The Slovenian Scientific Diaspora in North America: Structure, Potential and the Role of Diaspora Networks in Science Diplomacy*

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ABSTRACT

This article examines the Slovenian scientific diaspora in the United States and Canada through the lens of science diplomacy. It starts from a simple but often overlooked question: how can a small state make better use of scientific and professional networks that already exist beyond its borders? The study is based on a qualitative secondary analysis of recent Slovenian research projects on highly skilled migration, brain circulation, return migration and diaspora engagement. The analysis is organised around three dimensions: the changing structure of Slovenian diaspora communities in North America, their position within research, technological and innovation environments, and the forms of cooperation that connect diaspora professionals with institutions in Slovenia. The findings suggest that Slovenian professionals in North America represent an important source of expertise, contacts and institutional access. Nevertheless, this potential is only partly reflected in systematic cooperation with Slovenia. We argue that the Slovenian scientific diaspora should not be understood primarily as a pool of potential returnees. At present, it functions more as an informal infrastructure of science diplomacy, based

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on professional trust, individual initiative and dispersed transnational ties. For Slovenia, the main policy challenge is therefore not only how to attract people back, but how to build more stable mechanisms through which diaspora knowledge, experience and networks can support international research cooperation and the strategic positioning of Slovenian science.

Keywords: Slovenian diaspora, science diplomacy, brain circulation, diaspora networks, highly skilled migration.

Slovenska znanstvena diaspora v Severni Ameriki: struktura, potencial in vloga mrež v znanstveni diplomaciji

POVZETEK

Članek obravnava slovensko znanstveno diasporo v Združenih državah Amerike in Kanadi skozi prizmo znanstvene diplomacije. Izhaja iz preprostega, vendar pogosto spregledanega vprašanja, namreč kako lahko majhna država bolje uporabi znanstvene in strokovne mreže, ki že obstajajo zunaj njenih meja? Raziskava temelji na kvalitativni sekundarni analizi novejših slovenskih raziskovalnih projektov o visoko kvalificiranih migracijah, kroženju znanja, povratnih migracijah in vključevanju diaspore. Osredotoča se na tri ključne razsežnosti: spreminjajočo se strukturo slovenskih diasporni skupnosti v Severni Ameriki, njihov položaj v raziskovalnih, tehnoloških in inovacijskih okoljih ter oblike sodelovanja, ki diasporne strokovnjake povezujejo z institucijami v Sloveniji. Ugotovitve kažejo, da slovenski strokovnjaki v Severni Ameriki predstavljajo pomemben vir znanja, kontaktov in institucionalnega dostopa. Kljub temu je ta potencial le delno zajet v sistematično sodelovanje s Slovenijo. V članku izpostavljamo, da slovenske znanstvene diaspore ne bi smeli razumeti predvsem kot nabora potencialnih povratnikov.

Trenutno deluje bolj kot neformalna infrastruktura znanstvene diplomacije, ki temelji na zaupanju, individualni pobudi in razpršenih transnacionalnih povezavah. Za Slovenijo zato glavni politični in strateški izziv ni le, kako ljudi pritegniti nazaj, temveč kako vzpostaviti stabilnejše mehanizme, preko katerih lahko znanje, izkušnje in mreže diaspore podpirajo mednarodno raziskovalno sodelovanje ter strateško pozicioniranje slovenske znanosti.

Ključne besede: slovenska diaspora, znanstvena diplomacija, kroženje možganov, mreže diaspore, visokokvalificirane migracije

1. Introduction

The international mobility of highly skilled professionals has long been discussed through the language of loss. In the classical "brain drain" perspective, the departure of educated individuals was understood mainly as a reduction of human capital in the country of origin (Bhagwati, Hamada, 1974). This interpretation remains relevant, especially for smaller states with limited research capacity. However, it captures only part of the story. A growing body of research has shown that migrants do not necessarily disappear from the social, scientific or economic life of their countries of origin. Many continue to participate in professional networks, collaborative projects, academic exchanges and entrepreneurial activities that connect different national environments (Kuznetsov, 2006; Meyer, Brown, 1999; Saxenian, 2005). This shift has given rise to the concept of "brain circulation", which is now one of the key frameworks for analysing highly skilled migration. Saxenian's (2006) work on transnational entrepreneurs showed that migrant professionals can connect innovation ecosystems across countries and regions. Other studies of diaspora knowledge networks have made a similar point: skilled migrants often act as carriers of knowledge,

contacts and institutional experience, rather than simply as individuals who have left their home country (Kuznetsov, Sabel, 2006; Meyer, 2001). Therefore, diaspora communities are increasingly viewed not only as cultural or ethnic communities, but also as professional and scientific networks that may link universities, firms, research institutions and innovation systems.

A parallel debate has developed around the concept of science diplomacy. Science diplomacy is usually understood as the use of scientific cooperation to support international relations, address shared global challenges and build trust between countries (Gluckman et al., 2017; Royal Society & AAAS, 2010; Ruffini, 2017). Much of the early discussion focused on formal cooperation between states, international organisations and major research infrastructures. More recent approaches, however, have paid greater attention to actors that operate outside traditional diplomatic channels. Universities, research institutions, private companies and transnational professional networks can all influence how scientific cooperation develops in practice (Flink, Schreiterer, 2010; Turekian et al., 2015).

