Brain Circulation and its Role in Knowledge Diffusion and Economic Growth Lessons for Sri Lanka: A Systematic Literature Review

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Abstract

While the migration of highly skilled workers and professionals from developing countries is traditionally viewed as detrimental to the source countries, the emerging concept of brain circulation presents a controversial view on the subject. This systematic literature review investigates the concept in depth for its implications on knowledge diffusion and economic growth in the context of developing countries, to draw implications on Sri Lanka, a country grappling with severe brain drain. The study follows the guidelines of PRISMA, analysing information from 63 studies conducted between 2000 and 2024 on developing countries. Through the analysis of existing literature, the study identifies key factors influencing brain circulation, including return migration, successful reintegration of returnees, and the importance of diasporic connections. It also explores mechanisms for knowledge transfer and technology diffusion that can stimulate economic growth in developing countries. Through the lens of theories on economic development, the implications will be analysed to derive the impacts on economic growth. The findings highlight the critical need for Sri Lanka to develop strategic policies that address barriers to reintegration, foster diaspora engagement, and implement structural reforms to harness the potential of brain circulation.

Key words: Brain Gain, Brain Circulation, Knowledge Diffusion, Brain Drain, Return Migration

JEL Codes: F22, F63, O15, O33, I25

Background

Brain drain, a contemporary trend of migration, is characterized by the migration of highly skilled professionals and tertiary-educated individuals from developing to developed countries and has long been a subject of concern for policymakers and researchers. Human capital that is advanced in skill and knowledge, plays a significant role in enhancing the productivity and efficiency of an economy (Schultz, 1961; Becker, 2009; Tan, 2014). Nonetheless, brain drain depletes the human capital of developing economies, undermining their capacity for innovation, productivity, and long-term economic growth. As illustrated by Dustmann et al. (2011), Gibson & McKenzie (2012) and Gaillard et al. (2015) over the decades, these countries have struggled to retain their skilled workforce which is migrating due to critical push factors such as inadequate opportunities, political instability, and socio-economic disparities. Meanwhile, based on seminal work of Bhagwati (1976b), Beine et al. (2001) and Docquier and Rapoport (2006) state that developed economies actively attract talent, leveraging pull factors such as higher wages, advanced research environments, and better living standards.

However, controversial views such as brain circulation and skills accumulation have emerged overtime, insinuating a way forward for countries that experience acute brain drain. Brain circulation is referred to as a process by which a country can stipulate benefits from those who have left the country to progress along productivity and economic growth (Stark et al., 1997; Dodani & LaPorte, 2005; Saxenian, 2005; Mayr & Peri, 2009). The authors identify that it occurs when individuals who initially migrate for better opportunities eventually return to their home countries, bringing back advanced skills, knowledge, and access to global networks. The concept is linked to dissemination of knowledge and technology which would promote innovation and economic revitalization in countries where brain drain has taken a severe toll (De Silva et al., 2020; Bhardwaj & Sharma, 2022). Its significance lies in its potential to transform and leverage against the negatives of brain drain, converting missed opportunities of brain drain into gains and structural reformations. Returning migrants contribute by sharing expertise acquired abroad, adopting advanced technologies, and fostering innovation in the local economy (Mariani, 2008; Lissoni, 2018; Ekanayake & Amirthalingam, 2020). As a result, the process also has the capability to bridge the knowledge and technology gap between developing and developed countries.

The study also utilizes growth theories to endorse that knowledge and technology diffusion by migrants results in economic growth. Arrow's learning-by-doing model (Arrow, 1962) and Schumpeter's theory which refers to innovation and entrepreneurship (Schumpeter, 1934) as key drivers of growth, establishes that developing countries that lack the technical know-how and the innovation necessary

to drive growth. Therefore, brain circulation would act as a catalyst for economic growth in these countries as it will enable them to replenish the human capital they lost due to brain drain. It is believed that returning migrants and active diaspora members could enhance the productivity of the workforce, fostering growth in industries through innovations and structural reforms (Mariani, 2008; Mayr & Peri, 2009; Chen et al., 2022).

With a brain drain index of 7.6 (World Population Review, 2023) and a growth in the outward migration of professionals of 67% in 2022 (SLBFE, 2022), Sri Lanka faces a significant threat in terms of a deteriorating human capital. Therefore, the notion of brain circulation is of tremendous significance to the country as in this present era of globalization; brain drain cannot be eliminated in its entirety. However, there are very limited studies that focus on the topic and synthesizes the findings on other empirical instances where brain circulation has been prominent in leveraging brain drain. Contemporary studies by Saxenian (2005), Adkoli (2006), Chowdhury (2011), Gaillard et al. (2015) and Chand (2019) on the topic are focused on economies such as Bangladesh, Africa, India and China and hence, evidence can be drawn from them to the context of Sri Lanka. Firstly, the study will underscore how developing countries experience brain circulation, identifying factors that enables or hinders this process. Secondly, it will aim to analyse mechanisms of knowledge transfer and technology diffusion through return migrants in developing countries. Finally, it will examine the implications of knowledge diffusion through brain circulation, on economic growth and propose possible mechanisms for Sri Lanka to instigate brain circulation.

