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Diasporas as actors in Brazil's development: in search of "lost" human capital?

Diásporas como atores do desenvolvimento do Brasil: em busca do capital humano "perdido"?

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Abstract: This article aims to critically reflect on whether engagement with the Brazilian science, technology, and innovation (ST&I) diaspora can be considered a factor in enhancing the country's scientific and technological human capital. The article combines a literature review with documentary analysis, including legislation and other legal norms related to the topic discussed, as well as secondary data. Based on a critique of Human Capital Theory, we present perspectives on the role of highly skilled diasporas and the potential contributions they can make to their countries of origin. Additionally, we examine the history of Brazil's stance on the mobility and international migration of highly skilled individuals, as well as the recent changes that have occurred. While some progress has been observed, our analyses suggest that Brazil's stance, which emphasizes retention and return, has not undergone substantial changes. We conclude by proposing a research agenda, which we believe will be crucial in monitoring and shaping new policies for engaging with the Brazilian science, technology, and innovation (ST&I) diaspora.

Keywords: International mobility; Scientific diaspora; Public policies; Brazil.

Resumo: O objetivo deste artigo é refletir criticamente se o engajamento com a diáspora brasileira de ciência, tecnologia e inovação (CT&I), pode ser entendido como um fator de incremento do capital humano científico e tecnológico do país. O artigo combina revisão de literatura com análise documental - legislação e outras normas jurídicas relacionadas com a temática

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discutida -, além de dados secundários. A partir da crítica à Teoria do Capital Humano, apresentamos visões do papel das diásporas altamente qualificadas e as possibilidades de contribuições aos seus países de origem. Adicionalmente, traçamos um histórico da postura do Brasil frente à mobilidade e migração internacional de pessoas altamente qualificadas e as mudanças que ocorreram recentemente. Mesmo tendo observado alguns avanços, nossas análises sugerem que a postura do Brasil, de ênfase na retenção e no retorno, não parece ter se alterado substancialmente. Concluímos com a proposição de uma agenda de pesquisa, que acreditamos ser crucial para monitorar e moldar novas políticas de engajamento com a diáspora brasileira de ciência, tecnologia e inovação (CT&I).

Palavras-chave: Mobilidade internacional; Diáspora científica; Políticas públicas; Brasil.

1. INTRODUCTION

Many studies have sought to measure the contributions of human capital to innovation, technological advancement, and economic growth (Aghion et al., 2009). It is believed that accumulating this type of capital through investments in education produces positive effects for both developed and developing countries over time.

In this sense, postgraduate education obtained at research universities has a growth-enhancing effect in countries closer to the technological frontier. These countries benefit more broadly from investments in education, as they attract highly qualified students and workers from other countries, especially from the Global South, which ends up reinforcing their human capital contingent (Aghion et al., 2009).

Brazil has mobilized considerable public investment in training qualified human resources since at least the 1970s (Balbachevsky, 2005), both by establishing a robust postgraduate system and by sending individuals to undertake training abroad (Guimarães, 2002). Throughout this period, the country observed migration movements of trained talent, especially during economic and political crises, such as after 2018 (Gonçalves Jr. & Dellagostin, 2024). The view on this migration has oscillated between the image of brain

drain at one extreme and expatriates as an essential asset for the country's development at the other (Carneiro et al., 2022).

The term brain drain has been used to designate "the international transfer of resources in the form of human capital and mainly applies to the migration of relatively highly educated individuals from developing to developed countries" (Beine, Docquier & Rapoport, 2008, p. 631), implying losses for the former.

Likewise, it can be observed that the tone of policies aimed at the highly qualified Brazilian diaspora has changed. One example is the change in the rules regarding doctoral and post-doctoral students awarded by the federal government with scholarships abroad. Until recently, these rules established the immediate compulsory return immediately after the end of the period pre-established in the contract, that is, with the completion of the doctorate or post-doctorate, under penalty of reimbursement of all amounts received, plus monetary correction and possible fines. However, new ways of returning the investment made in the training of these doctors have currently been established, such as the novation institute, which underwent a reformulation in 2023, both within the scope of the Coordination for the Improvement of Higher Education Personnel (CAPES) and the National Council for Scientific and Technological Development (CNPq), now being named "Novation Policy for scholarship holders and former scholarship holders abroad."

Another example that deserves to be highlighted is the "Program for Attracting and Retaining Researchers for Innovation and Scientific Development - Knowledge Brazil" launched by the National Council for Scientific and Technological Development – CNPq (CNPq, 2023, 2024). Previously, the Ministry of Foreign Affairs (MRE) had already included the mobilization of the science, technology and innovation (CT&I) diaspora in the actions of the Innovation Diplomacy Program (MRE, 2024).

Therefore, significant changes can be noted in the way the Brazilian government, through its agencies and Ministries, understands the issue of international mobility and the role of its highly qualified diaspora. However,

although these initiatives are essential and represent an advance in the traditional approach to addressing the issue, it is possible to identify gaps, deficiencies, or problems in this set of measures, as we will elucidate at the end of this article.

