Brain Drain in Finland; A Real Threat or a Myth and its Impact on Finland's R&D Capabilities

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BRAIN DRAIN IN FINLAND; A REAL THREAT OR A MYTH AND ITS IMPACT ON FINLAND'S R&D CAPABILITIES

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The phenomenon of 'Brain Drain' or 'Human Capital Flight' is actively discussed in Finland recently. It is the phenomenon in which highly educated and skilled people leave the country where they attained their education and skills. The official statistics and data show that it is an alarming situation with every passing year in Finland. The phenomenon is widely observed in all sectors, but the most affected sectors are research-based fields, natural sciences, biosciences, humanities, anthropology, psychology, statistics, and core-engineering fields. However, is this really a brain drain phenomenon or something else? The focus of this paper is to explore the brain drain phenomenon's existence in Finland based on officially available data. The paper also investigates the main causes of brain drain, its future effects on Finland's R&D capabilities and the Finnish economy. This is a review article about the brain drain phenomenon based on previous studies and official quantitative data from Statistics Finland. This paper serves as the basis for the development of a research instrument to further analyze the situation in future research.

Keywords: brain drain, human capital flight, innovations, R&D, Finland

1. INTRODUCTION

Today's fast-paced world is highly dependent on intellectual and skilled workers in all walks of professional life. Extensive research has been carried out internationally both in developed and developing countries regarding the sustainability of intellectuals in the country of residence. As the world is shaping into a global village, it is a big challenge for countries to retain their brilliant minds.

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This phenomenon is defined as a part of the broader topic of human capital flight. The term refers to the movement of highly skilled and well-educated individuals to different countries other than their country of residence or where they learned those skills. The net loss during this process of emigration is referred to as 'brain drain', while net benefit is sometimes called 'brain gain'. An example of the biggest brain drain in recent times is Iran. According to the International Monetary Fund's 2006 ranking for brain drain among 90 countries (developed and developing countries included), Iran ranked highest in brain drain. The report showed around 180,000 people leaving their home country each year due to multiple factors such as job market complications, social reasons, and a lack of research opportunities according to international standards. The approximate cost of brain drain's impact on Iran's economy was over 50 billion USD in the form of overall economic crisis and loss of talent. Recently, the country took great measures to retain their skilled and highly educated workers (IMF, 2006).

Although extensive practical research has explored the dynamics of brain drain, it was mostly performed in developing countries (Beine et al., 2008). Little research is done in developed countries to calculate the net loss in terms of brain drain and its long-term economic impact (OECD, 2002, p. 1). When we talk about Finland specifically, in the recent past no long-term research has been carried out to monitor brain drain levels, its impact on the overall economy and the R&D capabilities of the country (OECD, 2017, p. 96). There is some data available from Statistics Finland and national TV Yle in the form of surveys and interviews, but it does not measure the real impact (Yle, 2017). This need is illustrated in many ways: for example, innovations in the last decade in Finland seem to be very limited, if we compare them with the earlier decade or two. After the 2007-08 international economic meltdown and Nokia crisis within Finland (Economist, 2012), nothing remarkable happened in terms of innovations and new product development in the last decade, even though the economy is relatively stable now (Filippetti & Archibugi, 2011). Why is the highly innovative country struggling to keep up the pace of introducing innovations which were its trademark and selling point in the international market (Kivim & Kerna, 2016)?

It is increasingly evident that the lack of these groundbreaking innovations and advances will have a broader impact on the economy in the long term until the problem of brain drain will be addressed. In previous literature, many responsible factors were discussed such as Nokia's sudden setback, the world economic meltdown, euro instability and the lack of marketing strategies for its crucial products in the international market (Atkinson & Morelli 2011). But one important cause which has not been intensively studied by researchers in Finland is 'Brain Drain' or 'Human Capital Flight' of top researchers and academia (Acatiim 2016). The intellectuals in this segment are not only people of Finnish origin but also brilliant minds around the world who came here to study, research, and work in different fields. The phenomenon is more proactively discussed in the media after the new

fee structure imposed on non-European students and researchers by parliament after 2016 (ICEF, 2016).