The paper is structured to first highlight the key concepts and theories upon which the study is grounded, and next, to illustrate the methodology undertaken. Then, it will discuss the results to fulfil three main objectives. Firstly, the study will underscore how developing countries experience brain circulation identifying factors that enable or hinders this process. Secondly, it will aim to analyse mechanisms of knowledge transfer and technology diffusion through return migrants in developing countries. Finally, it will examine the implications of knowledge diffusion through brain circulation, on economic growth and propose possible mechanisms for Sri Lanka to instigate brain circulation. The last section will include the key concluding remarks and a brief explanation of the policies recommended.

Key Concepts

Brain drain: The cross border movement of advanced human capital with a tertiary level education is known as brain drain (Bhagwati, 1976b; Commander et al., 2004; Dodani & LaPorte, 2005; Docquier & Rapoport, 2006; Mayr & Peri, 2009). Long term trends have shown that brain drain occurs mostly in developing countries, and

this labour flows to developed countries (Bhagwati, 1976a; Bhagwati, 1976b; Gibson & McKenzie, 2012; Bénassy & Brezis, 2013). As highlighted by researchers, impacts of brain drain involve low productivity and potential to grow, negative externalities to those who are left behind, economic cost to governments and hindered future potential for the economy which may result in a cycle of brain drain (Bhagwati, 1976b; Stark et al., 1997; Odhiambo, 2012; Bénassy & Brezis, 2013; Ekanayake & Amirthalingam, 2020; Chen et al., 2022).

Return migration, Reintegration and Remigration: Return migration occurs when migrants return to their home country, either voluntarily or by force (Gmelch, 1980; Arowolo, 2000; Dodani and LaPorte, 2005; Mayr and Peri, 2009; Dustmann, et. al, 2011; Gaillard et al., 2015). Temporary migrants often plan to return, while permanent migrants may return due to dissatisfaction, strict visa policies, job loss, financial issues, or family obligations (Gmelch, 1980; Dustmann, 1996; Mayr & Peri, 2009; Ekanayake & Amirthalingam, 2021b). However, about 30% of temporary migrants return within 20 years, seeking better opportunities or wishing to serve their home country Mayr & Peri (2009). Reintegration is key to a successful return, involving social adjustment and overcoming economic challenges (Arowolo, 2000; Wickramasekara, 2019; Kuschminder, 2017). Failure to reintegrate often leads to re-migration, especially in developing countries with limited opportunities or rigid social norms (Kuschminder, 2017; De Silva et al., 2020; Ekanayake & Amirthalingam 2021a).

When reintegration succeeds, returnees contribute to brain circulation, fostering innovation, productivity, and knowledge transfer in their home countries (Stark, et al., 1997; Jałowiecki and Gorzelak, 2004; Dodani and LaPorte, 2005; Mayr and Peri, 2009; Bahar & Rapoport, 2018; Chen *et al.*, 2022). Diaspora networks also enhance this process through collaboration and training (Chand, 2019). These knowledge spill overs can significantly boost developing economies, which often lack technological advancement (Bahar & Rapoport, 2018; Bongers et al., 2022).

Brain circulation: he successful reintegration of returnees leads to technology and knowledge spill overs. When they begin to work in local industries their knowledge and expertise is shared in terms of innovation, improving efficiency and enhancing productive capacity with minimal resource utilization. In addition, an active diaspora could also trigger knowledge spill overs in an economy when working in collaboration with the local labour force on certain projects or educating them through workshops (Chand, 2019). As a result, the locals would also be able to upskill themselves and acquire new skills and gain access to technology they otherwise would not be exposed to. According to Bahar & Rapoport (2018), these mechanisms will have ripple effects on the economy leading to intra industry spill overs of technology and knowledge. Subsequently, the productivity of the entire labour force

may increase leading to productive efficiency in the long run. Bongers et al. (2022) further explains that as a result of brain circulation and the skills acquisition by migrants and their contributions to the host country, both nations will experience an increase in human capital. This also leads to the conclusion that brain drain is needed for a country to benefit from brain gain.

The New Economics of Labour Migration (NELM) Theory

The theory explains that the decision to migrate is not grounded on wage differentials and other individual economic and social factors, but rather a collective decision of a household (Stark & Bloom, 1985; Taylor, 1999). It is illustrated that remittances and investments of migrants that flow back to the home country leads to production and economic activity. Additionally, the collaborative ventures with these migrants lead to knowledge and technology transfer that enhances the human capital growth in the home country (Taylor, 1999). Moreover, Taylor (1999) also elaborates that network effects from migrants could create opportunity for the home country leading to higher business activity as well as innovation. It may also result in stronger trade relationships between countries which could further stimulate economic activity. Thus, the theory underscores the multifaceted impact of migration, particularly in shaping economic growth and development through brain circulation.