Diaspora scientists and professionals belong to this wider landscape of science diplomacy. Their role is often informal, but that does not make it marginal. Researchers, engineers, entrepreneurs and other highly skilled professionals abroad may help open doors to research groups, laboratories, technology companies, funding environments and policy communities that would otherwise be more difficult to reach. Their contribution may take the form of joint research projects, academic mobility, mentoring, advisory work, conference participation or collaborative innovation initiatives (Ratha et al., 2011; Tejada, 2012). In many cases, these activities are not designed as diplomacy in a formal sense. Nevertheless, they can have diplomatic effects by strengthening scientific ties, improving international visibility and creating trust between institutions.

This is particularly important for small states, like in the case of Slovenia. Their research systems are often highly dependent on international cooperation, while their most talented researchers and professionals may build careers in larger and more competitive scientific environments abroad. This creates an obvious tension. Highly skilled mobility can weaken domestic capacity if it is understood only as permanent departure. At the same time, it can also expand the country's reach if diaspora professionals remain connected to domestic institutions and are recognised as partners in international research cooperation. The question, therefore, is not only how to bring people back, but also how to work with those who remain abroad.

Slovenia represents a relevant case for examining this question. Since independence in 1991, many highly educated Slovenians have pursued academic, scientific, technological or professional careers outside the country. A significant number of them are active in North America, especially in the United States and Canada, where they work in universities, research organisations, technology companies, innovation ecosystems and other knowledge-intensive environments. These settings are important not only because of their scientific excellence, but also because they provide access to networks, infrastructures and institutional cultures that can matter for Slovenia's own international positioning.

At the same time, the Slovenian case also reveals a familiar small state dilemma. The country has access to a dispersed but highly skilled community of professionals abroad, yet this potential is still only partly connected to systematic institutional mechanisms at home. Cooperation often depends on personal contacts, earlier academic ties, individual motivation and informal professional trust. Such links can be valuable and effective, but they are also fragile. They may disappear when individuals move, retire, change institutions or lose contact with Slovenia. This

makes the Slovenian scientific diaspora an important but still insufficiently organised resource for science diplomacy.

The aim of this article is therefore to examine Slovenian diaspora communities in the United States and Canada as potential actors of science diplomacy and as transnational networks of knowledge circulation. We try to answer three questions. First, what are the main characteristics of contemporary Slovenian diaspora communities in North America? Second, how are Slovenian professionals abroad embedded in scientific, technological and innovation environments? Third, what forms of cooperation currently connect diaspora professionals with institutions in Slovenia? We based our research on a qualitative secondary analysis of recent Slovenian research projects on highly skilled migration, brain circulation, return migration and diaspora engagement (Oset et al., 2024; Valentinčič et al., 2022; Žitnik et al., 2023; Žitnik et al., 2025).

Nevertheless, the article makes several contributions. First, it connects the literature on brain circulation with the debate on science diplomacy by treating diaspora professionals as knowledge brokers, not only as migrants or potential returnees. Second, it identifies a specific Slovenian policy challenge. Namely, the country has access to highly skilled professionals in leading North American knowledge environments, but this access remains weakly institutionalised. Third, it argues that diaspora engagement should be understood as a permanent and reciprocal infrastructure for scientific cooperation. In this perspective, the diaspora is not merely a symbolic extension of the national community abroad. It is a possible channel through which a small state can strengthen its research networks, international visibility and strategic position in global science.

2. Theoretical Framework: Diaspora Networks, Brain Circulation and Science Diplomacy

2.1. Diaspora networks and transnational knowledge communities

Diaspora research has moved well beyond the study of cultural identity and symbolic attachment to the country of origin. Classical approaches were mainly concerned with questions of belonging, memory, homeland orientation and the preservation of collective identity across generations (Cohen, 1997; Safran, 1991). These questions remain important, but they do not fully explain the role that diaspora communities may play in contemporary knowledge economies. In more recent research, diasporas are also examined as professional, economic and institutional networks through which knowledge, investment, expertise and innovation can circulate across borders (Kuznetsov, 2006; Meyer, 2001).

This shift is especially visible in studies of highly skilled migration. Diaspora networks are not simply communities of people living outside their country of origin. They may also connect individuals, universities, firms, research laboratories, start-up environments and public institutions across different national settings. Meyer (2001) described such arrangements as "diaspora knowledge networks", stressing that skilled migrants can remain professionally linked to their country of origin while also being embedded in research and innovation environments abroad. The same person may therefore belong to several institutional and professional worlds at once.

Empirical work on innovation and migration has shown why this matters. Saxenian's (2006) research on immigrant entrepreneurs in Silicon Valley demonstrated that migrant professionals often act as connectors between innovation ecosystems in different countries. Their value lies not only

in technical expertise, but also in their ability to understand several institutional contexts, move between them and translate opportunities from one environment to another. Similar arguments appear in research on diaspora networks and transnational entrepreneurship, where migrant professionals are seen as actors who can support technology transfer, business cooperation and scientific exchange (Agrawal et al., 2011; Kuznetsov, Sabel, 2006).

Such processes are particularly relevant for highly skilled migrants because their careers are rarely contained within one national labour market. Researchers, engineers, entrepreneurs and other knowledge workers often build careers through international mobility, multiple affiliations and project-based cooperation. They may study in one country, work in another, cooperate with colleagues in a third and still maintain professional links with institutions at home (Tejada et al., 2013). In this kind of setting, diaspora networks do not function as fixed organisations. They are more often flexible channels of cooperation that can be activated through personal trust, shared expertise and professional opportunity.