Given these elements, the objective of this article is to examine whether engagement with the ST&I diaspora can be viewed as a means of enhancing the country of origin's scientific and technical/technological human capital, with a focus on the Brazilian case.

In addition to this introduction, the text presents four other sections, which address, respectively, the following themes: the theory of human capital, the diaspora as a generator of scientific and technical human capital, a brief history of Brazil's stance on international mobility and return, and final considerations.

2. THE HUMAN CAPITAL THEORY

The idea of human capital developed from the seminal studies of two Nobel laureates in Economics, Theodore W. Schultz[3] (1961, 1968, 1973a, 1973b) and Gary S. Becker [4] (1964, 1993), known as the fathers of Human Capital Theory (TCH). However, Viana and Lima (2010) state that Jacob Mincer (1958) was the precursor of the theory when he previously argued that investments in human capital would have an impact not only on increased worker productivity and income but also on economic growth. This is the central idea of the Human Capital Theory, that is, that better-prepared individuals, primarily through formal education, would, as a rule, be more productive and achieve higher productivity rates, which, consequently, would boost a country's growth. In the article Investment in Human Capital (The American Economic Review), Schultz (1961, p.1) makes the following statement,

> although it is obvious that people acquire useful skills and knowledge, it is not obvious that these skills and knowledge are a form of capital, that this capital is in substantial part a product of deliberate investment, that it has grown in Western societies

[3] Awarded in 1979.
[4] Awarded in 1979.

> at a much faster rate than conventional (nonhuman) capital, and that its growth may well be the most distinctive feature of the economic system.

In turn, Becker (1964, 1993) maintains that schooling increases productivity mainly because it provides knowledge, skills, and a way of analyzing problems. According to the author,

> moreover, few, if any, countries have achieved a sustained period of economic development without having invested substantial amounts in their labor force, and most studies that have attempted quantitative assessments of contributions to growth have assigned an important role to investment in human capital (Becker, 1964, p. 2).

The human capital theory places education as the central source of economic development. Although it has been harshly criticized by educators, economists, sociologists, and philosophers, it still appears as a dominant thought. Although criticized, the concept of human capital has been widely used as an instrument to shape educational policies in many countries (Tan, 2014).

Some criticisms have been directed at the neoclassical economic model itself, to which the THC is linked, of the rational and utilitarian homo economicus[5] , which seeks to maximize its economic interests. For these critics, the benefits of education would be much more private than public (Tan, 2014). Wilson and Briscoe (2004, p. 47), however state the following:: "It has long been recognised that the benefits of investing in human capital are not restricted to the direct recipient but spill over to others in society," as they also they can indirectly affect the community through indirect effects or spillovers of knowledge arising from improvements in human capital, such as the environment, health, among others. These are called positive externalities. As the authors explain,

> it is clear that human capital externalities are much more than just a spill-over effect from education in the economy. They are a whole series of net outcomes, most of which are only partially realised after initial impact, and many take full effect over a very long time span. (Wilson & Briscoe, 2004, p. 47).

[5] The origin of the term dates back to the Classical School, a line of economic thought whose most influential founders included Adam Smith, John Stuart Mill, and David Ricardo. It is an abstraction or an ideal type used in economic discussions and analyses (Sandroni, 2016).

According to Wilson and Briscoe (2004), there is no guarantee that any investment in human capital will yield a positive return, as risk and uncertainty will always be present. However, evidence from various studies suggests that, in general, these investments yield a positive return. Based on an extensive literature review of international research examining the links between education and macroeconomic growth, these authors concluded that educational investments and national economic growth have been positively and significantly correlated. However, the total effect required considerable effort to measure precisely, as many of the mechanisms of influence were indirect and complex, as is the case, for example, with externalities. Furthermore, some spillovers generated by improved education and qualifications need to be considered or may be difficult to measure.

It is interesting to consider the relationship between neoclassical economic theory, HCT, and the perception of international migration as a brain drain[6] . This term was first used to describe the British Royal Society's deep apprehension about the significant emigration of scientists and technologists to other developed nations, particularly the United States, between the late 1950s and early 1960s. The fear was that this brain drain would result in a permanent loss of knowledge in the country of origin (Giannoccolo, 2009; Balmer, Godwin, & Gregory, 2009). Interestingly, these discussions occurred during the same historical period in which the foundations of Human Capital Theory were being established.