Economic growth and development

Arrow (1962) suggests that human capital acquires advanced skills and knowledge by learning on the job and with overtime experience. He proved that this enhances the capacity of human labour improving efficiency leading to increasing returns to scale and sustainable growth. When applied in the context of this study, the model can be used to show that when migrants return with experience and exposure to foreign technology and knowledge they experience the same enhancement in efficiency and productivity which in return will stimulate production. Moreover, the Uzawa-Lucas model suggests that education plays a vital role in propelling economic growth as it increases productivity of the labour force (Uzawa, 1965; Lucas, 1988). Since brain circulation is a technique to spread and enhance knowledge, the local labour force could undergo training and education through this, which would increase their productivity and efficiency. On the other hand, the Schumpeterian growth model focuses on three key elements that could drive growth; creative destruction, innovation and entrepreneurship (Schumpeter, 1934).

Therefore, when these migrants return, they will have gathered much experience and exposure to technology that is only available in developed countries and is inaccessible to developing countries (Jalowiecki & Gorzelak, 2004; Harnoss, 2011). Once they return and join the labour force in their home country, local labour becomes exposed and productivity is enhanced through learning by doing according to

Arrow's (1962) model. Further, the enhanced knowledge and skill of returnees will stimulate creativity as new ideas are born through exposure to new environments driving innovation and knowledge based growth according to Schumpeterian Theory. As a result, productivity and efficiency will improve.

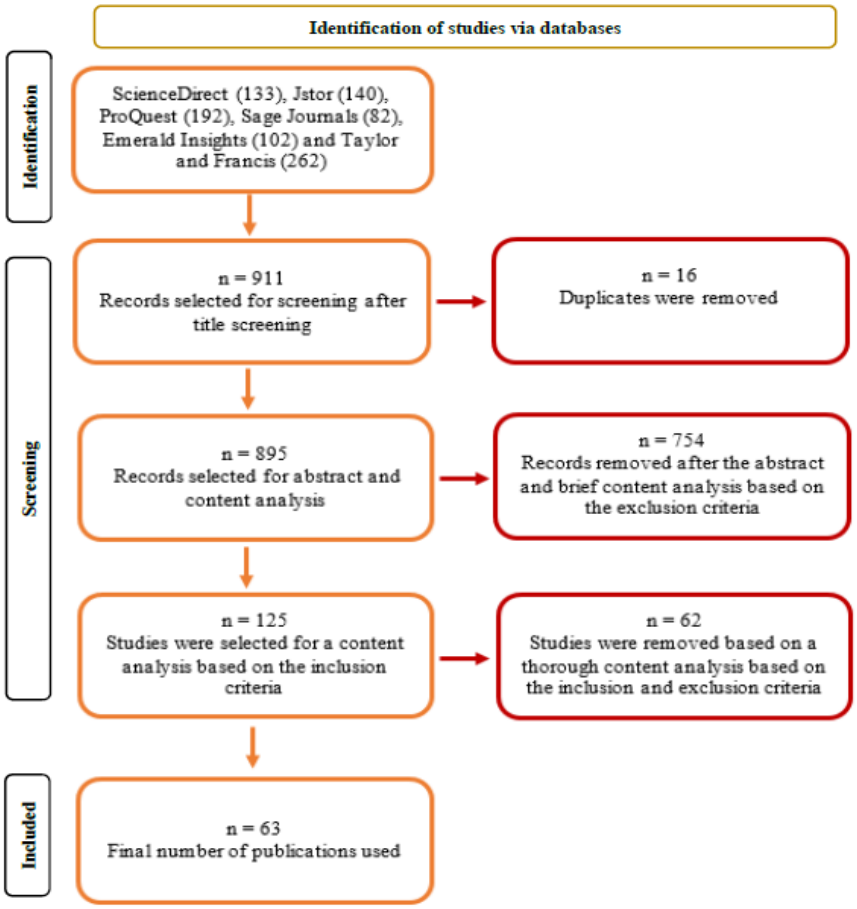
Methodology

Given the subjectivity of interpretations of reality, the study has used a qualitative methodology to conduct a systematic review of literature on the chosen topic. The search and selection strategy of journal articles to be used in the review has been formulated on the guidelines of PRISMA. Initially, the studies taken to consideration were only Q1, Q2 and Q3 articles but the empirical evidence from developing countries were insufficient based on this search. Therefore, the search was expanded and studies published in journals with an impact factor or in well-reputed, peer-reviewed journals and databases were considered for inclusion. The following inclusion and exclusion criteria was followed as in Table 1.