For smaller states, this has a specific significance. Limited domestic research capacity makes access to international knowledge environments especially important. Diaspora professionals working in major research and innovation centres can help domestic institutions enter scientific networks, identify partners, understand emerging technological trends and participate in international projects. Their contribution is therefore not limited to economic development in a narrow sense. It can also support the internationalisation of national research systems and strengthen the visibility of smaller scientific communities. Studies dealing with highly skilled migration in Central and Eastern Europe similarly point to the importance of diaspora professionals as bridges between national research systems and wider knowledge environments (Daugeliene & Marcinkevičiene, 2009).

2.2. From brain drain to brain circulation

The migration of highly educated professionals has traditionally been discussed as a development problem. In the classical "brain drain" perspective, the departure of skilled workers reduces the human capital of the country of origin and may weaken its institutions, research capacity and long-term development prospects (Bhagwati, Hamada, 1974). This argument cannot simply be dismissed. For small countries, the loss of trained researchers, engineers, medical professionals or technology experts may have very concrete consequences.

At the same time, the brain drain perspective is too narrow if it treats migration as a one-way movement followed by a complete break with the country of origin. A substantial body of research has shown that many highly skilled migrants continue to maintain professional and personal ties with their home countries. These links may support remittances, research cooperation, knowledge transfer, mentoring, investment and access to international networks (Docquier, Rapoport, 2012; Ratha et al., 2011). The key question is therefore not whether mobility is good or bad in itself, but under what conditions mobility can be converted into cooperation.

The concept of "brain circulation" emerged from this more nuanced understanding of migration. Saxenian (2005) argued that highly skilled mobility does not necessarily represent a permanent loss for the country of origin. Migrants may become part of transnational professional communities that exchange knowledge, create business links and contribute to more than one innovation ecosystem. Later studies developed this argument further by showing how knowledge circulation can connect diaspora professionals, research institutions and innovation systems across national borders (Daugeliene & Marcinkevičiene, 2009; Kuznetsov, 2006).

Return migration is one possible form of such circulation, but it is not the only one. Some migrants do return and bring back international experience, professional contacts and institutional knowledge (Dustmann, Weiss, 2007). Others remain abroad but continue to cooperate with institutions in their country of origin through research projects, visiting lectures, doctoral supervision, mentoring, advisory roles or entrepreneurial initiatives (Kuznetsov, 2006). From this perspective, permanent return is only one point on a wider spectrum of possible engagement.

This distinction is important for policy preparation and implementation. If diaspora engagement is understood only as a question of return migration, the range of possible cooperation remains too limited. Many highly skilled professionals may not wish to return permanently, but may still be willing to contribute through temporary, digital, project-based or advisory forms of cooperation. For this reason, contemporary diaspora policies increasingly focus on creating channels for transnational engagement: short academic visits, research partnerships, mentoring schemes, digital platforms, diaspora databases and structured cooperation between institutions. Similar questions have also become relevant in smaller European states, where highly skilled mobility is increasingly discussed together with brain circulation, return policies and long-term diaspora engagement (Lukšič Hacin, 2020).

2.3. Diaspora and science diplomacy

Science diplomacy provides the third conceptual element of this article. The term generally refers to the use of scientific cooperation in support of diplomatic relations, international problem solving and the building of trust between states (Royal Society & AAAS, 2010). A widely used distinction separates three dimensions: diplomacy for science, science in diplomacy and science for diplomacy (Gluckman et

al., 2017). This typology is useful, but it can also create the impression that science diplomacy is primarily a matter of formal state action.

In practice, scientific cooperation is shaped by a much wider range of actors. Universities, academies, research institutes, private companies, foundations, international organisations and professional networks all participate in the making of international scientific relations. Some of these actors operate through official agreements and programmes. Others work through informal links, personal contacts and project-based cooperation. This is why recent literature has paid more attention to non-state actors and to the institutional spaces between science policy and foreign policy (Flink, Schreiterer, 2010; Turekian et al., 2015).

Diaspora scientists and professionals occupy precisely this intermediate space. They are not diplomats in the formal sense, yet they may perform functions that are highly relevant for science diplomacy. A researcher abroad can introduce colleagues from the country of origin to a laboratory, support a joint publication, help a doctoral student enter an international network or advise a domestic institution on developments in a particular field. Such activities are often modest in form, but they can gradually strengthen scientific trust and institutional familiarity. Through publications, research partnerships, visiting appointments and advisory roles, diaspora scientists may help domestic research communities become more visible and more connected internationally (Tejada, 2012). Burns (2013) similarly points to the diplomatic potential of scientific diasporas as informal channels between scientific communities.

The diplomatic value of diaspora engagement is not only symbolic. Diaspora professionals often work in environments where new research agendas, technologies, funding models and innovation practices are developed earlier than in smaller national systems. Their experience can therefore provide insight into emerging scientific trends and institu-

tional practices. When these links are maintained over time, diaspora networks can contribute to the internationalisation of research and to the strategic positioning of national scientific systems within competitive knowledge economies.

For small states such as Slovenia, this connection between diaspora networks and science diplomacy is particularly relevant. A small research system cannot rely only on domestic capacity or on formal diplomatic channels. It also needs people who understand both the home country and the international environments in which advanced research and innovation take place. Diaspora professionals can play this bridging role, but only if their contribution is recognised and supported through more stable forms of cooperation. Understanding the structure and dynamics of diaspora knowledge networks is therefore a necessary step in assessing their potential role in contemporary science diplomacy.

