration of qualified labor remains an open topic. Even though few studies have historically analyzed the phenomenon (BALBACHEVSKY, MARQUES, 2009; RAMOS, VELHO, 2011; SILVA, 2008; SANTOS, 2021), the national bibliography regarding the Brazilian government's policy responses is even scarcer (RODRIGUES, 2013; CARNEIRO *et al.*, 2020). To overcome these gaps in the literature, it was deemed necessary to combine the following methodological resources: documentary research, consultation of public agency websites, and bibliographic research. The analysis encompassed all scarce scientific works focused on the theme in Brazil, along with consultation of the limited documents available online and the webpages of Brazilian public agencies involved in policies for the scientific and technological diaspora. Furthermore, data were requested from federal government agencies via the Access to Information Act (LAI).

The text is organized into five additional sections, apart from this introduction. The first section briefly addresses the emigration of highly qualified Brazilians. Following that, the shift in paradigm – from "brain drain" to "brain circulation" – in understanding the impacts of emigration of qualified labor on home countries is analyzed. Subsequently, the policy responses of these countries to the phenomenon are presented. The fourth section identifies and analyzes Brazilian state policies for its scientific and technological diaspora. The text concludes with some final considerations.

The emigration of highly qualified Brazilians

Throughout its history, Brazil was a recipient country of immigrants. Until 1970, the emigration of Brazilians was a sporadic movement. In more recent times, particularly from the 1980s onwards, this flow gained significance, eventually leading to a substantial number of

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Brazilians residing abroad (IOM, CNPD, MTE, 2010). The Ministry of Foreign Affairs (MRE) estimates that, in 2022, this group comprised approximately 4.5 million Brazilians. The countries hosting the largest communities include the USA (1,900,000), Portugal (360,000), Paraguay (254,000), United Kingdom (220,000), and Japan (206,990) (BRASIL, 2023).

The phenomenon of Brazilian emigration is difficult to measure (IOM, CNPD, MTE, 2010). [3] There are no official data concerning the emigration of qualified labor from Brazil (SANTOS, 2021), as information regarding the emigrant profile is limited, particularly concerning education, which is crucial for characterizing the diaspora (CARNEIRO *et al.*, 2020). In 2010, there were 291,510 Brazilians with tertiary education residing in countries of the Organisation for Economic Co-operation and Development (OECD), marking a growth of 102% compared to 2000 (ARSLAM *et al.*, 2014). Although the absolute number of Brazilian immigrants isn't massive compared to the primary source nations[4], Brazil stands out as one of the countries with the highest rate of highly qualified migrants (28.9% of the total Brazilian migrants) living in OECD countries (ARLAM *et al.*, 2014).

However, by the end of the 2000s and the beginning of the following decade, several authors asserted that the "brain drain" remained a marginal phenomenon in Brazil (BALBACHEVSKY, MARQUES, 2009; CASTRO *et al.*, 2012; LOMBAS, 2017; RAMOS, VELHO, 2011). Traditionally, the emigration of doctoral candidates has been comparatively low (RAMOS, VELHO, 2011). According to Lombas (2013 *apud* LOMBAS, 2017), between 1996 and 2007, the proportion of individuals who received doctoral (full and sandwich) and post-doctoral scholarships in the USA, France, and the United Kingdom and stayed abroad did not exceed 5%. Therefore, it can be concluded that historically, Brazil doesn't experience substantial losses of scientific talents abroad, as the predominant movement involves circulation, with scholars sponsored by the Coordination for the Improvement of Higher Education Personnel (CAPES) and the National Council for Scientific and Technological Development (CNPq) returning to the

[3] On one hand, records regarding the departure of Brazilians are unsatisfactory; on the other hand, few countries have reliable statistics on the quantity of immigrants within their territories, given that many are irregularly situated. This explains why information regarding the number of Brazilians residing abroad is contradictory, and depending on the source, the results show significant variation (IOM, CNPD, MTE, 2010).