Brain drain has three main types, namely organizational, geographical, and industrial (Investopedia, 2017). To further our understanding, we only explored the *geographical* type of brain drain. The research questions driving this paper are as follows:

- **RQ1:** What is the intensity level of the brain drain phenomenon in Finland?
- **RQ2:** What are the possible reasons for brain drain or human capital flight in Finland?
- **RQ3:** Does the brain drain phenomenon have a direct impact on economic growth and the R&D capabilities of Finland in the long run?

To investigate these research questions, we have adopted a review approach which is based on the already available quantitative data on Statistics Finland, YLE news portals, and the related best available literature to date.

The rest of the paper is structured as follows: first, the extensive literature on the brain drain phenomenon, the brain drain phenomenon in Finland, and Finland's past and current innovation performance. This is followed by a description of the research methods used in the study. The findings of review data and research are then presented in the form of results. The last extensive portion is a discussion, which answers the RQs, implications, limitations of the study, and directions for future research.

2. LITERATURE REVIEW

Overall, literature on brain drain is quite rich, and the whole phenomenon is explained in close connection to the migration of individuals between continents and countries (Docquier & Hillel, 2012). But most of the literature revolves around the movement of highly skilled individuals from developing countries to developed countries (Docquier, 2014). According to some researchers, it is good for both of the countries involved in the whole process of migration (Clemens, 2015). However, some believe that it is only good for destination countries and some consider it good for developing countries in cases when these skilled migrants send capital back home or come back with innovative skills (Gibson & McKenzie, 2012). Both capital and innovative skills help the developing countries progress (Dustmann et al., 2011).

On the other side of the story, many studies show that once the migrants have moved to the destination countries, it is still not known how long it would take for them to incorporate into the system and play key roles in the growth of the country (Blanchflower & Shadforth, 2009). Moreover, there is always a chance that if the migration is not well planned statistically, by checking which professional segment

needs how many trained migrants, the process will again lead to brain drain even though the migration was legal and successful (Ngoma & Ismail, 2013). However, a few studies show that if immigrants are moved to rural areas they directly help to explore entrepreneurship opportunities in villages (Munkejord 2017). This is rather a complicated topic which involves so many factors that it is hard to make a universal strategy to avoid brain drain (Gibson & McKenzie, 2011). Each country must set up its own specialized rules and laws regarding migration associated with brain drain and how to minimize the damage.

The economic growth and R&D capabilities of a country is another side of the picture which is connected to brain drain. Again, in the literature opinions on this topic are divided. Some believe that the migration of highly skilled workers to destination countries enhances the economic and innovative growth of that country (Ratha et al., 2011), while others believe that it is a two-way process and both countries (source country and destination country) benefit from this migration (Clemens, 2015). Apparently, that means it is more brain gain than brain drain. But many studies also show that this is not always the case and brain drain somehow dominates one way or other (Eggert et al., 2010).

However, all the previously mentioned literature explains the brain drain phenomenon when one involved country is developed and another one comes under the category of a developing country – meaning brain drain occurs from developing country to developed country (Beine, 2008). Somehow, it is observed in Finland's case that both of the countries involved in the brain drain phenomenon are categorized as developed countries, yet brain drain still exists (Acatiim, 2016). This means movement of skilled workers from one developed country to another developed country (Biavaschi, 2016). The movement of highly skilled workers from central Europe to the United States and vice versa is one of the key examples (Castles et al., 2013). The main point is that it is not usually considered brain drain until it starts to affect the source country in terms of its own economic growth and loss of R&D capabilities in the long run (Gibson & McKenzie, 2012). There is very little research on this type of geographical brain drain in which both the source and destination countries are already well-developed countries. Finland is an example of such a type of brain drain in the last decade (Acatiim, 2016).