Schultz (1961) saw migration as an investment by individuals in their improvement (skills and knowledge), with losses for those who continued to

[6] The term was used expressly in articles in the popular press in the United Kingdom as a reaction to the discussions generated by the 1963 report produced by the British Royal Society, which highlighted the loss, especially to the United States, of qualified professionals, including prominent researchers and fellows of the Royal Society. This report had a significant impact on various sectors of society, sparking intense discussions in the House of Lords and generating numerous articles in the press, as well as on radio and television (Balmer, Godwin & Gregory, 2009). Interestingly, while at first the term was used to refer to the massive exodus of qualified workers from rich nations, what is noticeable is that, over the years, the term began to be used, both in literature and in political discourses and in the media, to refer to the movement of these workers from poorer or developing nations to more developed nations (Carneiro et al., 2022).

reside in the country of origin since they would not benefit from these gains. For Johnson (1965, p. 300), this simplistic view of analyzing a phenomenon as complex as international migration is based on the "philosophy of economic nationalism"[7] and assumes that the only well-being that matters is that of individuals who continue to reside in the country. Johnson (1965; 1968) then suggested an alternative type of nationalism that could be proud of its nationals who prospered in foreign countries without considering these achievements as a loss but, that considered "the potential benefits of the outflow of the highly skilled, both for the home country and the world economy" (Cañibano & Wooley, 2015, p. 117).

This internationalist nationalism (Johnson, 1965; Johnson, 1968) was based on the following assumptions: migrants generally maintain ties with their families and send resources; if they return, they will bring with them the knowledge they have acquired; if they had remained in their country of origin, they would not necessarily have developed new skills, as they depend on the availability and access to different types of resources. Externalities in knowledge production can benefit a broader range of people (Cañibano & Wooley, 2015).

Cañibano and Wooley (2015) understand that it is necessary to separate the understanding of qualified human resources for Science and Technology and the economic concept of human capital because, despite being related, "most studies on brain drain tend to confuse the two, which leads to a situation in which human capital is conceived as limited and circumscribed to an individual body" (Cañibano & Wooley, 2015, p. 116). In this way, the authors emphasize the importance of achieving greater precision in academic discourse and caution against the dangers of oversimplification.

Cañibano and Wooley (2015) draw attention to the wealth of views on the migration of highly skilled workers during the 1960s. However, the

[7] Economic nationalism was founded in the 19th century by the German-American economist Friedrich List. This type of nationalism "assumes the existence of a society with a shared history and destiny in which its members are convinced that the role of their State and the government that runs it is to defend the interests of national labor, knowledge, and capital." (Bresser-Pereira, 2018, p. 862).

predominant view in the debate on brain drain was based on the neoclassical approach, as the authors explain,

> (i) skilled individuals will be attracted to locations with high stocks of human capital and therefore higher returns to their accumulated skills;5 (ii) skilled emigrants take not only their marginal product with them but also their social product; and (iii) if skilled emigrants' education was financed by the government, then emigrants fail to repay this investment through their contribution to the tax system (Cañibano & Wooley, 2015, p.120).

In this scenario, developing countries would suffer the most significant losses, mainly when the government-financed education. After decades of launching these ideas, our question is, what are the other elements that the brain drain approach may have yet to consider and that are essential to understanding the mobility of highly qualified professionals, especially in the field of ST&I?

3. DIASPORA AND SCIENTIFIC AND TECHNOLOGICAL HUMAN CAPITAL: A POSSIBLE RELATIONSHIP?

3.1 The reframing of the concept of diaspora

Initially, the term diaspora had a negative connotation, being used to represent "the breaking up and scattering of a people or those settled far from their ancestral homeland" (Séguin et al., 2006, p. 80). Over time, the term gained new meanings, encompassing not only forced migrations resulting from armed conflicts or persecution based on political, religious, or ethnic-racial grounds, but also voluntary migrations of individuals and communities abroad (Cohen, 2022; Séguin et al., 2006). Thus, there was a gradual process of redefining the concept of diaspora, which began in the 1960s with the entry of scholars from diverse areas, thereby giving this field of study an interdisciplinary character (Cohen, 2022).

Currently, the terms "scientific diasporas," "knowledge diasporas," "intellectual diasporas," or even "highly qualified diasporas" are used to designate expatriates who work in the scientific, technological, and higher

education fields, as pointed to Barré et al. (2003), Ho, Hickey and Yeoh (2015), among others.

However, as mentioned previously, the talent migration has always been seen as unfavorable, a loss for the sending country. Although the term "brain drain" is commonly used today to refer to the migration of highly skilled professionals from the Global South to the Global North, it was initially used to describe the movement of such professionals between countries in the Global North, as mentioned earlier.

However, while in the past, diasporas were often viewed as a loss for the originating states (brain drain) and a gain for the receiving states (brain gain), many studies now examine diaspora from the perspective of knowledge or brain circulation, or even brain networking. This literature is based on the idea of mutual benefits, that is, that both sending and host countries can benefit (Ciumasu, 2010; Tung, 2008).

From the 1990s onwards, approaches emerged that constructed new meanings for the concept of highly qualified diaspora, emphasizing connectionist approaches based on empirical research (Cañibano & Wooley, 2015), developed from the early 2000s onwards. The works of Meyer (2001; 2011), Meyer and Wattiaux (2006), which deal with diaspora knowledge networks, as well as Barré et al. (2003), on scientific diasporas, challenged the foundations of neoclassical theory, criticizing especially the failure of policies based on the brain drain approach, focused on retention, attraction, and return According to Didou-Aupetit (2009), this is also the reality of policies developed in Latin America and the Caribbean, which prioritized short-term programs much more focused on "reconnecting" with the diaspora than on fostering cooperation, as well as improving working conditions in academia, or even promoting the internationalization of national ST&I systems.