[4] With nearly 18 million people living abroad, India has the world's largest emigrant population. Mexico is the second most significant country of origin, with around 11 million. Russia stands as the third-largest country of origin, closely followed by China (approximately 10.8 million and 10 million, respectively). The fifth most notable country of origin is Syria, with over eight million people residing abroad (IOM, 2022).

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country after completing their activities abroad (BALBACHEVSKY, MARQUES, 2009; LOMBAS, 2017). [5]

Shortly after Brazil experienced continuous funding for postgraduate research between 2007 and 2014, in 2015, an economic crisis, followed by a political crisis leading to the impeachment of President Dilma Rousseff, resulted in significant budget cuts for science, technology, and innovation (ST&I), including resources for research grants and scholarships in almost all federal and state research funding agencies (MOURA, CAMARGO JUNIOR, 2017; OLIVEIRA, 2019). Although there are no scientific articles yet analyzing the impact of this context on the emigration of qualified labor, a series of news reports have pointed to the growth of this phenomenon in recent years.

From the 2000s onward, there has been a self-organizing movement within Brazilian diaspora networks in science, technology, and innovation (ST&I) structures abroad (CARNEIRO *et al.*, 2020). The fact that the USA traditionally receives the most Brazilian students going abroad (CASTRO *et al.*, 2012) and grants doctoral degrees to Brazilian scholars (CGEE, 2015) helps explain why the first network of the Brazilian scientific diaspora, Integra Brazil, originated in Silicon Valley in 2006 (COUTO E SILVA, SOUZA, 2008). Since then, several other networks have been organized and established in different countries (CARNEIRO *et al.*, 2020).

From "brain drain" to "brain circulation": a paradigm shift

The first discussions about academic and scientific mobility date back to the 1960s when the emigration of European researchers and educators to the United States, especially from the United Kingdom, grew exponentially. As a consequence, in 1963, the Royal Society of London published a report referring to the exodus of British scientists to the American territory as a "brain drain" (BRANDI, 2006). In the subsequent decades, the debate about the emigration of academics and professionals from developing countries to developed ones dominated discussions (FRANÇA, PADILLA, 2019), and the term "brain drain" became commonly used to describe these flows (BRANDI, 2006). According to this perspective, prevalent until the early 1990s, it was considered a unidirectional, definitive, and permanent migration of qualified individuals from

[5] According to the main national agencies supporting postgraduate studies and research, CAPES and CNPq, the majority of their scholarship recipients return to the country after completing their proposed activities abroad, relying on continuous information in their records confirming the use of the return airfare (LOMBAS, 2017).

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developing countries to industrialized ones (MEYER, 2003). Its proponents believed that the phenomenon would benefit the host countries while bringing adverse consequences for the development of the countries of origin (BRZOZOWSKI, 2008; MEYER, 2003). Consequently, they fostered an exclusively negative view of qualified migration by restricting their analysis solely to the negative impacts that could be generated in the nations of origin (MEYER, 2003; SANTOS, 2021).

However, more recent contributions have identified different channels through which qualified emigration can bring benefits to the countries of origin. Among these are "brain gain", "brain circulation", and network effects (KONE, ÖZDEN, 2017; MARSH, OYELERE, 2018). Starting from the late 1980s, the emergence of the concept of "brain gain" introduced the idea that "brain drain" is not always detrimental to the countries of origin (BRZOZOWSKI, 2008, p. 2), and highly qualified emigrants can be seen as a potential asset rather than a definitive loss (MEYER, BROWN, 1999). This hypothesis gained prominence in the mid-1990s and predicts long-term positive effects of the phenomenon in cases of: stimulating investment in education; contributing to global economic integration through the sending of financial and technological remittances; growth in foreign direct investment; and return (KONE, ÖZDEN, 2017). In certain circumstances, when gains outweigh costs, the phenomenon of qualified emigration could be a "blessing in disguise" (BRZOZOWSKI, 2008).