Table 1: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
• Studies between 2000-2024 to ensure there is sufficient research and it is not too outdated • Seminal work on the theories have been included without considering the time frame • Studies should identify how brain circulation has taken place in a developing economy • Studies that demonstrate how a developing or underdeveloped country has established connections with its diaspora and these connections have led to a brain circulation • Studies that aim to analyse mechanisms of knowledge transfer and technology diffusion • Studies that examine the implications of knowledge diffusion through brain circulation, on economic growth	• Studies that dated before 2000 • Research on brain circulation in developed countries • Studies that only focus on brain drain

Figure 1: Methodological Approach



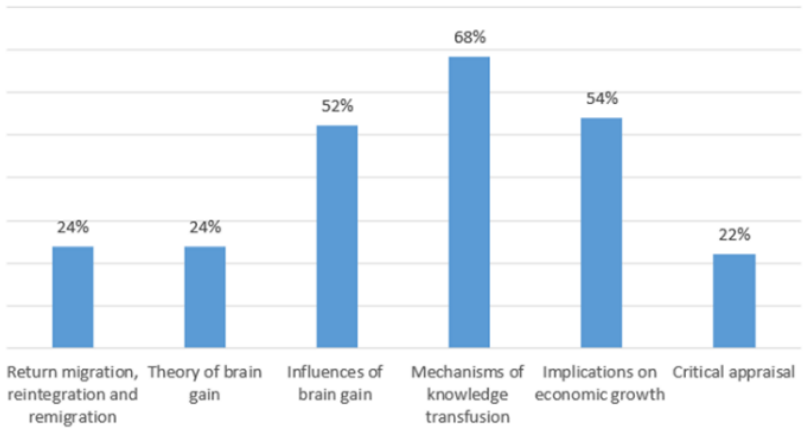
Source: Prepared by authors

As per the guidelines by Page et. al. (2021) the search strategy involved web based researching on databases indicated below and Boolean Operators "AND" and "OR" were used along with key words such as "brain circulation", "brain gain", "diaspora", "return migration", "repatriation" to generate relevant suggestions. Then these studies were further screened based on its titles, content and the relevance of information on based on the inclusion and exclusion criteria which is given below. The final count of studies stood at 63 and these were used to carry out the systematic literature review. The relevant information was extracted, tabulated and summarized and thereafter, specific themes were formulated. The results therefore, are presented in a thematic analysis.

Results and Discussion

The common themes that emerged among the findings are; return migration, reintegration and remigration, factors that influence brain circulation, mechanisms of knowledge and technology transfusion and lessons for Sri Lanka and finally, implications of knowledge diffusion on economic growth.

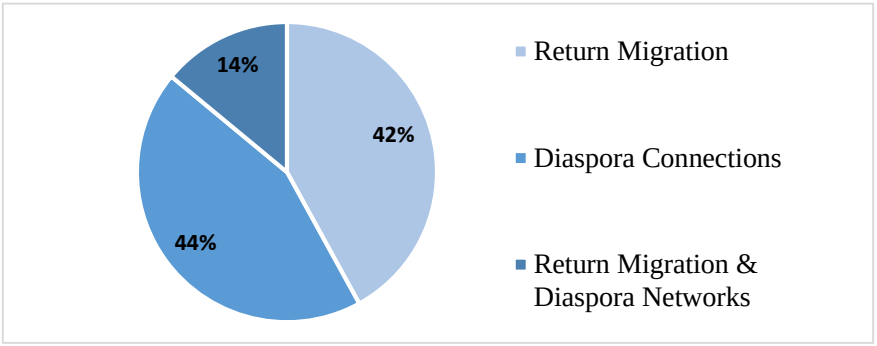
Figure 2: Classification of Papers according to Common Themes as a Percentage of the Total Journal Articles Utilized



Source: Prepared by authors

As indicated in the graph above, 24% of the studies included presents theoretical ideas on brain circulation, return migration and reintegration. Further, 68% of the studies chosen contained extensive discussions on the mechanisms of brain circulation while 54% included implications of brain gain on economic growth. These studies referred to empirical evidence observed in emerging or developing countries. Factors that promoted brain gain and factors that hindered brain gain which fell under influences of brain gain were seen among 52% of the studies chosen and 24% of the studies were used to discuss effects and reasons of return migration, reintegration and remigration. Finally, 22% of the studies contained information on the critical appraisal of brain gain, indicating that brain circulation does not promote significant growth and there are many instances where brain gain would not take place in economies that have experienced severe brain drain. In addition to the above, from the 43 studies that portrays mechanisms of brain circulation, 42% of the studies highlights how return migration has stimulated knowledge transfusion, 44% of the studies identify diaspora connections and networks bear a significant impact on brain circulation while 14% of the studies attribute brain circulation to both diaspora connections as well as the integration of skilled returnees. This is portrayed below in Figure 3.

Figure 3: Mechanisms of Brain Circulation



Source: Prepared by authors

Factors that influence brain circulation

The authors have focused this discussion on facilitators observed in developing countries as it then suits the context of Sri Lanka. As identified by researchers, the most significant factor in facilitating brain circulation is return migration also known as repatriation of highly skilled and professional migrants. When migration of highly skilled and professional labour is temporary or changing circumstances results in dissatisfaction of their decision to migrate, they may return to their home country (Gmelch, 1980; Dustmann, 1996; Arowolo, 2000; Mayr & Peri, 2009). When these workers return home they bring enhanced knowledge, communication, managerial and technical skills, and global perspectives to their home countries. The experience they have gathered and the international exposure they have gained further upskills their abilities, enhancing their knowledge which can then be shared with the local community (Commander et al., 2004; Jalowiecki & Gorzelak, 2004; Bahar & Rapoport, 2018; Chand, 2019). For this process to be complete, a successful reintegration is of utmost importance. According to Langa, (2018), the Chinese government has recognized the potential of return migration and implemented programs like China's "Thousand Talents Plan," which incentivizes returnees through financial rewards, housing, and professional opportunities. This brings the vital economic support these migrants require as soon as they return.