3. Methodology and Research Design

In this article we focused on qualitative secondary analysis of recent Slovenian research projects dealing with migration, diaspora engagement and the mobility of highly skilled professionals. We decided not to collect new primary data due to methodological reasons rather than merely practical. Several Slovenian projects have already produced empirical material on diaspora communities, return migration, brain circulation and cooperation with Slovenians abroad. Taken separately, these studies answer important but relatively specific questions. Yet, if taken together, they make it possible to examine a wider issue that has received less direct attention, meaning whether and how Slovenian diaspora professionals can be understood as actors of science diplomacy.

Nevertheless, secondary analysis is well suited to this purpose. It allows the researcher to return to existing empirical findings and reinterpret them in relation to a new research question (Heaton, 2004; Johnston, 2014). In this article, the

aim is not to reproduce the original findings of the selected projects, nor to treat them as a single statistical dataset. The aim is to compare their results, identify recurring patterns and examine what they reveal about the relationship between diaspora networks, knowledge circulation and international scientific cooperation.

The analysis draws primarily on four Slovenian research projects conducted between 2021 and 2025: Valentinčič et al. (2022), Žitnik et al. (2023), Oset et al. (2024), and Žitnik et al. (2025). These studies address different but closely related aspects of the same phenomenon. They include research on the consequences of brain drain and the possibilities of brain circulation, studies of Slovenian professionals in the United States and Canada, analyses of mechanisms for attracting or reconnecting highly skilled professionals, and policy oriented work on return migration and diaspora cooperation. Their combined value lies precisely in this overlap: each project illuminates one part of the relationship between Slovenian institutions and highly skilled Slovenians abroad.

The selected projects used different empirical and analytical methods, including surveys, qualitative interviews, policy analysis and institutional mapping. This diversity is useful for the present article, because the research question cannot be answered through one type of evidence alone. Survey based findings help indicate the structure and professional profile of diaspora communities. Interviews and qualitative material provide insight into motivations, expectations and informal forms of cooperation. Policy and institutional analyses show how far diaspora engagement has been translated into structured mechanisms. The present article brings these strands together through a comparative interpretative reading.

In our analysis we followed three steps. First, the selected studies were reviewed for findings related to the structure of contemporary Slovenian diaspora communities, with par-

ticular attention to North America. Second, the material was examined for evidence of professional and scientific embeddedness, including employment in universities, research organisations, technology companies, innovation environments and international professional networks. Third, the analysis focused on forms of cooperation between diaspora professionals and Slovenian institutions, such as academic collaboration, mentoring, advisory work, project participation and informal knowledge exchange.

Our focus on the United States and Canada was deliberate. These two countries are not examined simply as destinations of Slovenian migration, but as major research and innovation environments in which many highly educated professionals build academic, technological and entrepreneurial careers. For the purposes of this article, North America is therefore relevant because it combines diaspora presence with dense scientific, technological and institutional networks. This makes it a particularly useful setting for analysing the possible role of Slovenian professionals abroad in science diplomacy.

The study also reviewed publicly available reports, institutional documents and contextual material related to Slovenian communities in the United States and Canada. These sources were not used as a substitute for the selected research projects, but as supporting material for understanding the geographical, institutional and policy context of diaspora engagement. They helped situate the findings from the Slovenian projects within the wider landscape of cooperation between diaspora professionals and institutions in Slovenia.

Our article does not attempt to provide a comprehensive statistical mapping of the Slovenian scientific diaspora in North America. Such a task would require a different research design and a more systematic database of individuals, institutions and fields of expertise. The article identifies patterns across existing research and interprets them through

the lens of science diplomacy. This makes it possible to see a recurring tension, because Slovenian diaspora professionals are already active in transnational knowledge networks, but the connection between these networks and Slovenian public, academic and innovation institutions remains only partly formalised.

Our findings should be understood as an analytical synthesis rather than as a new empirical census. Their value lies in showing how evidence from several related projects points towards the same policy relevant conclusion. Slovenia does not lack diaspora potential in North America. The more important question is how this potential can be recognised, organised and supported as part of a more stable infrastructure for international scientific cooperation.

4. The Structure of Contemporary Slovenian Diaspora in North America

Slovenian migration to North America cannot be reduced to a single migration story. It has developed through several historical waves, shaped by economic conditions, political change, family networks and later by education and professional mobility. Earlier migration was often connected with industrial labour markets and led to the formation of relatively cohesive Slovenian communities in parts of the United States and Canada. These communities built associations, churches, cultural societies and heritage organisations, which helped preserve language, identity and social ties among migrants and their descendants (Lukšič Hacin, 2020).

The more recent Slovenian presence in North America has a different profile. It is less centred on territorially concentrated ethnic communities and more connected with academic mobility, professional careers and participation in international labour markets. Many contemporary migrants from Slovenia are highly educated professionals who work

in universities, research organisations, technology companies, international organisations or other knowledge-based environments (Valentinčič et al., 2022; Žitnik et al., 2023). This does not mean that older forms of diaspora organisation have disappeared. It does mean, however, that the contemporary Slovenian diaspora is increasingly shaped by professional affiliation as much as by ethnic belonging.