It is now widely recognized that it would be more accurate to speak of "brain circulation" rather than "brain drain". In the current knowledge society, globalization has made international temporary mobility commonplace (DAUGELIENE, MARCINKEVICIENE, 2009). According to this new perspective, this "brain circulation" would benefit all involved parties – countries, institutions, and individuals (DAUGELIENE, MARCINKEVICIENE, 2009; MEYER, 2003; SAXENIAN, 2002). For this to happen, migrants wouldn't necessarily need to permanently return to their country of origin but rather remain consistently linked to it (SAXENIAN, 2002). Meyer (2003) suggests this shift occurred due to drastic changes in the conditions governing mobility, including new forms of communication, transportation, geopolitics, intercultural relations, and trade, causing qualified emigration to lose some of the traditional characteristics that led to it being characterized as "brain drain". [6]

[6] "For example, it may be temporary - with occasional returns to the country of origin – rather than permanent; it is multi-directional instead of unilateral; and, being a global movement, it affects developed as well as developing countries. Furthermore, the increased ability to interact at a distance helps maintain umbilical links with regions of origin, in contrast to the past when a break with such a region was often total." (MEYER, 2003, s.p.).

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In the current phase of globalization, "the key issue has become not where people are physically located but what contribution they are able to make to the social, cultural, and economic development of the countries with which they identify." (RIZVI, 2005, p. 189). For instance, scientific diaspora networks might solidify technical cooperation, the exchange of financial and technological resources between countries, and the generation of transnational projects to accelerate scientific and technological development (SANTOS, 2021). [7]

Presently, the widely held notion is that the global circulation of skilled workers cannot be avoided, even if it were considered desirable (RIZVI, 2007). Consequently, what prevails as a research agenda and in the formulation of public policies is no longer about preventing highly skilled individuals from developing countries from emigrating to developed nations but rather how to derive benefits from the international circulation of "their" brains to leverage economic development (RIZVI, 2007; SANTOS, 2021). However, the potential to gain positive externalities from the "brain drain" does not imply that this phenomenon is inherently beneficial for developing countries (SANTOS, 2021).

The political responses of the countries of origin

The mobility of scientists and the circulation of scientific knowledge from one national or regional context to another have significant political consequences (DAVENPORT, 2004), giving rise to various types of policies and programs to encourage or regulate these flows (VIDEIRA, 2013). The responses from the countries of origin can be grouped into two basic approaches, "brain drain" or "brain gain", depending on how they interpret the phenomenon (MEYER *et al.*, 1997).

Countermeasures for the "brain drain" issue were dominant between the 1960s and 1980s and mainly focused on two policy options for countries of origin: taxation and conservation (GRUBEL, 1968; MEYER *et al.*, 1997). Taxation received considerable attention during the latter half of the 1970s and the early part of the 1980s (BHAGWATI, 1976 *apud* MEYER *et al.*, 1997), with the rationale that it would reduce the monetary rewards received by emigrants and compensate the country of origin for the investment made in their education (GRUBEL, 1968).

However, this kind of policy never materialized and practically ceased to be considered by the late 1980s (MEYER *et al.*, 1997). Several countries also implemented conservation

[7] As highlighted by Meyer and Brown (1999, p. 12), despite these relationships having occurred in the past, "[w]hat is new today, is that these sporadic, exceptional and limited links may now become systematic, dense and multiple".

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policies aiming at retaining or recovering qualified professionals (MEYER *et al.*, 1997). These can be divided into three subcategories: retention through educational policies, retention through economic development, and restriction of international mobility (LOWELL, FINDLAY, 2001). While the first two aim to alleviate the causes behind these movements (MÁRMORA, 1998), the latter seeks to hinder their nationals from finding work abroad (LOWELL, FINDLAY, 2001). These initiatives failed to bring viable or effective solutions (MEYER *et al.*, 1997).