3.2 Diaspora as a source of human capital?

As we have discussed so far, the view of brain drain or loss has a strong relationship with the Human Capital Theory. Based on the critique of this relationship, we investigate whether it is possible to affirm that the engagement

of countries with their qualified diasporas can be seen as a means of utilizing, for the benefit of national development, the human capital that has migrated abroad in search of better opportunities. It remains, then, to question how this can occur. Would the use necessarily involve the physical return of expatriates, or would it be possible to do so remotely?

As we have seen, for economic orthodoxy, the departure of researchers from the country reduces the stock of human capital, which can only be replenished by either physically attracting these researchers back or by training new researchers. Thus, the net departure of professionals to other organizations or countries implies a loss of human capital, and the net entry implies a gain. However, other approaches have questioned this rigid view of the dichotomous relationship between brain drain and brain gain, as it does not satisfactorily explain the complex flows of knowledge associated with mobility (Cañibano, Otamendi & Andújar, 2008).

According to these approaches, several key elements are not being considered. First, talents that went abroad may not have been effectively utilized in their home country due to a lack of opportunities, for example (Gaillard & Gaillard, 1998). Second, it is necessary to consider the potential benefits associated with international mobility, such as gaining access to broader scientific networks and international funding sources (Cañibano, Otamendi, Andújar, 2008). Finally, the social connections that migrants establish are a key component of scientific and technological human capital (Cañibano, Otamendi, Andújar, 2008; Bozeman, Dietz & Gaughan, 2001), considering the social and collaborative nature of the process of producing and disseminating ideas and knowledge (Bozeman, Dietz & Gaughan 2001).

Bozeman and Corley (2004, p. 601) point to another view of scientific and technological human capital as,

> is the sum of scientific, technical and social knowledge, skills and resources embodied in a particular individual […]. It includes both human capital endowments, such as formal education and training, and social relations and network ties that bind scientists and the users of science together knowledge value collective.

Thus, human capital in ST&I is the sum of skills, knowledge, and social relationships necessary to work in this field. In this way, human capital needs to be understood as contextual and relational. (Cañibano & Wooley, 2015). This is the line that the International Organization for Migration (IOM) followed when developing a manual[8] to serve as a guide for decision-making on policies aimed at the diaspora. The text explicitly states the idea of "transferring human capital" to countries of origin by leveraging the knowledge, skills, and experiences of the diaspora (Agunias & Newland, 2012, p. 167).

Therefore, it is possible to see that human capital theorists developed their models without considering that "the value and effectiveness of human capital depend on the complementarity of the human capital assembled in collectives of skilled individuals, and how it relates to other resources, including infrastructure (physical capital) (Meyer & Brown, 1999) and institutions (Meyer & Wattiaux, 2006)", as pointed out by Cañibano and Wooley (2015, p. 124).

These connections are crucial in the field of science and the formation of a scientific career. Scientific collaboration, particularly when it takes on mentoring characteristics, is a key factor in the development of human capital in ST&I. This is especially true when a more experienced scientist collaborates with a junior scientist, as seen in studies such as those by Bozeman and Corley (2004). We can broaden this understanding to include the interactions between researchers at the forefront of scientific and technological institutions and those who are not, creating a sense of connection and community.

The diaspora option is a strategy based on the understanding that many expatriates are not interested in returning to their home countries for various reasons, mainly because they have already established themselves personally and professionally abroad, but may be interested in remaining connected (Meyer & Brown, 1999). In these cases, it is necessary to create mechanisms that foster engagement, enabling the diaspora's knowledge, skills, and abilities

[8] Develop a roadmap to engage the diaspora in development. Professionals in countries of origin and destination. See at: https://publications.iom.int/books/desenvolver-um-roteiro-para-engajar-diaspora-no-desenvolvimento-um-manual-para-decisores

to flow back to the home country, generating both skill and knowledge gains for local workers in the sectors directly involved (Strozzi & Naghavi, 2012) and virtuous circles of interaction and collaboration (Gimenez et al., 2024; Carneiro et al., 2020; Kuznetsov & Freinkman, 2013; Boyle & Kitchin, 2013).