It is also worth to point out that the migration of highly skilled workers, professors, scientists, and researchers to other countries has reached an alarming rate (Koikkalainen, 2017). The official statistics show that the number has doubled from 2011 to 2016 (Statistics Finland, 2016). Although in and out-migration was always observed in Finland especially when the country was in its developing stage (Kero, 1980), this present brain drain phenomenon, when the country has already topped global rankings many times as the most innovative country in the world, presents a really worrying trend (Gray, 2017).

In 2017, Petri Koikkalainen, the head of the Finnish Union of University Researchers and Teachers highlighted many disturbing facts in one media interview about the ongoing brain drain situation (Yle TV, 2017). According to Koikkalainen,

there are huge cuts in state funding to research centers in Finland in all universities. He claimed that the main issue is not that people move abroad for research and scientific work, but that they never come back. Additionally, we aren't able to attract a similar level of foreign experts to Finland. He also added that most of the experts who suffer from this situation belong to the natural sciences, biosciences, humanities, anthropology, psychology, and statistics fields (Koikkalainen, 2017). The lack of resources and unstable contracts lead to the splitting and migration of research groups abroad (Radio Suomi, 2017).

The research and innovative history of Finland forced us to have a comparative review of the past and present R&D values of Finland. The small island country in the North achieved many innovative milestones, a decade earlier or so, which really changed the face of science in the world (Herring, 2008). A few notable innovations that Finland brought into the world prior to 2008 include: the universal mobile phone Nokia 1100 (2003), Polar's wireless wearable technology (1980s), SSH the universal tool for secure computer administration (1995), Linux (1992), IRS (Internet Chat Relay System 1988) and finally Erwise, the first available graphical web browser in 1992 (Nybergh, 2016).

There are also hundreds of other different types of innovations that the country of 5 million inhabitants introduced to the world (Aro & Heiskala, 2015), but if we look at the last decade there are not so many promising innovations from Finland like in the past (Juntunen et al., 2013). Is this connected to the lack of sustainability of Finnish and foreign minds in Finland or it is something else? No specialized study has been done yet to explore this important relationship between brain drain and the R&D capabilities of Finland. There is also no quantitative or qualitative study carried out which could calibrate the relationship of brain drain with economic growth and the R&D capabilities of Finland in the long run. In the next section, we will talk about the methodology involved in this paper and its data set.

3. METHODOLOGY

The methodology of this article is based on the overall literature and quantitative data available related to 'Brain Drain in Finland'. We performed a critical analysis of the officially available data from various possible angles to answer our research questions comprehensively. The main sources of information which are used include: the existing literature related to the brain drain problem in Finland, authenticated surveys done by broadcasting channels (YLE TV), OECD reports regarding migration and the official data of Statistics Finland (stat.fi).

The lack of retrospective and consistent data on international human capital flight has always limited the ability of researchers to analyze the brain drain myth. This paper has utilized data from various best available sources. The data on the

emigration of skilled workers from Finland is from Statistics Finland's official database. OECD reports and the EU database regarding the movement of skilled workers within the EU and out of the EU is also used to answer the RQs. The surveys conducted by the national TV of Finland (YLE TV) in the last decade also played a key role in evaluating the whole brain drain phenomenon in Finland.

Since Statistics Finland and Yle TV are the main sources of data for this study, we include a brief description of the data sources, data collection methods, and techniques used by them. The data collection methods used by Statistics Finland are based on the extraction of data once a year from population registers from all municipalities. The data is delivered to Statistics Finland after the notification of administrative courts to update the population register. Both migration and immigration data are recorded by population registers and later submitted to Statistics Finland (Stat.fi, 2018). We acquired this data online from the official public portal of Statistics Finland.

The national TV of Finland published many informative articles regarding the brain drain phenomenon on their YLE news website (both in the English and Finnish language). These articles and reports are mainly based on their own surveys conducted on a random dataset, data extracted from Statistics Finland, different surveys conducted by the Education and Culture Ministry, Eurostat data and data from Euro-student surveys. The national TV also conducted interviews with key professors and researchers from time to time who have done intensive research in their respective fields.