Strategies based on the idea of "brain gain" emerged as the limitations of the aforementioned policy options became apparent. Their emergence is also linked to the increasing importance of S&T in national development planning (MEYER *et al.*, 1997). According to this perspective, there would be two ways to promote "brain gain": through the return of emigrants to the country of origin (return option) or their remote mobilization and association with its development (diaspora option) (MEYER, BROWN, 1999).

The return option emerged in the early 1970s and was widely implemented in the 1980s and 1990s (MEYER *et al.*, 1997). Return policies can be permanent or temporary (OLARTE, 2015). In the case of the former, the aim is to encourage and facilitate the return of researchers with expertise in strategic areas. Applicants commit to staying in the country for a specific period to build human capital and engage in projects that benefit it. In turn, the country of origin assumes commitments to the migrant (e.g., remuneration, research resources, health plans for them and their family, etc.) (OLARTE, 2015). However, convincing the emigrant to return permanently might not be an easy task (SIAR, 2013). Therefore, as an alternative to repatriation, countries of origin also create temporary return policies aimed at reaping benefits from members of the diaspora. In these cases, resources are invested in research projects involving members of the scientific diaspora and established research groups in the home country, as well as in projects that connect agents from the country's private sector with national researchers residing abroad. This approach also includes promoting short or long-term stays where national researchers residing abroad come to the home country to support knowledge transfer processes or strengthen human capital (OLARTE, 2015). [8]

[8] Return policies differ from conservation policies because, in the case of the former, "the recovering of highly qualified professionals is part of a comprehensive development policy, including and often integrating scientific, technological and economic dimensions." (MEYER *et al.*, 1997, p. 287). To a large extent, this explains why the most successful cases of return policy have occurred in the Newly Industrialized Countries, which already had advanced industrial and S&T sectors where the workforce could be effectively employed (for example, India, Singapore, South Korea, and Taiwan) (MEYER *et al.*, 1997).

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The diaspora option is more recent[9] and stems from a different strategy. It starts from the premise that, regardless of how well-crafted return policies are, most emigrants probably won't return, at least in the short term. However, they might still be concerned about the development of the country of origin due to cultural, family ties, among other reasons. The aim is to establish connections so they can be effectively and productively linked to its development, without any temporary or permanent physical return (MEYER, BROWN, 1999; THORN, HOLM-NIELSEN, 2008). Thus, through emigrants, the country of origin can gain access not only to their individual embodied knowledge but also to the socio-professional networks in which they are embedded abroad (MEYER, BROWN, 1999). A crucial advantage of the diaspora option is that it doesn't depend on massive prior infrastructure investment, as it involves capitalizing on existing resources. Therefore, these policies can bring significant benefits to developing countries at a relatively low cost and are available to any state willing to undertake the social, political, organizational, and technical effort to mobilize its diaspora (MEYER, BROWN, 1999; THORN, HOLM-NIELSEN, 2008; VIDEIRA, 2013).

Within this debate, diaspora networks have been considered key tools for engaging members of the scientific diaspora (CARNEIRO *et al.*, 2020). [10] Therefore, governments of countries of origin have created and/or supported these initiatives (OLARTE, 2015; VIDEIRA, 2013). These networks bring together members of the scientific diaspora through online platforms that include databases of researchers by areas of expertise and provide information on events, calls, job offers, and opportunities to collaborate on projects. They also offer tools that enable national researchers residing abroad to establish contacts, interact, exchange documents, and reach out to representatives of the productive sector in their home country (OLARTE, 2015).