In this context, engagement with the diaspora is relevant, and there are documented cases where this can occur through physical return, as seen in the examples of the Indian (Saxenian, 2006), Chinese (Leung, 2015), and Argentine (Rivero & Trejo Peña, 2020) diasporas. Studies show, however, that most engagement policies have more than one component in addition to repatriation. According to Rivero and Trejo Peña (2020), this is not necessarily a conflict between policies, as the design depends largely on the reality of each country. For example, the Network of Argentine Researchers and Scientists Abroad (RAICES)[9] Program combines elements of talent retention in the country and the creation of links with members of the diaspora and repatriation (Andrade & Amaral, 2018). Retention occurs through an increase in the number of postdoctoral fellowships in the country. This connection is achieved through instruments such as creating a platform for scientists and researchers residing abroad, financing short-term visits to Argentina for research, teaching, and outreach activities, and forming international research networks in specific areas of knowledge and across countries. However, the repatriation component is the most visible, which includes the provision of resources for scientific and technological research projects developed in Argentina and subsidies for their return, and the dissemination of job offers by companies that have agreements with RAICES (Argentina, 2008; Andrade & Amaral, 2018).

For Agunias and Newland (2012), the advancement of information and communication technologies (ICTs) has expanded the possibilities of bringing countries closer together without the need for physical presence. Some

[9] The RAICES Program was created in 2003 and incorporated into State Policy (Law nº 26,421) in 2008. It is managed by the Ministry of Science and Technology (MinCyT) and Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET).

countries support the creation of scientific, technical, and business networks composed of local and diaspora experts, facilitated by ICTs.

> Eritrea, for instance, has been engaging the diaspora through its various websites, while Germany maintains an alumni portal. Virtual exchanges with skilled diasporas are also supported by the Philippines, as well as Uruguay (through its consular posts), Bulgaria, Colombia, Burundi, Estonia, Hungary, Switzerland, and Ecuador.302 Still other countries combine Internet-based networks with opportunities for face-to-face encounters. (Agunias & Newland, 2012, p. 183).

There are, therefore, other ways of harnessing the intellectual potential of the highly qualified diaspora, such as establishing partnerships and research collaborations with individuals who work, for example, in international centers of excellence. These partnerships can leverage the development of national ST&I without the necessary return of these expatriates (Tejada Guerrero, 2013). According to Brown (2000, p. 10),

> often, an expatriate acquires new skills and expertise that he/she might not have had access to in the country of origin. The diaspora option allows the country-of-origin access to not only the skills and expertise of the expatriate but also the knowledge networks that he/she forms part of in the host country. It also allows for the transfer of information and technology from more industrialized to developing countries. In short, it turns the brain "DRAIN" into a brain "GAIN".

Thus, the diaspora can be seen as a vector for improving the human capital and overall productivity of their countries of origin. To this end, it is necessary to engage them in scientific and/or commercial networks that create opportunities for knowledge transfer, technology transfer, and experience sharing, among other significant outcomes that support the development needs of these countries (Gnimassoun, 2021).

Agunias and Newland (2012) explain that although diasporas can be significant sources of capital (financial, intellectual, and social), countries should not privilege them to the detriment of human resources established in the country and should design forms of interactions that promote mutual enrichment. According to the authors, "the goals of diaspora engagement cannot be set in a vacuum" (p. 26), nor should engagement be seen as an end

in itself, but rather as part of a broader strategy that has the following purposes: knowing the diaspora, its capabilities and resources; knowing the resources and capabilities of domestic institutions (public and private); developing mutual trust; and establishing the objectives of engagement.

In this sense, Brown (2000, p. 11) warns that,

> the diaspora option might not be a magical "solution" to the brain drain problem. However, it goes beyond traditional approaches in that the brain drain is not seen as a "problem" only. Still, it allows developing countries to capitalize on the characteristics inherent to the "brain drain" through remote mobilizing its highly skilled human resources.

For Brinkerhoff (2012), it is necessary to create an environment conducive to engagement with the diaspora, and this involves improving political, legal, and regulatory structures; building institutional capacity across sectors and at various levels; understanding the potential and needs of diasporas; establishing and maintaining a series of oversight, accountability and feedback mechanisms; and mobilization and allocation of public resources and investments.

It is, therefore, clear that analyses of the migration of highly qualified people need to consider the broader context of circulation, including the situation in the country of origin and destination (Cañibano & Wooley, 2015).

4. INTERNATIONAL MOBILITY AND RETURN: BRAZIL'S STANCE

The Brazilian government's dominant stance on international mobility is firmly anchored in the idea of talent retention. Thus, former scholarship recipients are required to return to Brazil upon completion of their training abroad and must remain in Brazil for the same period as their stay abroad, under penalty of reimbursement of all amounts received, plus monetary compensation and any applicable fines. These rules are known in advance and were accepted by scholarship recipients when signing the scholarship documentation. According to the THC, this investment of public funds is intended to increase the country's human capital stock in the long term. Therefore, demanding a return means demanding faithful fulfillment of the

contractual obligations assumed by the scholarship holder. However, in practice, returning to Brazil can present challenges for former scholarship recipients due to the difficulties they face in entering the Brazilian job market. In some cases, advantageous job offers abroad may have to be abandoned due to the obligation to return without any concrete job prospects. Moreover, as we have seen, returning would not be the only possibility.