Available research suggests that Slovenian professionals in the United States and Canada are present in a range of knowledge intensive fields, including higher education, scientific research, information technology, engineering, finance, creative industries and innovation related activities (Oset et al., 2024; Valentinčič et al., 2022; Žitnik et al., 2023; Žitnik et al., 2025). This professional structure is important for the argument of our article. A diaspora composed of researchers, engineers, entrepreneurs, managers and other highly skilled professionals does not only preserve cultural links with the country of origin. It can also provide access to expertise, institutions and networks that are relevant for scientific and technological cooperation.

The geographical distribution of Slovenian professionals in North America also reflects this professional profile. Research on Slovenian professionals in the United States and Canada points to the role of large metropolitan, academic and innovation environments in shaping their careers (Žitnik et al., 2023). In the United States, these include areas such as California's technology clusters, the Boston Cambridge academic environment and other urban centres with strong research infrastructure. In Canada, Slovenian professionals are particularly connected with metropolitan areas such as Toronto, Vancouver and Montreal, where leading universities, research institutes and technology firms are located. These settings matter because they place diaspora professionals close to scientific communities, funding opportunities, advanced technologies and international research networks.

A further structural feature of the contemporary Slovenian diaspora is the relatively weaker connection of many highly skilled professionals to traditional ethnic organisations. For earlier generations, Slovenian associations, churches and cultural societies often provided the main institutional framework of community life. For many recent migrants, professional networks, academic cooperation, digital communication and informal peer contacts are more important channels of connection (Valentinčič et al., 2022; Žitnik et al., 2023). These networks are often less visible than formal organisations, but they may be more relevant for science diplomacy because they operate through expertise, trust and professional opportunity.

We do not argue that cultural identity has become irrelevant. Many Slovenian professionals abroad continue to maintain symbolic, cultural and personal ties with Slovenia. They may participate in Slovenian events, cooperate with Slovenian institutions, mentor younger researchers or students, and remain interested in developments in the country of origin (Oset et al., 2024; Žitnik et al., 2023). The contemporary diaspora should therefore not be understood as either ethnic or professional. In practice, these dimensions often overlap. A scientist, engineer or entrepreneur abroad may be connected to Slovenia through family history, language, professional cooperation and personal motivation at the same time.

Yet, the structure of the Slovenian diaspora in North America thus points to an important transformation. Earlier diaspora communities were often organised around relatively stable ethnic institutions. Contemporary highly skilled migrants are more likely to operate through dispersed professional networks that connect several institutions, countries and fields of expertise. For the purposes of science diplomacy, this is a crucial distinction. The most relevant part of the Slovenian diaspora may not be the most formally organised or publicly visible one. It may consist of

informal professional ties that already link Slovenian individuals and institutions with North American research and innovation environments, but that are not yet systematically recognised as part of Slovenia's international scientific cooperation.

5. Scientific and Technological Potential of the Slovenian Diaspora

The scientific and technological potential of the Slovenian diaspora in North America lies less in its size than in its position. Slovenian professionals in the United States and Canada are often located in institutions and sectors where advanced knowledge is produced, applied and commercialised. Recent Slovenian research on migration, brain circulation and diaspora engagement shows that highly educated Slovenians abroad are present in academic institutions, research organisations, technology-oriented industries and other knowledge-intensive environments (Oset et al., 2024; Valentinčič et al., 2022; Žitnik et al., 2025). For a small research system, this is an important finding. It suggests that diaspora engagement should not be understood only as a cultural or demographic issue, but also as a question of access to scientific expertise, institutional experience and innovation networks.

Research focused on Slovenian communities in North America points to a broad professional profile. Slovenian professionals in the United States and Canada are active in fields such as engineering, information technology, biomedical sciences, natural sciences and advanced manufacturing (Žitnik et al., 2023; Žitnik et al., 2025). Many work in universities, research institutes, laboratories, technology companies or innovation driven organisations. These positions place them in environments where international cooperation, interdisciplinary work and technological development are part of everyday professional practice. In this sense, the dias-

pora does not represent only a group of individuals abroad, but rather a set of entry points into research and innovation systems that are difficult for smaller countries to access on their own.

Slovenian researchers and professionals in the United States are often connected with metropolitan and academic environments that have strong research infrastructure, including California's innovation ecosystems and the academic centres of the northeastern United States. In Canada, important locations include Toronto, Vancouver and Montreal, where major universities, research institutes and technology firms are concentrated (Žitnik et al., 2023). These environments are relevant not simply because they are prestigious, but because they bring together knowledge, capital, research infrastructure, professional mobility and international networks. A Slovenian professional working in such a setting may therefore have access to opportunities that are far wider than his or her individual position would suggest.

The potential of the diaspora is also visible in the links that many professionals maintain with Slovenia. Research on highly educated Slovenians abroad shows that cooperation may take the form of academic contacts, joint publications, participation in international projects, conference cooperation, visiting lectures or informal professional exchange (Valentinčič et al., 2022; Žitnik et al., 2023). These forms of cooperation are often modest and individually driven, but they matter because they connect Slovenian institutions with wider scientific communities. In smaller research systems, even a single active connection can open access to a laboratory, research group, project consortium or professional network that would otherwise remain distant.