Another engagement initiative is organizing gatherings in the countries of origin and/or destination. When held in the former, these initiatives facilitate contacts and collaborations between the scientific diaspora and researchers, institutions, and companies from the country of origin. These meetings can be diaspora conventions, encouraging collaborations among researchers and participation in projects benefiting the country of origin, or seminars on specific topics, facilitating knowledge transfer

[9] However, precedents of the diaspora option can be traced back to the 1870s during the Meiji era in Japan. At that time, expatriate students in Europe were organized to channel scientific and technical knowledge back to their home country (MEYER *et al.*, 1997).
[10] Meyer and Brown (1999) classify these networks into five categories: student networks, local associations of qualified expatriates, collective expert assistance through the Transfer of Knowledge Through Expatriate Nationals (TOKTEN) program by UNDP, and intellectual/scientific diaspora networks.

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between national researchers residing abroad and those in the home country. When organized outside the home territory, these gatherings aim to engage the scientific diaspora residing in a particular location or approach a reference country in a specific knowledge area (OLARTE, 2015).

Countries of origin can also offer awards to diaspora researchers who have significantly contributed to strengthening their scientific and technological capacities or whose research has resulted in economic, social, or environmental benefits for the country itself (OLARTE, 2015).

Finally, countries of origin have used Science Diplomacy to engage the scientific diaspora (PANDEY, SRINIVAS, DEEPTHI, 2022). Diasporas are being sought and engaged as potential diplomatic actors to perform central diplomatic functions such as communication, representation, and negotiation (HO, MCCONNELL, 2019). Their networks, such as NGOs, civil society organizations, and multinational corporations, are increasingly relevant and influential actors in international relations (BURNS, 2013). Through specific programs and policies, governments of countries of origin can use the scientific diaspora to expand the number and effectiveness of scientific agreements they maintain with other countries (PANDEY, SRINIVAS, DEEPTHI, 2022). According to Burns (2013, s.p.), "Scientific diasporas are vital to a new architecture of cooperation that will allow us to invent, create, innovate, and solve problems together."

The previously analyzed policy options of the country of origin do not oppose but complement each other and can be better understood through Table 1:

Table 1 - Origin Countries' Policies for Their Qualified Emigrants

Approach	Policy category	Implemented policies
"Brain Drain"	Taxation	Taxation of emigrants
	Conservation	Restriction of international mobility; Retention through economic development; Retention through educational policies.
"Brain Gain"	Return Policies (return option)	Promotion of permanent return; Promotion of temporary return.
	Engagement Policies (diaspora option)	Creation of networks; Mapping; Granting of awards; Organization of diaspora conventions and seminars (countries of origin and/or destination); Integration of the scientific diaspora into Science Diplomacy efforts.

Source: Own elaboration

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The evolution of Brazil's policies for its qualified emigrants

In Brazil, the perception that "brain drain" harms national interests has traditionally guided the public authorities' political reactions (BALBACHEVSKY, MARQUES, 2009). This explains why the first and most enduring initiative of the Brazilian state towards its scientific diaspora is a conservation policy restricting international mobility. For decades, both CAPES and CNPQ have included clauses in the regulations for their scholarships abroad, requiring the immediate return of the grantee after completing studies and mandating a period of residency in Brazil equivalent to the scholarship's duration, known as the "interstice period".[11][12] Failure to comply leads these funding agencies to initiate administrative procedures and demand the repayment of subsidized amounts with interest (ANDRADE, 2019; BALBACHEVSKY, MARQUES, 2009).[13][14] Additionally, some authors have stated that, with the same objective, the Brazilian government seeks to sign international agreements with "receiving" countries to prevent visas from being granted to former scholarship holders (BALBACHEVSKY, MARQUES, 2009). However, the Ministry of Foreign Affairs (MRE) denies such involvement, stating that "[t]he subject matter falls beyond the scope of this division's responsibilities."[15]

Apart from this initiative, the Brazilian state took time to address the Brazilian scientific diaspora as a subject of public policies. Government initiatives from the perspective of "brain gain" only emerged in the early years of the new millennium, specifically in 2010, when the MRE organized meetings with support from the consulates in São Francisco and Washington to establish contact with Brazilian scientists working and studying abroad and paid tribute to prominent members of its scientific diaspora (BALBACHEVSKY, COUTO E SILVA, 2012).