According to Cañibano and Wooley (2015), this stance is common in several countries in Latin America and Asia. It is based on the assumptions of neoclassical theory, centered on the predominant logic of "'train'" and "'attract back'" (p. 122). This occurs in China, where those who obtain a doctorate abroad, financed by the Chinese Scholarship Committee, are obliged to return to country and stay for two years after receiving their doctorate degree. The same situation also occurs in Peru, where job opportunities are scarce for those who have returned from periods of study abroad, the departure of highly qualified professionals is growing, and opportunities for scholarships to study abroad are becoming increasingly rare (Cañibano & Wooley, 2015).

We can observe changes in the traditional approach in recent years. The Ministry of Foreign Affairs included the mobilization of the Science, Technology, and Innovation (ST&I) diaspora in the actions of the Innovation Diplomacy Program, implemented in 2018. Among the Program's objectives are increasing Brazil's visibility abroad, identifying partners for companies in Brazil, attracting investment, supporting the internationalization of startups, and assisting in the mobilization of the Brazilian scientific diaspora abroad (MRE, 2024).

The possibility of promoting changes in the obligations agreed between the scholarship holders and the federal government funding agencies, Coordination for the Improvement of Higher Education Personnel (CAPES) and the National Council for Scientific and Technological Development (CNPq), was established through the novation institute. In practical terms, they replaced the return with other actions that may impact the ST&I system and the national scientific community.

Another change was the possibility of altering the obligations agreed upon between scholarship recipients and federal government funding agencies, namely the Coordination for the Improvement of Higher Education Personnel (CAPES) and the National Council for Scientific and Technological Development (CNPq), established through the novation institute. In practical terms, this means replacing the return with alternative actions that could have an impact on the ST&I system and the national scientific community. This policy is more aligned with connectionist approaches (Cañibano & Wooley, 2015; Didou-Aupetit, 2009).

The novation (novatio) is a legal figure originating from Roman law (Silva, 2016) and provided for in the Brazilian Civil Code (articles 360 to 367). As established in Article 360, novation occurs "when the debtor contracts a new debt with the creditor to extinguish and replace the previous one" (Brasil, 2002, n.p). Through novation, therefore, there is the extinction of the contractual obligations assumed by the scholarship holder, precisely the obligations to return and fulfill a period of interstice in Brazil through the establishment of new obligations, the fulfillment of which would justify the continuation abroad. Figure 1 displays the findings of our investigation into the legal frameworks of the novation institute under CAPES and CNPq.

Figure 01: Normative frameworks of the novation

CAPES	Theme	CNPq	Theme
Normative act		**Normative act**	
Ordinance nº 176/2016	Novation Institute	RN-023/2012	Scholarship reimbursement
Ordinance nº 167/2017		RN-024/2014	
Ordinance nº 291/2018		RN-013/2016	
Ordinance nº 287/2023	Novation Policy	Ordinance 1594/2023	Novation Policy

At CNPq, novation was discreetly provided for in Normative Resolutions RN-023/2012, RN-024/2014, and RN-013/2016, which provided for reimbursement. However, in 2012 and 2014, novation could only be invoked in "exceptional cases", with proof that the stay abroad was of scientific and technological importance to Brazil. In 2015, novation was suspended. In 2016, the term "exceptional cases" no longer appears in the text of the resolution - only the need to prove the strategic relevance for the development of science,

technology, and innovation in Brazil was foreseen (CNPq, 2012; CNPq, 2014; CNPq, 2015; CNPq, 2016). With the new rule, established in 2023, novation gained a more comprehensive treatment, no longer being a possibility modestly embedded in a rule that aimed to deal with compensation (CNPq, 2023).

Within the scope of CAPES, the possibility of novation existed for around ten months between 2016 and 2017 (Ordinance nº 176/2016) and was later reestablished with Ordinance nº 291/2018[10] (CAPES, 2016; CAPES, 2018).

In 2023, through a joint effort by both CAPES (Ordinance 287/2023) and CNPq (Ordinance 1594/2023), the "Renewal Policy for scholarship holders and former scholarship holders abroad" was established, enabling them to remain abroad, provided that, for example, "cooperation networks in research in science, technology and innovation" are formed (CAPES, 2023, n.p.).

In 2023, based on a joint effort by both CAPES (Ordinance nº 287/2023) and CNPq (Ordinance nº 1594/2023), the "Novation Policy for scholarship holders and former scholarship holders abroad was established", was established, enabling them to remain abroad, provided that, for example, "cooperation networks in research in science, technology and innovation"[11] are formed (CAPES, 2023, unpaged). Among the changes to the previous rule, we can mention: the non-requirement of signing a debt confession term[12] for the

[10] The "Center for Experiences, Studies, and Struggles of (Former) Scholarship Holders from Brazil Abroad" found, in a meeting with CAPES members, that during the validity of Ordinance 176/2016, only four novation proposals were approved, out of a total of 55 submitted, indicating an approval rate of only 7.2%. In the case of Ordinance 291/2018, 29 proposals were approved, six proposals were under merit review (in 2023), and 110 were rejected (out of a total of 145 proposals). Regarding requests made during the Novation Policy (Ordinance No. 287/2023), CAPES Notice No. 15/2024 received 73 novation proposals (J. Salles, personal communication, July 9, 2025), of which 62 proposals were approved (84.9% approval) (CAPES, 2025). Regarding CNPq, we do not have information on the number of proposals submitted; however, we know that 56 proposals were approved between 2016 and 2023, and 143 proposals were approved between the beginning of 2024 and the end of April 2025 (J. Salles, personal communication, July 9, 2025).