Further, infrastructure development with support for research and development along with a positive economic outlook may also facilitate brain circulation as these encourage return migration (Beine et al., 2001; Mayr & Peri, 2009). This is because most migrants leave due to the lack of support given to researchers and a negative economic outlook. Moreover, according to Dustmann et al., (2011) and Ekanayake & Amirthalingam, (2020), if the skills gained abroad command higher wages or are more valuable in the home country as opposed to the host country, it incentivizes

return migration. Additionally, Hall, (2005) explains that policies to innovate encourages return and therefore a solid framework should be available to support inventors and protect their intellectual property.

Similar to economic reintegration, social reintegration should and also occur simultaneously. In India, policies such as dual citizenship laws, voting rights for expatriates, and reduced barriers to migration creates a supportive social environment for diasporic engagement and return migration (Langa, 2018; Rajan & Arcand, 2023). Moreover, as many migrants prioritize reconnecting with cultural roots and supporting family, highlighting the importance of emotional ties, it is important to ensure that community reintegration succeeds (Chacko, 2007; Gaillard et al., 2015; Wickramasekara, 2019). Consequently, the minds of repatriates would be at ease facilitating a clear path for uninterrupted knowledge and technology diffusion. These measures are meant to facilitate a smooth transition back to the home norms of the home country so that they could reintegrate successfully. Additionally, some skilled and professional migrants leave on a temporary basis to advance their skills but they have a strong motivation to return home and contribute towards the development of the home country and therefore they will be driven to return (Kurokawa, 2023). According to the author, this was observed among Sudanese returnees from Japan.

Connections with the diaspora is another facilitator of brain circulation. As per the findings of Fongwa (2018) and Ferdous & Das, (2024), stable connections with the diaspora, which consists of highly skilled and professional migrants among many, may open pathways to global professional networks established by expatriates enable ongoing collaboration, even without physical return, creating pathways for innovation and economic development. Moreover, these members could also initiate programs like the Carnegie African Diaspora Fellowship illustrate how temporary engagements can channel diaspora expertise to home countries (Chand, 2019; Gnimassoun & Anyanwu, 2019; Ojo, 2023). Globalization too has acted as a significant facilitator of brain gain as its advancement has increased the geographic mobility of labour, especially that of highly skilled migrants who already possess occupational mobility of labour (Stankovic et al., 2013). Moreover, the advancement in technology and the interconnectedness that globalization has brought to the world has also strengthened the ties that source countries have with their diaspora. This is evident in the cases of India and Bangladesh where members of the Diaspora has facilitated the inflow of investments as well as knowledge sharing in the IT and Healthcare sectors (Saxenian, 2005; Adkoli, 2006).

On the other hand, there are also factors that would prevent migrants from returning to their home countries, thereby hindering the process of brain circulation. According to Langa (2018) and Chand (2019), there is a significant resource gap in terms of facilities as well as human capital in the African higher education sector which has

resulted in many academics being overburdened with teaching loads and prioritizing other factors such as being physically present at all times in the institution as it is required. These conditions prevent professionals from focusing on delivering a quality education and it has occurred also due to the lack of infrastructure and the brain drain from this sector (Odhiambo, 2012; Langa, 2018). Consequently, it may also prevent repatriation and brain circulation leading to more brain drain. A similar situation can be observed in the healthcare sectors of African economies as well as in Pakistan (Crush & Pendleton, 2010; Zafar, 2023). These circumstances could also entrap a country in a cycle of brain.

Lack of job opportunities with attractive remuneration, better working conditions such as hybrid working opportunities, unstable economic and political environments, lack of career progression in the home countries are also elements that would prevent return migration as observed in Eastern European developing countries, China and 37 other developing countries including those in South and South East Asia (Mayr & Peri, 2009; Beine et al., 2011; Yu, 2021; Rajan & Arcand, 2023). These elements are also the same reasons why individuals initiated the migration but overtime these predisposing factors have not been solved. The reasons being, poor governance, corruption, weak institutions, nepotism and bureaucracy which have hindered the meritocracy of governing bodies and authorities (Chacko, 2007; Stankovic et al., 2013; Gaillard et al., 2015; Chand, 2019). Ekanayake & Amirthalingam (2020) indicates that due to these unresolved predisposing factors in Sri Lanka, many who migrated to the Gulf region prolong their stay or they re-migrate to OECD economies, becoming permanent migrants in the process. Consequently, this will lead to a net brain drain. However, it is important to note that there are also security concerns as they may have opted for asylum in a foreign country.