Additionally, Slovenian diaspora professionals may also contribute to technological and entrepreneurial links between Slovenia and North America. Studies of diaspora engagement identify examples of advisory work, mentoring, cooperation with start-up communities, participation in in-

novation initiatives and links with Slovenian companies or research institutions (Oset et al., 2024; Žitnik et al., 2023). These activities are rarely part of a single coherent programme. More often, they arise from personal contacts, previous educational ties, professional trust or a shared interest in maintaining a connection with Slovenia. This is precisely where the potential and the limitation of the Slovenian case meet. The networks exist, but they are not always visible, coordinated or institutionally supported.

The experience accumulated by diaspora professionals in North American research and innovation environments can also be valuable for Slovenia in a less direct but strategically important way. Professionals who work in competitive institutions are exposed to advanced research infrastructures, interdisciplinary practices, funding cultures, technology transfer models and organisational routines that are not always available in smaller national systems. Even when they do not return permanently, they may transfer parts of this experience through collaboration, mentoring, advisory roles, visiting appointments or participation in international projects (Valentinčič et al., 2022; Žitnik et al., 2025). This is one of the reasons why the notion of brain circulation is in the case of Slovenia more useful than a narrow focus on return migration.

We can conclude that the Slovenian diaspora in North America represents a real reservoir of scientific expertise, institutional knowledge and professional contacts. At the same time, this potential is not automatically transformed into cooperation with Slovenia. Much of it still depends on individual initiative, informal networks and personal motivation rather than on stable institutional channels (Oset et al., 2024; Valentinčič et al., 2022). From the perspective of science diplomacy, this means that Slovenia already has access to a dispersed infrastructure of knowledge abroad. The main challenge is to recognise it, connect it and support it in a more systematic way.

6. Forms of Cooperation Between Diaspora Professionals and Slovenian Institutions

Cooperation between Slovenian diaspora professionals and institutions in Slovenia does not follow a single model. It appears in different forms, ranging from academic collaboration and mentoring to advisory work, project participation and occasional links with innovation ecosystems. What connects these forms is that they are often built around people rather than programmes. Existing research on highly educated Slovenians abroad, diaspora engagement and brain circulation shows that cooperation is frequently shaped by professional trust, previous academic ties and individual initiative, while more stable institutional mechanisms remain less developed (Oset et al., 2024; Valentinčič et al., 2022; Žitnik et al., 2023). This pattern is consistent with wider literature on diaspora knowledge networks, which emphasises the importance of transnational professional ties in linking migrant communities with institutions in their countries of origin (Meyer, 2001; Kuznetsov, 2006).

Academia represents the most visible form of cooperation. Slovenian researchers working abroad may remain connected with colleagues in Slovenia through joint research projects, co-authored publications, conference participation, guest lectures or involvement in international project consortia. In many cases, these links do not begin as a result of a formal diaspora policy. They often grow out of earlier educational or professional relationships that continue after a researcher has moved abroad. Studies of diaspora knowledge networks show that such personal professional ties can be important channels of scientific cooperation across borders (Kuznetsov, 2006; Meyer, 2001). Slovenian empirical research points in the same direction: diaspora researchers often maintain informal academic links with colleagues in Slovenia, and some of these links later develop into concrete

research cooperation or participation in international projects (Žitnik et al., 2023).

Another form of cooperation is mentoring and informal knowledge exchange. Slovenian professionals in North American research and innovation environments may advise younger researchers, students or early career professionals in Slovenia. This can include guidance on doctoral studies, research careers, international applications, publication strategies, access to professional networks or the preparation of research proposals. These forms of support are often small in scale, but they can be very important for individuals and institutions with limited international access. Qualitative findings from research on Slovenian professionals in North America suggest that such mentoring relationships usually emerge from existing academic or professional contacts rather than from organised institutional programmes (Žitnik et al., 2023).

Additional potential area of cooperation concerns technology, entrepreneurship and innovation. Some Slovenian diaspora professionals working in technology companies, laboratories, start-up environments or research-intensive industries maintain links with Slovenian companies, innovation organisations, universities or research institutes. These links may take the form of advisory roles, participation in innovation events, mentoring of start-ups, support in identifying partners or cooperation in specific projects. This corresponds to broader research on transnational entrepreneurship, which shows that migrant professionals can connect innovation ecosystems across national borders (Kuznetsov, Sabel, 2006; Saxenian, 2006;). Slovenian project findings also point to examples of diaspora professionals contributing through advisory activities, mentoring programmes and cooperation initiatives involving Slovenian research institutions and technology companies (Oset et al., 2024).

The fourth form of cooperation is more diffuse, but no less relevant: access to institutional knowledge. Diaspora

professionals often understand the working cultures, expectations and informal rules of universities, research organisations, companies and funding environments abroad. This kind of knowledge is difficult to transfer through official documents alone. It is usually shared through conversation, advice, introductions and repeated cooperation. For Slovenian institutions, especially smaller universities, research groups or start-ups, such access can help reduce distance to North American scientific and technological environments.

The main limitation is that these forms of cooperation remain uneven and only partly institutionalised. Slovenia has several channels for maintaining links with communities abroad, but cooperation with highly skilled diaspora professionals often still depends on fragmented networks and ad hoc initiatives. Previous studies of Slovenian diaspora engagement have similarly pointed to the limited institutionalisation of cooperation mechanisms and to the important role of individual actors in sustaining transnational professional connections (Oset et al., 2024; Valentinčič et al., 2022). This does not mean that existing cooperation is weak, but we rather argue that much of it remains vulnerable because it relies on personal motivation, individual contacts and occasional opportunities.