[11] In Ordinance No. 1594/2023 (CNPq), the wording is as follows: "Formation of cooperation networks in Education and Science, Technology and Innovation."

[12] It is a formal commitment by which the debtor acknowledges the amount of the debt and undertakes to pay it. A debt confession can take different forms, all with legal validity and the nature of an extrajudicial enforcement document, as established in Article 784 of the Code of Civil Procedure: a contract with specific clauses regarding the amount of the debt and payment; a promissory note—which represents a promise to pay on a specific date; a public deed; or a

processing and applicability of novation (CAPES and CNPq), the provision of public calls providing opportunities for novation (CAPES), the expansion of the list of beneficiaries - (CAPES and CNPq), partial novation (CAPES and CNPq), among others. According to Cruz (2023, unpaged),

> the procedure for submitting a novation proposal has been improved in recent CAPES and CNPq regulations. One of the most significant changes is suspending the administrative charging process. At the same time, the novation request is being analyzed, representing an essential advance in avoiding situations of abusive charging during this period.

Although the novation policy represents progress, it also raises some questionable points, the most serious of which are the following: former scholarship holders who have already signed a debt confession agreement or are already enrolled in active debt cannot request the novation; The request is conditioned on the withdrawal of any legal actions that may have been filed. Demanding withdrawal is an illegal, arbitrary act and can be attacked using the writ of mandamus, as Cruz (2023) explains. It is essential to note that the right of action is a subjective public right of the citizen to seek judicial protection (Lenza, 2024), as stipulated in Article 5, item XXXV, of the Federal Constitution (Brazil, 1988). The writ of mandamus, in turn, also finds constitutional support, being provided for in item LXIX of article 5, and may be filed in defense of a clear and specific right, violated or about to be violated, due to illegality or abuse of power practiced by public authority (Brazil, 1988).

Additionally, in 2023, CNPq launched the "Knowledge Brazil Program - Talent Attraction and Retention", as outlined in CNPq Ordinance nº 1,708 of April 9, 2024 (CNPq, 2024a). The financial resources come from the National Fund for Scientific and Technological Development (FNDCT), and CNPq launched two calls in 2024: one for repatriation (CNPq/MCTI/FNDCT nº 21/2024) and the other for the support of network projects (CNPq/MCTI/FNDCT nº 22/2024).

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private document signed by the debtor, provided it contains the essential elements of acknowledgment of the debt (Lexly Brasil, 2023).

The repatriation call aims to support research projects through the awarding of "boosted" scholarships, supplementary capital and operating expenses, installation assistance, travel assistance, resources for family health insurance, and pension assistance, as well as the settlement of debts arising from non-return with the Brazilian government (if any). The target audience for this call is "Brazilian researchers with a master's or doctoral degree residing abroad and Brazilian researchers who completed their doctoral or postdoctoral studies abroad from 2019 onwards and are residing in the country" (CNPq, 2024b, n.p.). This call targets "Brazilian researchers with a master's or doctoral degree residing abroad, and Brazilian researchers who completed their doctoral or postdoctoral studies abroad from 2019 onwards and are residing in the country" (CNPq, 2024b, n.p.)[13].

The call for networks, in turn, will finance consumables (travel and per diem, third-party services, import expenses) and capital (equipment and bibliographic material), with the following objectives: to support projects in partnership between public or private higher education institutions or science and technology institutes (in Brazil) and Brazilian researchers working abroad in educational, research, and technological development institutions; to stimulate knowledge exchanges between researchers and research groups in Brazil and Brazilian researchers based abroad (CNPq, 2024c).

Finally, the Brazilian Studies and Projects Financing Agency (Finep) also launched a continuous call to support companies interested in receiving Brazilian researchers based abroad with experience in "Research, Development, and/or Technological Innovation" (Finep, 2024, p. 1) through non-reimbursable economic subsidies from the FNDCT, with a total budget of

[13] More than 2,500 researchers expressed interest in the opportunities created by the calls for proposals under the Knowledge Brazil Program. Call for proposals CNPq/MCTI/FNDCT nº. 21/2024 (repatriation and settlement) approved 599 projects by researchers working abroad, with an estimated investment of R$604 million. The selected researchers will work in Brazil at universities, research institutes (566 projects), and companies (33 projects), developing their projects for up to five years. Call for proposals CNPq/MCTI/FNDCT nº 22/2024 (network projects), which was approved, resulted in 640 projects (to be implemented over two years), totaling R$228.5 million in investments (CNPq, 2025).