Moreover, returnees may face challenges in reintegrating into society, including stigma or lack of recognition of their foreign experience. When locals do not possess the same international exposure to multi cultures, their perceptions become narrow which may lead to a discriminative attitude towards foreign graduates and those with foreign work experience (Wickramasekara, 2019; Rajan & Arcand, 2023). Further, in his study on the ASEAN member states, Wickramasekara (2019) notes that local communities may not recognize the true potential highly skilled workers and professionals who have trained abroad may possess and therefore their skills and knowledge will not be valued. Additionally, (Saxenian 2005) illustrates that in some instances in India and China existing societal structures has not supported the kind of entrepreneurial activities that returning migrants might want to initiate. As a result, these repatriates may struggle to reintegrate to the local culture, impairing their ability to work efficiently and transfuse knowledge to the local community. However, certain skills and technology are non-transferable and the lack of collaborations

between academia and the industry may further hinder the potential to successfully transfer technology and knowledge (Dustmann et al., 2011; Stankovic et al., 2013). Ultimately, it will result in remigration and a brain drain with no gains.

Mechanisms of brain circulation and lessons for Sri Lanka

There are mechanisms that facilitate the knowledge transfer and diffusion process and these may vary depending on the characteristics of the country. According to Mayr and Peri (2009) and Langa (2018), digital and collaborative networks are used in African nations for virtual learning and curriculum development so that members of the Diaspora can contribute their knowledge. Regional partnerships too, could aid the approach and the local system gains access to foreign knowledge (Saxenian, 2005; Yu, 2021). Further, Radwan & Sakr (2018) and Bhardwaj & Sharma (2022) indicate that expertise can be shared for special one-time research projects as well where migrants return to the home country to collaborate with the locals in the same industry. Moreover, with the advancement in technologies and high-speed internet facilities, migrants can connect through online platforms for real-time collaborations which has been observed in Bangladesh and India (Saxenian, 2005). Briggs (2017) also proposes that inventions created through collaborations between diaspora members and local scientists could obtain joint patents so that both countries could benefit from new innovations. Sri Lanka could also adopt the same strategy as many of the migrants now reside in developed countries and it could be a good opportunity for them to contribute to the country. However, Sri Lanka lacks the technological capacity to facilitate online collaborations, especially in rural parts of the country which are the regions that most need the assistance of these professionals.

Moreover, training, conferences and workshops can also be carried out by members of the diaspora or arrangements with migrants can be made, to come back to their home countries to deliver these workshops or mentor locals in the same profession (Beine et al., 2001; Wickramasekara, 2019; Rajan & Arcand, 2023). This could also lead to an effective transfusion of knowledge and expertise. The healthcare and science sectors of Sri Lanka can benefit significantly as these industries are struggling without experienced professionals to guide the fresh graduates. Further, students from rural areas may also attend these training and workshops which could also lead to knowledge and technology spills in the rural parts of Sri Lanka where those in poverty have limited access to education and training opportunities to upskill themselves. However, these professionals may not come voluntarily at all times and therefore, the government of Sri Lanka or industries that bring them down may have to incentivize these professionals which could be costly as the government also has a significant fiscal deficit along with debt servicing costs to manage.

To encourage the process of brain circulation through returnees, Ekanayake and Amirthalingam (2021a) and Yu (2021) suggests incentives for expatriates to return could be given, including tax breaks, housing assistance, and funding for start-ups. Additionally, research Institutions could be enhanced and investments could be injected to local universities so that their status and capabilities can be elevated to attract returnees which was a strategy undertaken by Chinese universities in rural areas (Yu, 2021). While these could be expensive strategies, it guarantees stable knowledge and technology transfusion overtime as migrants would be living in the home country. However, these incentives alone may be insufficient in the context of Sri Lanka as the country grapples with long term developmental issues as well as fiscal deficits, which limits the government's ability to spend. Therefore, a more feasible option for Sri Lanka could be an institutional reform where engaging members of the diaspora with local policymakers could improve the business environment and regulatory framework to foster the growth of technology sectors.

Diasporic groups, such as the Ghana Physicians and Surgeons Foundation, contribute to healthcare improvements and knowledge sharing among the healthcare sectors in African nations(Crush & Pendleton, 2010; Chand, 2012; Fongwa, 2018). This strategy can also be followed by the science and technology sector in Sri Lanka which is currently struggling to contribute to the economy. According to Gaillard et al. (2015), mapping and connecting expatriate scientists with their home countries can facilitate collaboration and knowledge exchange. This could even foster the essential environment for research and development lacking in developing economies such as Sri Lanka as many scientists and inventors have left the country. However, it should be understood that the main reason these professionals leaving the country is the lack of infrastructure and remuneration to support their work.