In 2011, the Young Talent Attraction Program (PAJT) was created as part of the Science Without Borders Program (CsF) (ANDRADE, 2019). PAJT led to a new type of scholarship, the Young Talent Attraction Scholarship (BJT), aiming to "[a]ttract and

[11] According to data obtained through the Access to Information Act (LAI) from CAPES on May 16, 2023, the compliance with the interstice period began to be enforced as an explicit rule in the 1980s.
[12] Through the Access to Information Act (LAI) on May 4, 2023, CNPQ explains that "the return of scholarship holders has always been required by this Council. Initially, the requirement was recorded in the concession agreement signed by the scholarship holders. Later, the requirement started to be recorded not only in the concession agreement but also in the regulations for scholarships abroad. [...] the requirement is stated in the scholarship resolution since RN 18/2006. However, [...] the requirement has always been present in the agreements."
[13] Available at: https://revistapesquisa.fapesp.br/retorno-compulsorio/. Accessed on: March 16, 2023.
[14] However, it is important to note that these penalties for those who do not return to the country are not sufficient to reverse highly qualified emigration (CRUZ JR, 2011).
[15] Data obtained through the Access to Information Act from the Ministry of Foreign Affairs on June 7, 2023.

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stimulate the settlement of young researchers residing abroad, preferably Brazilians, who have outstanding scientific and technological production" (CNPQ, 2020).[16] During its four-year tenure, PAJT repatriated 104 researchers. In addition to encouraging returns, the program sought to ensure talent retention. Throughout the project's execution, if the BJT grantee passed a public, permanent position competition related to the proposing higher education institution, the scholarship was preserved, albeit reduced by 50% of its value for up to 12 months, provided that the research project's execution continued. After the end of CsF and consequently PAJT in 2017, CAPES' International Relations Directorate institutionalized the BJT scholarship modality within its actions and programs by publishing Ordinance No. 125 in May 2018 (ANDRADE, 2019).

The Brazilian state adopted the "diaspora option" only in 2012, during Dilma Rousseff's government, when the Diaspora Brazil Network was created as part of the International Innovation Agenda project of the International Management of the Brazilian Agency of Industrial Development (ABDI). This initiative targeted qualified expatriated Brazilians and the so-called "friends of Brazil", individuals of other nationalities fostering a relationship of friendship and closeness with the country (PEDROSA et al., 2014). Officially launched for the Brazilian diaspora in 2013, the Network's main objective was to "[g]enerate business/projects in knowledge-intensive areas, support the formulation of public policies, and repatriate knowledge to enhance the country's competitiveness." (REZENDE, DIOUM, 2012, s.p.).

Despite ABDI's technical coordination of the Diaspora Brazil Network (REZENDE, DIOUM, 2012), this initiative received support from various actors, both in Brazil and abroad, such as: the Ministry of Development, Industry, and Foreign Trade (MDIC); MRE; Ministry of Science, Technology, and Innovation (MCTI); Ministry of Health (MS); National Health Surveillance Agency (ANVISA); National Institute of Metrology, Quality, and Technology (Inmetro); National Institute of Industrial Property (INPI); Brazilian Agency for the Promotion of Exports and Investments (Apex Brasil); National Confederation of Industry (CNI); Farma Brasil Group, among other business sector representative entities; MTI-Brazil; Georgetown University; University of California, San Diego; and the Wilson Center (PEDROSA *et al.*, 2014; REZENDE, DIOUM, 2012).

During its existence, the Diaspora Brazil Network mapped diaspora initiatives worldwide, aiming to develop a best practices plan and guide the Network's action

[16] Available at: https://www.gov.br/cnpq/pt-br/acesso-a-informacao/bolsas-e-auxilios/copy_of_modalidades. Accessed on: March 16, 2023.