The Finnish National Agency for Education also conducted an official survey in 2016. The dataset of the survey comprised the Finnish students living abroad and getting a higher education with Kela's (The Social Insurance Institution of Finland) study-related benefits. The online survey form was sent to about 3,787 international Finnish students on Kela financial aid. Around 1422 answers were received out of 3787 students (Kauppalehti, 2018).

Analyzing all mentioned resources and some independent reports regarding the brain drain problem in Finland is the key methodology for this study. The critical review of available data, articles, and reports helped us answer our research questions and formulate the results and discussion parts of this study.

4. RESULTS

The methodology of this review article is based on the previous studies and surveys as mentioned in the earlier sections of this paper. The results are also interpreted from the official data of Statistics Finland and YLE news surveys.

The emigration and immigration data updated in December 2017 from Statistics Finland gives a real picture of the current situation (Fig. 1). According to this offi-

cial data, the net emigration of Finnish citizens is higher than immigration. Most immigrants and emigrants' age ranges between 25 to 29 years of age. There were 6407 educated people, which was 18 percent of all immigrants, and 56 percent of them were men. On the contrary, the emigrants aged between 25 to 29 years old were also numerous and 2971 fall in this group. The difference between immigration and emigration was 3436 with 57 percent of women in this group. There was also huge inter-municipal migration within Finland between urban and rural municipalities also reported which is, for now, not the scope of this paper.

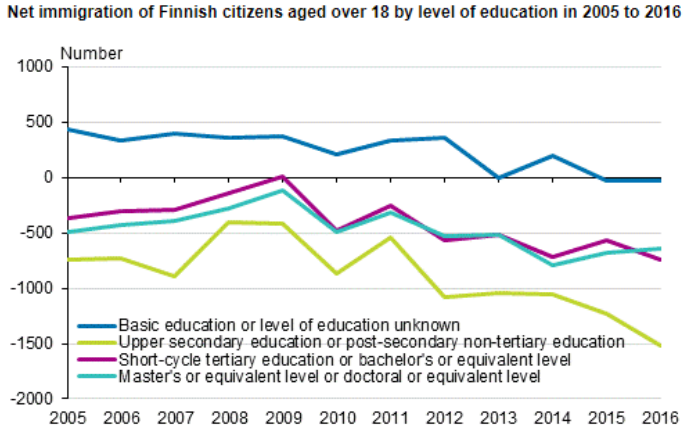

Fig. 1. Net immigration levels of educated Finns between 2005-2016 (Statistics Finland, 2017)

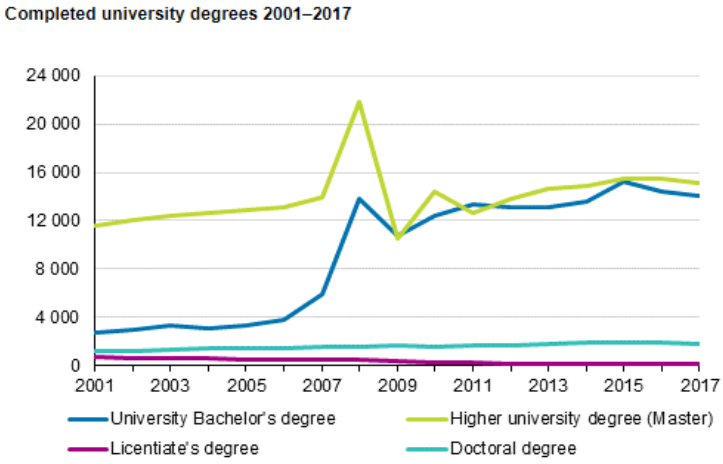

Fig. 2. Students who completed university degrees in 2001-2017 (Statistics Finland, 2018)

The data shows greater emigration of individuals having upper secondary qualifications, PhDs and researchers in the last decade in comparison to the immigration of similarly qualified people who immigrated to Finland. According to official data of Statistics Finland, about 274 highly trained researchers left Finland in 2011, but this number has nearly doubled to 500 in 2016. In the similar period, only 200 equally qualified people came to Finland leading to net loss of brilliant minds by Finland and a worrying situation. The following graph from Statistics Finland also shows the fall of 7% in the number of Doctorate students in 2017, which means Finland is already producing fewer PhDs than ever and even those people are moving abroad.