R$500 million[14] . Repatriated researchers must be hired under the Consolidation of Labor Laws (CLT) (Finep, 2024).

As seen, the Knowledge Brazil Program focuses more on the repatriation[15] and settlement of researchers in Brazil than on establishing partnerships, considering that two of the three calls presented here are focused on repatriation. However, as we know, conducting science in Brazil remains a challenging task, which leads us to reflect on the long-term sustainability of this policy. Since the Program was announced, reflections on this initiative have emerged in the media, particularly pointing out that it focuses on bringing back those who are abroad without having resolved complex problems that threaten ST&I activities in our country, such as the lack of opportunities for PhDs here, as well as uncertainties and instability related to research funding (Carneiro et al., 2024a). These are precisely the main reasons that led many Brazilian scientists to seek more favorable environments abroad, as highlighted by a survey conducted by Carneiro et al. (2024b) with members of the Brazilian diaspora.

5. FINAL CONSIDERATIONS

In this article, we reflect on the potential contributions of skilled diasporas to their countries of origin, seeking to understand whether this diaspora can be considered a source or stock of human capital that countries could mobilize.

As discussed, for economic orthodoxy, the departure of researchers from the country reduces the stock of human capital, which can only be replenished with the physical return of these researchers or with investment in the training of new researchers. Therefore, only by increasing the stock of human capital in

[14] By June 2025, of the three companies that submitted proposals, only two were approved with a financing value of R$40,123,922.20 (8% of the estimated budget) (Finep, 2025).

[15] Still on the topic of repatriation, it is worth noting that, in 2011, the Young Talent Attraction Program (PAJT) emerged within the Science Without Borders Program (CsF) to attract Brazilian researchers abroad with outstanding scientific and technological production. The initiative gave rise to the Young Talent Attraction Grant (BJT), designed to encourage the return and retention of these professionals in Brazil. During its four-year duration, the PAJT repatriated 104 researchers. With the closure of the CsF and PAJT in 2017, CAPES officially recognized the BJT as a permanent modality through Ordinance No. 125/2018 (Brum, 2024), revoked by Ordinance No. 263/2019 (also revoked - Ordinance 1/2020) (CAPES, 2020).

the country of origin, which may involve talent retention or even repatriation, will it be possible to mitigate the potentially deleterious effects of "brain drain".

There are authors, however, who criticize the views that circumscribe human capital to individual bodies, with departures always representing losses for sending countries and gains for host countries, as it is also important to consider the benefits that international mobility can generate, such as knowledge and learning flows, in addition to the formation of knowledge networks (Cañibano, Otamendi; Andújar, 2008; Cañibano & Wooley, 2015; Cañibano, Otamendi & Andújar, 2008; Bozeman; Dietz & Gaughan, 2001).

Human capital represents the stocks of knowledge and skills that individuals acquire and perfect through education and training. This set of skills and knowledge (tacit and explicit) can generate positive externalities, extending beyond the individual sphere and benefiting groups, communities, and society as a whole (Wilson & Briscoe, 2004). Therefore, for countries of origin to mobilize these stocks of human capital, they must develop and implement engagement policies that promote synergies and virtuous circles of interaction and learning.

The literature highlights several possibilities for engaging with the diaspora, including physical return, mentoring and training programs (on-site or remotely), and establishing partnerships for developing joint projects. According to Rivero and Trejo Peña (2020), there is no single formula for engagement, as policies must be tailored to the specific contexts and migration profiles of each country.

We have observed changes in the Brazilian government's stance toward the diaspora, including at the Ministry of Science, Technology, and Innovation, the National Council for Scientific and Technological Development (CNPq), CAPES, and the Ministry of Foreign Affairs.

It remains to be seen whether Brazil is transitioning from a neoclassical "retain, attract, and return" approach to a connectionist one, as has occurred in Europe and several newly industrialized countries in Asia (Cañibano & Wooley, 2015, p. 20), or whether it will adopt a hybrid of both approaches.

We must consider that the existence of a domestic environment conducive to ST&I activities is essential for more attractive interactions and partnerships between the diaspora and their peers in Brazil. In this sense, it is not enough to simply create opportunities for return and collaboration; it is also necessary to provide more robust and continuous investments in education, science, and technology, as well as to value science and scientists working in Brazil (Gimenez, 2024; Carneiro, 2024a; Carneiro, 2024b).

Finally, based on the elements presented in this article, we recommend a research agenda that seeks to monitor and study, in depth, the Innovation Policy, the Knowledge Brazil Program, the Innovation Diplomacy Program, and other initiatives aimed at the qualified Brazilian diaspora that may be created. Furthermore, just as important as studying these programs aimed at engaging the Brazilian ST&I diaspora is analyzing the adequacy of domestic conditions, as stated by Brinkerhoff (2012).

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