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(RODRIGUES, 2013); granted honors, the Diaspora Brazil Award[17]; and organized various events such as workshops, calls for Innovation Learning Laboratories (LABs)[18], and seminars. The Network also sought to create a web platform for interaction and connection, intended to be "a virtual space for interactions among Brazilians abroad and foreign friends of Brazil with professionals and public and private institutions established in Brazil" (ABDI, 2016, s.p.). However, this platform was never created. The Network's activities had a geographical and thematic focus, concentrating on the Brazilian scientific diaspora in the USA and in two strategic areas, the health industrial complex and information and communication technologies (ICT) (ABDI, 2016).[19] With Michel Temer coming into power in 2016, the Diaspora Brazil Network was disbanded.

More recently, there has been a resurgence of interest from the Brazilian federal government, specifically from the MRE, in the Brazilian scientific diaspora (CARNEIRO *et al.*, 2020). In 2017, this ministry created the Innovation Diplomacy Program (PDI) aiming to "break stereotypes associated with Brazil's image abroad and showcase a country that produces knowledge, products, and services in the frontier scientific sectors..." (BRASIL, 2022). One of the program's modes of operation is the "mobilization of the scientific diaspora abroad" (BRASIL, 2022). To achieve this, the Science and Technology Sections (SECTECs) of embassies and consulates have conducted mappings to identify and analyze the characteristics of the Brazilian scientific diaspora[20], and in 2022, produced a document identifying the "best practices in terms of policies and initiatives supporting the mobilization of scientific, technological, and innovation diasporas" (BRASIL, 2022, p. 5). Additionally, Brazilian embassies have sponsored workshops aiming to "facilitate the building of bridges between Brazilian scientific

[17] The Diaspora Brazil Award was a joint initiative of the Ministry of Foreign Affairs, the Ministry of Industry, Foreign Trade and Services (MDIC), and the Brazilian Agency for Industrial Development (ABDI). Its purpose was to "recognize Brazilian talents in the fields of science, technology, innovation, and entrepreneurship, as well as their contribution to building a positive image of Brazil abroad and promoting innovation and technological development in the country" (BRASIL, 2015, s.p.). There were three editions of the Diaspora Brazil Award, divided into three categories: Honorable Mention, Highlights, and Professional of the Year (BRASIL, 2015).

[18] The LABs were workshops held periodically with the goal of "knowing and sharing knowledge" (ABDI, 2015). These meetings took place in various U.S. cities: Boston (2013), Palo Alto (2013), San Diego (2014), Washington, DC (2014), Boston (2014), New York (2014), Houston (2014), Philadelphia (2015), San Diego (2015), Los Angeles (2015), Mountain View (2015), Tampa (2016), Gainesville (2016), and San Francisco (2016).

[19] However, before being discontinued, the expansion of the Network to Europe and Asia was already planned. To achieve this goal, in 2016, a map of new actors began to be developed (ABDI, 2016).

[20] Published in September 2021, the first completed study was the Mapping of the Brazilian Diaspora in Science, Technology, and Innovation in Austria, Slovakia, and Slovenia. Available at: https://www.gov.br/mre/pt-br/assuntos/ciencia-tecnologia-e-inovacao/mapeamentodadiasporaaustria.pdf. Accessed on: March 30, 2023.

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communities abroad and Brazil."[21][22] These events are supported by various governmental and non-governmental actors, such as: Brazilian Academy of Sciences (ABC); CNPQ; São Paulo Research Foundation (FAPESP); Getulio Vargas Foundation Europe (FGV Europe); National Council of State Foundations for Research Support (CONFAP); São Paulo Innovation and Science Diplomacy School (InnScid SP); and Brazilian diaspora networks.