Professionals who establish business networks while abroad can facilitate technology transfer and knowledge diffusion upon their return (Ekanayake & Amirthalingam, 2020). Prato (2022) introduces the Endogenous Interaction Network model which emphasizes that inventors learn from one another, and their interactions can enhance their productivity, creating knowledge spill overs across borders. These transnational networks are associated with zero economic cost but the government and the private sector industries which needs these connections to expand should take the initiative to connect with these migrants abroad. Further, these connections may also open up export opportunities which could in the long-term create attractive job opportunities resulting in more migrants returning to the home country (Chacko, 2007; Fongwa, 2018). According to Grossman (2010), networks with Chinese diaspora in the USA has resulted in a significant flow of investments to mainland China and the business models have evolved to reflect the US context which has also been the cause for its success. These investments will have a profound impact on economic development

as these are injections to the circular flow of income and they also create job opportunities to the local community. Thus, Sri Lanka should take this approach for sectors which they already have a comparative advantage in the global market so that they could first focus on expanding these sectors and its exporting revenue.

Such connections with emigrants could also be established through organizations and Durmaz (2022) explains how Turkish diaspora in Germany connected their scientists with the country resulting in significant knowledge spill over effects through data obtained from 466 Turkish scientists residing in Germany. Similarly, Bacchi (2016) and Polishchuk et al. (2023) expresses how Egypt has benefitted through their scientists in Austria, and how the Ukrainian science community has established the Ukranian Science Diaspora to maintain connections with the home country and rebuild it after the war and respectively. As a result, these countries gain knowledge access to innovations in the field and will be able to enhance the productivity of local scientists and nourish its field of science through new inventions. However, the study also explains that Intellectual Property Rights restricts the knowledge shared by these scientists (Durmaz, 2022). Moreover, according to Gëdeshi & King (2021), although Albania has established a community with its diaspora members who are scientists, academics and researchers, the country has not been able to engage successfully with them due to institutional weaknesses in embassies and relevant government organizations.

Moreover, there is also a need for Institutional change and international emigration could result in the evolution of the institutions in the origin countries. The impact can be two fold according to Beine and Sekkat (2013), and the first impact concerns the influence of emigration through people who have left as they can voice concerns more in a way they would be heard by policymakers in the home country. The second impact relates to the transfer of the norms of the host country to the home country and skilled migration is capable of achieving this (Beine and Sekkat, 2013). Thus, such reforms could make the institutions more competitive in the home country which may lead to more knowledge transfusion. Further, Wang (2015) explains that efficiency in institutions would enable more migrants to become cross border brokers of knowledge and technology thereby making the process more impactful. This is further endorsed by Jackson (2011) who explains that these institutional reforms are needed to strengthen the ties between the diaspora and the home country, connecting the groups to relevant private or public sector organizations to collaborate on projects.

The flow of remittances to the home country from highly skilled and professionals is generally quite high as their incomes too are high (Ekanayake & Amirthalingam, 2020). The study further elaborates that they remit a significant proportion of their income especially when their families reside in the home country. Consequently, it sets off a spending spiral which would encourage Foreign Direct Investments (FDI)

into the economy as business confidence will be high. When these foreign firms come into the country they would bring in their technology and knowledge and overtime will also begin to attract highly skilled workers which would result in a return migration of professionals and highly skilled labour that migrated (Javorcik et al., 2011; Khachoo & Sharma, 2016; Baškot, 2020). Moreover the technology brought in by these firms and the repatriated highly skilled migrants will trigger a knowledge transfusion and innovations stimulating industrial growth (Khachoo & Sharma, 2016). Further, highly skilled and professional migrants may remit money back to the home country in terms of business investments which will come in with their newly obtained expertise and furnished entrepreneurial skills (Stankovic et al., 2013; Ferdous & Das, 2024) which may further enhance the knowledge creation and sharing process. However, according to Offenberg and Rivera (2011) who have experimented the remittance flow of highly skilled workers to Latin America, illustrates that as the level of skill and knowledge increases the amounts they remit back to their countries is less. This is based on survey data received from 117 Latin Americans and the reasons for these low level of remittances has been identified as the high income taxes and the recession suppressing their ability to survive in the host country and remit money.

Setrana and Tonah (2016) also emphasize on the importance of maintaining links and relationships with the host country after returning home. The study demonstrates that these links enables the home country to continuously benefit from knowledge and technology diffusion overtime. The experience is drawn from Ghana, where it is indicated that maintained connections even after returnees are back in the home country, enhances the global competitiveness.

Implications of knowledge diffusion on economic growth

The exposure to new technology and knowledge along with the work experience, upskills migrants resulting in human capital development. According to Parthasarathi (2002), Khadri and Meyerb (2013), Shamsu (2017) and Gupta and Basole (2020) the IT sector in India saw significant gains in terms of technological progress in the software and BPO branches as a result of knowledge diffusion. As a result, India has been able to increase their export of IT services to the rest of the world, thereby contributing to the expansion in the economy as well. Additionally, African academia too, has seen numerous improvements to their education system especially in terms of curriculum development with the interaction of diaspora (Langa, 2018). Moreover, De Vreyer et al. (2010) suggest that return migration from OECD countries results in a higher productivity and higher wages. However, it is seen among those who have exposure in OECD countries. These developments would aid the country in providing an updated quality education to the future generations, increasing the potential for growth. According to the Uzawa-Lucas model, education through knowledge

transfusion and upgraded education systems to reflect the current needs of economies would increase productivity leading to sustainable economic growth.