Acatiim, another trusted magazine of researchers, professors, teachers, scientists and research organizations in Finland, publishes regularly about human capital flight in Finland. According to this magazine, a total of 1963 Finnish graduate students moved back to Finland in 2005-2015. On the other hand, in the same period, 3124 Finnish graduates emigrated to Europe and other parts of the world. This shows net immigration is negative with –1161 individuals and 59% of graduate students coming under the term brain drain. Brain drain has really accelerated over the 2005-2015 decade (Acatiim 9/2016).

The official survey conducted by the Finnish National Agency for Education, as mentioned earlier, received 1422 answers. The results of this survey clearly highlighted the brain drain phenomenon. Irma Garam, a representative of the Finnish National Agency for Education, disclosed the results to Finland's renowned newspaper Kauppalehti in May 2018. According to Garam, very few Finnish students think that they would like to come back to Finland. Of the respondents, 89% believed that the atmosphere abroad is very important, they preferred the atmosphere of their post-graduate residential country over Finland. Only 22% of students find Finland attractive and 76% of students think that the international community, labor, and foreign students are important factors. Respondents of the survey also said that the poor employment situation, lack of opportunities, and a socially unfocused environment made Finland unattractive. They also claimed that these are a few of the important reasons for a labor shortage in Finland along with many other reasons (Kauppalehti, 2018).

5. DISCUSSION

This review study investigates the brain drain or human capital flight phenomenon in Finland. It also discusses the potential mechanism, factors involved in the phenomenon and their impact on Finland's R&D capabilities in the future. To our knowledge, this is the first review study which is fully focused on Finland regarding the brain drain phenomenon, the reasons for it, and its R&D impact.

The results, which are based on the official data acquired from Statistics Finland and news articles published by YLE, indicate that the brain drain problem not only exists in Finland but also got worse in the last decade or so, especially after the 2007-2008 economic meltdown. This is aligned with the many international studies conducted in other countries which concluded that economic problems play a key role in human capital flight (Iravani, 2011). The results also showed that the phenomenon of brain drain is worse for highly educated people in Finland. The emigration of highly skilled workers, researchers or scientists is always alarming for the R&D capabilities of any country's future (Docquier & Hillel, 2012).

RQ1: What is the intensity level of the brain drain phenomenon in Finland?

The statistics described in the results chapter clearly show the intensity of the brain drain phenomenon in Finland. The statistical data shows that the rate of emigration of highly skilled workers is far higher than the influx of equally qualified people into Finland. There is a difference of 3436 individuals between those who emigrate and those who immigrate. The Acatiim reports also show the negative immigration (-1161) of researchers, scientists, professors and teachers over the period of 2005-2015. The Finnish National Agency for Education survey also showed that 89% of respondents preferred the post-graduate residential country atmosphere over Finland in many aspects such as living and working. This huge percentage of respondents who don't want to come back to Finland after completion of their education and training, shows that the intensity level of the brain drain phenomenon in the coming years will be high. All the results, based on statistics and surveys, clearly demonstrate the intensity of human capital flight in Finland.

RQ2: What are the possible reasons for brain drain or human capital flight in Finland?

The previous studies and data review show that there is no single reason behind the brain drain phenomenon in Finland. There are multiple factors and reasons, which caused extensive loss of brilliant minds in the last decade. The most important ones are push and pull factors driving skilled emigration, a shift in the quantity and quality of innovation capabilities in Finland, a lack of central body to monitor and guide the highly skilled workforce (such as a brain drain think tank). Additionally, the lack of uniform cooperation channels within Finland between Finnish and foreign researchers in Finland, complicated visa policies for foreign students and researchers working in Finland, unstable or short-term contracts for researchers, and huge cuts in research funding in the recent past in many segments are seen as the prominent reasons for brain drain in Finland. The survey results of the Finnish National Agency for Education also directly highlighted many reasons why educated and skilled Finns don't want to come back to the home country post-graduation. In their opinion, a stagnant employment situation, lack of opportunities, narrow-mindedness about internationalization and a cold attitude are a few of the reasons among many other social factors.