Table 2 - Historical Overview of Brazilian State Policies for the Scientific Diaspora

Perspective	Policy Type	Initiative name	Duration	Key actor(s)	Main supporters (if any)	Main activities
Brain loss	Conservation	"Interstice period"	1980s – still existing	CNPQ e CAPES	-	Requirement for former scholarship holders to return to Brazil.
Brain gain	Return	PAJT	2011 - 2016	ME	CAPES, CNPQ, MCTI.	Creation of the BJT scholarship modality.
		BJT	2017 – still existing	CAPES	-	Institutionalization of the BJT scholarship modality.
	Engagement	Brazil Diaspora Network	2012 - 2017	ABDI	Apex Brasil, FINEP, MRE, INMETRO, Brazilian diaspora networks.	Concessão de honrarias (Prêmio Diáspora Brasil); organização de eventos nos países de destino (LABs e seminários); mapeamento de políticas de vinculação.
		Innovation Diplomacy Program (PDI)	2017 – still existing	MRE	ABC, CNPQ, FAPESP, Brazilian diaspora networks.	Granting of honors (Diaspora Brazil Award); organization of events in destination countries (LABs and seminars); mapping of engagement policies.

Source: Own elaboration

[21] Available at: https://www.gov.br/cnpq/pt-br/assuntos/noticias/oportunidades-externas/oportunidades-externas-encontro-da-diaspora-cientifica-brasileira-na-europa-central. Accessed on: March 31, 2023.
[22] The first of these events was promoted in Washington in 2017. Since then, similar initiatives have multiplied: Washington (2018), London (2019), Washington (2019), Zurich (2019), Dublin (2019), Tokyo (2020), Berlin (2021), Paris (2021), Rome (2022), Tokyo (2022), Berlin (2022), South Africa (2022), Berlin (2023).

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Conclusions

In recent decades, there has been a paradigm shift – from "brain drain" to "brain circulation" – in understanding the impacts of highly qualified individuals' emigration on their home nations, significantly impacting the policy responses of origin countries. This shift is largely due to scholars and policymakers increasingly viewing the phenomenon as a natural process that should not be hindered, but rather managed effectively. In parallel, initiatives based on the "brain gain" approach, especially engagement policies, have gained popularity.

However, an analysis of Brazil's history of policies toward its scientific and technological diaspora reveals that the country traditionally perceived qualified emigration through the lens of "brain drain". This largely explains why its oldest and most enduring policy revolves around conserving and restricting international mobility. The Brazilian state took a while to consider this group as a potential resource, i.e., through the lens of "brain gain." This shift only occurred in 2010 and gained momentum from 2012 with the establishment of the Diaspora Brazil Network. Therefore, it was Dilma Rousseff's government that inaugurated an engagement policy aiming to strengthen ties with this segment of Brazilians abroad. This political evolution was temporarily interrupted by the discontinuation of the initiative under Michel Temer's presidency. The creation of the Innovation Diplomacy Program in 2017 signaled the federal government's renewed interest in the scientific and technological diaspora. Since then, the Ministry of Foreign Affairs (MRE) has been leading these efforts, seeking to map and organize this diaspora.

However, it's crucial to note that in Brazil, policies for the scientific diaspora were not part of a cohesive and coordinated state strategy, and almost all were discontinued after a few years. Another characteristic of these initiatives is their transversal political nature, involving various actors – both state and non-state – in their creation and implementation. Historically, some of the most active actors identified include ABDI, CAPES, CNPQ, and MRE. Depending on the time, different government bodies have led governmental efforts. For instance, while the formal engagement with this group was initiated by ABDI, in recent years, MRE has taken the forefront.

In conclusion, despite the delay, the Brazilian government is finally moving in the right direction, aligning with the global trend of origin countries creating linkage policies for their scientific and technological diasporas. However, to definitively break away from the perspective of "brain drain", funding agencies must abandon the requirement for the return of scholars studying abroad. Additionally, these initiatives need to be transformed into state policies that transcend specific contexts and administrations.

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