According to Arrow (1968), learning by doing, working experience leads to specialization which enhances productivity and leads to innovation. Likewise, the experience gained by migrants overseas, would lead to innovations and the development of cutting edge technology. Further, when returnees educate the local labour force, they pass down this knowledge to them thereby increasing their potential too. The sectors that experience the knowledge transfusion will see sustained growth overtime as these returnees and diaspora members who share their knowledge, are creating the future generations who will drive productivity in these sectors. Consequently, a rise in productivity is inevitable with innovations on the rise and as a result GDP would increase stimulating economic growth. Nonetheless, based on the research conducted in South Africa, Levin and Barnard (2013) suggest that it has been proven that in some instances the knowledge from returning managers is not always beneficial to local firms in the country. It is however explained that it is beneficial in instances that the firm needs innovation and new knowledge for industries. Such knowledge spill overs also lead to positive externalities among communities. Further, the skills acquisition by the local communities will increase their incomes enabling rural communities to afford education and other essential products (Hall, 2005; Hussain, 2015). The rising competitiveness of industries causing them to expand will create jobs to those who have been unemployed and as a result their families will too will benefit.

With sustained growth in specific sectors overtime, countries may expand production to a level where they could export these products. They would be able to attain a competitive edge or even a comparative advantage in the global market which would then provide the opportunity for these countries to export to many destinations with a lower competitive and comparative advantage (Bahar & Rapoport, 2018). As a result, these industries will expand further, creating jobs for many which would even remedy the problem of unemployment faced by most developing countries, including Sri Lanka. Income levels of these individuals would increase, enabling them to spend on goods and services, improving their standards of living. Overtime, it would lead to increasing returns as indicated in the endogenous growth models which would further increase production, job creation and economic development. Moreover, entrepreneurial activity of diaspora may also trigger innovation in the economy, leading to higher productivity and unique inventions may also capture the global market bringing in a competitive advantage to the country (Liu et al., 2010). Such developments could pave way for export led growth, which would increase the GDP leading to the economic development that many developing countries hope to attain. Further, the rise in incomes could also trigger the spending multiplier in an economy,

increasing the speed of growth and its trickle down effects may reduce poverty levels prompting economic development.

Overtime, with the home country's labour force being upskilled through brain circulation, it may attract MNCs that produce goods and services in the manufacturing, tertiary and quaternary sectors which are usually of high economic value (Javorcik et al., 2011). Further, while returnee entrepreneurs also leads to knowledge spill overs they will also fuel the investments needed for innovation in high-tech firms in emerging economies according to Liu et al. (2010) which would also stimulate entrepreneurial activity as established above. Based on the Schumpeterian growth model, investments and entrepreneurial activity leads to innovations and creative destruction overtime where new technologies developed by the workers themselves could take over the existing technology, thereby enhancing productivity. The teachings of the NELM model also highlight the vital role played by returning entrepreneurs and multiplier effects caused by remittances to the home country, explaining that these result in economic activity otherwise unattainable by some developing countries that have significant investment gaps (Taylor, 1999). Moreover, these firms would also employ locals and migrants could return to take up attractive job opportunities created by these MNCs.

Nonetheless, Lien & Wang (2005) argue that while brain gain is a possibility and has been observed, it depends on the probability to migrate. The authors suggest that even if brain gain was to take place, if there is a higher number of highly skilled workers leaving the home country there will be a limited number to absorb the knowledge and technology that is transferred to the home country. Moreover, the connections with Diasporas have to remain strong to collaborate with these groups so that they could continue to assist the home country. Further, repatriation and reintegration has to succeed for brain gain to occur and even if reintegration is to succeed, the repatriates should not be of the age of retirement which would limit their capacity to serve in the labour force (Dhar & Bhagat, 2021). As a result, brain gain will not take place.

Conclusion

Brain circulation offers a transformative framework for mitigating the detrimental effects of brain drain and harnessing its potential for economic growth and knowledge diffusion. While brain drain has traditionally been viewed as a challenge for developing nations like Sri Lanka, this study emphasizes that with strategic reintegration, diaspora engagement, and structural reforms, the negative impacts can be reversed into opportunities for innovation, productivity enhancement, and sectoral development. Empirical evidence from various developing countries demonstrates the significant role of returning migrants and active diaspora in driving technological advancements, educational improvements, and entrepreneurial activities. For Sri

Lanka, with its pressing brain drain issue, fostering brain circulation requires addressing barriers to reintegration, creating conducive environments for knowledge transfer, and leveraging diaspora networks. Implementing targeted incentives, promoting international collaborations, and building institutional capacities are essential strategies to stimulate economic development through brain circulation. However, achieving these goals will require sustained policy focus and collaboration among stakeholders.

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