From the perspective of science diplomacy, this is the key central finding. Diaspora professionals already act as intermediaries between Slovenian institutions and international research environments, but they do so mostly without being formally recognised as part of Slovenia's science diplomacy infrastructure. Through academic cooperation, mentoring, advisory work and innovation related contacts, they can increase the visibility of Slovenian research and open access to wider scientific communities. The challenge is therefore not to invent cooperation from nothing, but to make existing forms of cooperation more visible, more stable and more reciprocal.

7. Challenges and Opportunities for Diaspora Engagement

Our analysis points to a central tension in Slovenian diaspora engagement. On the one hand, Slovenian professionals in North America are present in research, technological and innovation environments that are highly relevant for Slovenia. On the other hand, the links between these professionals and Slovenian institutions remain uneven, fragmented and often dependent on personal initiative. This means that the problem is not the absence of diaspora potential. The more important problem is the limited capacity to recognise, connect and sustain that potential over time (Oset et al., 2024; Valentinčič et al., 2022; Žitnik et al., 2023).

Visibility is the first challenge. Slovenia does not yet have a sufficiently systematic overview of who its highly skilled diaspora professionals are, where they work, what fields they represent and how they might be willing to cooperate. Research on diaspora networks has long emphasised that mapping professional profiles and institutional affiliations is a precondition for more effective cooperation (Kuznetsov, 2006; Meyer, 2001). In the Slovenian case, existing studies provide valuable insights, but information about the professional trajectories, expertise and institutional positions of diaspora members remains incomplete and dispersed (Žitnik et al., 2023; Žitnik et al., 2025). Without this knowledge, cooperation depends too much on coincidence, personal contacts or individual awareness.

There is also the issue of institutional coordination. Several Slovenian institutions have an interest in maintaining links with Slovenians abroad, including universities, research institutes, ministries, diplomatic missions, business support organisations and diaspora organisations. Yet these efforts are not always connected into a coherent framework. As a result, diaspora cooperation may emerge in one project,

one university department or one diplomatic initiative, but fail to become part of a more stable system. Similar difficulties have been observed in other small states, where limited administrative capacity and dispersed institutional responsibilities can slow the development of structured diaspora policies (Ratha et al., 2011). Slovenian studies also point to the importance of individual actors and the limited institutionalisation of cooperation mechanisms (Oset et al., 2024; Valentinčič et al., 2022).

A third challenge concerns the practical costs of cooperation. Even when there is interest on both sides, collaboration requires time, administrative support, funding, institutional recognition and clear procedures. Joint research projects, visiting appointments, mentoring schemes or innovation partnerships do not happen automatically. They require someone to coordinate contacts, prepare proposals, manage expectations and remove organisational barriers. Research on international scientific cooperation has shown that even relatively small bureaucratic obstacles can influence the feasibility of cross border collaboration (Flink, Schreiterer, 2010). For diaspora professionals whose main career obligations are abroad, unclear procedures or weak institutional follow up can quickly reduce motivation.

At the same time, the opportunities are considerable. The strongest advantage of the Slovenian diaspora in North America is its embeddedness in advanced research and innovation environments. Slovenian professionals working in universities, research institutes, technology companies and laboratories in the United States and Canada operate close to scientific networks, funding cultures, technological trends and innovation practices that are difficult to access from a small national research system (Žitnik et al., 2023). Their experience can help Slovenian institutions understand not only what is happening in particular scientific fields, but also how international research and innovation environments actually work.

A second opportunity lies in the relational character of diaspora networks. Diaspora cooperation is not based only on formal agreements. It often depends on trust, shared professional standards, personal credibility and repeated interaction. Research on diaspora knowledge networks shows that such ties can support the circulation of expertise, ideas and opportunities across national borders (Saxenian, 2006; Tejada, 2012). Slovenian studies similarly indicate that diaspora professionals participate in research collaboration, mentoring and professional exchange that connect Slovenian institutions with wider knowledge environments (Žitnik et al., 2023; Žitnik et al., 2025). These connections may be informal, but they can be strategically important.

Digital communication adds another layer to this opportunity. Virtual meetings, online seminars, digital mentoring, remote participation in research groups and hybrid project work make it easier for diaspora professionals to remain involved without permanent return or frequent travel. This is particularly relevant for highly skilled professionals who may be willing to contribute to Slovenia, but cannot interrupt their careers abroad. Digital forms of cooperation cannot replace deeper institutional partnerships, but they can lower the threshold for first contact, regular exchange and gradual trust building.

The main lesson is therefore not that Slovenia should choose between return migration and diaspora engagement. It needs both, but they address different realities. Some professionals may return permanently, while others may contribute through temporary visits, project work, mentoring, advisory roles or digital cooperation while remaining abroad. From the perspective of science diplomacy, this wider spectrum of engagement is crucial. It allows Slovenia to treat the diaspora not only as a community to be maintained, but also as a living network through which scientific knowledge, institutional experience and international opportunities can circulate.

7.1. Policy implications for Slovenian science diplomacy

In regard to policy implications, we argue that Slovenia should move from occasional diaspora contacts towards a more stable science diplomacy approach. The central issue is not whether the Slovenian scientific diaspora has potential, since the evidence suggests that it does. The question is how this potential can be converted from dispersed individual cooperation into a more reliable, visible and strategically supported form of international scientific cooperation.

In our opinion one of the first steps would be systematic and regularly updated mapping of diaspora expertise. This should not be understood as a closed administrative database, but as an opt in professional platform developed with universities, research institutes, diplomatic missions, diaspora organisations and relevant ministries. Such a platform could identify fields of expertise, institutional affiliations, geographical location and possible forms of cooperation. It could also help Slovenian institutions find partners for joint research, doctoral supervision, mentoring, guest lectures, advisory work and international project development (Žitnik et al., 2023; Žitnik et al., 2025).

The second point of focus should concern coordination. Diaspora engagement should not be left only to individual enthusiasm or occasional project-based initiatives. Slovenia would benefit from a clearer coordination point linking research policy, higher education, innovation policy, economic diplomacy and diplomatic missions abroad. This does not require a large bureaucratic structure. What is needed is a visible entry point where diaspora professionals and Slovenian institutions can find information, express interest, propose cooperation and receive support in turning contacts into concrete activities (Oset et al., 2024; Valentinčič et al., 2022).

A third implication relates to instruments. If policy focuses mainly on permanent return migration, it will miss

many realistic forms of cooperation. Slovenia should develop a broader portfolio of flexible engagement tools, including short research visits, virtual guest lectures, mentoring schemes, diaspora advisory boards, seed funding for joint project proposals, temporary expert fellowships and support for joint participation in international research consortia. These instruments would correspond more closely to contemporary brain circulation, where highly skilled professionals often contribute through periodic, hybrid or project based engagement rather than through permanent relocation.

Another thing would be reciprocity, because diaspora professionals should not be approached only as a resource for Slovenia. Cooperation has to be meaningful for them as well. This means offering professional recognition, serious institutional follow up, access to Slovenian research and innovation partners, and opportunities for visible contribution. If diaspora engagement is treated only as a moral obligation towards the country of origin, it is unlikely to become sustainable. If it is organised as a professional partnership, it has a much better chance of producing long term value.

Finally, the Slovenian scientific diaspora should be explicitly recognised as part of science diplomacy. Its role is not limited to transferring knowledge back to Slovenia. Diaspora professionals can help position Slovenian institutions within international research networks, open access to innovation ecosystems, support the visibility of Slovenian science and contribute to trust based relations between scientific communities. In the case of a small state, these functions matter. They extend the reach of national research and innovation systems beyond domestic capacity and beyond formal diplomatic channels. In this sense, diaspora engagement should become a more deliberate part of Slovenia's broader strategy for international scientific cooperation and knowledge diplomacy.

8. Conclusion

We argue that Slovenian scientific diaspora in North America should not be understood only as a community abroad, nor only as a possible source of return migration. The analysis in this article suggests a more specific interpretation. Slovenian professionals in the United States and Canada are embedded in universities, research institutes, technology companies, innovation environments and professional networks that are directly relevant for Slovenia's international scientific cooperation. Their importance lies not simply in the fact that they are Slovenian, but in the positions they occupy and in the institutional worlds they are able to connect.

The central finding of our paper is therefore somewhat paradoxical. Slovenia already has access to a dispersed scientific and professional infrastructure abroad, but this infrastructure is only partly recognised and only weakly organised. Cooperation exists through joint research, mentoring, conference participation, advisory roles, innovation related contacts and informal professional networks. Yet much of it still depends on personal initiative, previous academic ties and individual motivation rather than on stable institutional mechanisms (Oset et al., 2024; Valentinčič et al., 2022; Žitnik et al., 2023; Žitnik et al., 2025). The main problem is not a lack of diaspora potential. It is the limited ability to translate this potential into sustained cooperation between diaspora professionals and institutions in Slovenia.

This finding also has implications for the way science diplomacy is understood. Science diplomacy is often discussed through formal agreements, state institutions and international programmes. The Slovenian case shows that part of it also takes place in less visible spaces, like through introductions, advice, co-authored work, mentoring, institutional familiarity and trust between professionals. Diaspora professionals may therefore act as informal knowledge diplomats. They help connect research systems, interpret institutional

cultures and reduce the distance between a small national research system and larger scientific environments abroad.

For Slovenia, this is not only a migration issue. It is also a question of research policy, innovation policy and international positioning. A narrow focus on return migration would miss many realistic forms of engagement. Some highly skilled professionals may return, but many will contribute from abroad through periodic visits, digital cooperation, project work, supervision, mentoring or advisory roles. A more effective policy would therefore treat brain circulation as a permanent form of cooperation rather than as a temporary stage before return.

Our paper consequently argues for a more deliberate approach to diaspora engagement. Slovenia would benefit from better mapping of diaspora expertise, clearer institutional coordination, flexible instruments for cooperation and stronger recognition of diaspora professionals as partners in science diplomacy. Such an approach would not require a large new bureaucracy. It would require a more consistent way of identifying people, maintaining contact, supporting concrete cooperation and ensuring that collaboration is useful for both sides.

Future research should examine Slovenian professionals in specific North American scientific and technological environments in greater empirical detail. Interviews with researchers, engineers, entrepreneurs, academic leaders and policy actors could help clarify which forms of cooperation already work, where the obstacles are and what kind of institutional support would be most useful. Comparative studies with other small states would also be valuable, especially in identifying models that have successfully transformed dispersed diaspora networks into durable mechanisms of science diplomacy. Nevertheless, the broader lesson is clear. For a small state, scientific capacity does not end at the national border. It also depends on the quality of the networks through which knowledge, trust and institutional access are maintained abroad.

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