RQ3: Does the brain drain phenomenon have a direct impact on economic growth and the R&D capabilities of Finland in the long run?

To our best knowledge, there is no direct study performed in Finland to measure the impact of brain drain on economic growth and the R&D capabilities of Finland. However, if we closely observe the number of innovations in the last decade (2007--2017) and compare them with 1997-2007, we can clearly see the difference. As mentioned in the literature review section, the innovation and R&D capabilities of Finland before 2007 revolutionized the world in many ways and made Finland well known for its innovativeness, but the last decade was not that promising. There are many factors and reasons behind this weak performance, but one of the key reasons is less sustainability of scientists, researchers, and skilled workers in Finland. It is believed that the lack of innovative products and cash cows introduced by the country locally and internationally has a direct impact on the economic growth of the given country (Teece, 2010). So, brain drain does affect the economic growth and R&D capabilities of Finland in the long run.

As this is a review study and previously no extensive research has been done in Finland on brain drain and measuring its impact on long-term R&D capabilities, by depending on Statistics Finland, YLE news data, and similar international literature we can answer the research questions within certain limits. The greater impact of brain drain in specific age groups (25-29 years of age) in comparison to all other age groups is possibly because this "Millennials" group is more ambitious or there is a lack of opportunities for them in their home country (Edwards, 2016). Another explanation for brain drain in the given age group is that they must make a fresh start on the job market in Finland and they consider it the same as having to start working in another country in Europe with equal or less struggle (Pyoria et al., 2017).

This review study has one important limitation which is a lack of local literature and research on brain drain in the past, especially in connection with economic growth and the R&D capabilities of Finland. There is data available for migration (emigration, immigration) on Statistics Finland but there is no study which quantitatively measures the impact of brain drain on the R&D capabilities of Finland in the long run. A similar kind of study has been conducted in New Zealand where they found the need to balance global migrant pressures and the country's international obligations to facilitate migrants and global policy analysis (Cruickshank & Dupuis 2015). A similar type of study in Finland can be very helpful to evaluate the current situation.

Another limitation of the study is a lack of behavioral studies regarding the brain drain phenomenon. We do utilize statistical data from official sources to answer the RQs, but there is not much focus on the behavioral side of this overall phenomenon.

We believe that intensive qualitative and quantitative exclusive research is needed to explore the brain drain phenomenon, reasons behind the phenomenon,

and its impact on economic growth and R&D capabilities. For future research, we are building a research instrument to measure human capital flight or brain drain in Finland. This article is a good starting point for us and other researchers to study the brain drain myth in Finland from different angles and perspectives. This research can be very helpful for Finnish law and policy makers in the future to design such legislation which can ensure the retention of top talent and make Finland attractive for them.

Note: A shorter summarized version is also published in Siirtolaisuus-Migration 4/2018 in the Finnish language.

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DRENAŻ MÓZGÓW W FINLANDII; PRAWDZIWE ZAGROŻENIE CZY MIT I JEGO WPŁYW NA POTENCJAŁ FINLANDZKIEGO SEKTORA B+R

Zjawisko „drenażu mózgów" (ang. *brain drain* lub *human capital flight*) stało się ostatnio przedmiotem intensywnie dyskutowanym w Finlandii. Jest to zjawisko, gdy wysoko wykształceni i wykwalifikowani ludzie opuszczają kraj, w którym zdobyli wykształcenie i umiejętności. Oficjalne statystyki i dane pokazują, że w tym zakresie sytuacja w Finlandii staje się coraz bardziej alarmująca z każdym rokiem. Zjawisko to jest powszechnie obserwowane we wszystkich sektorach, ale najbardziej nim dotknięte są sektory, których działanie opiera się na badaniach, nauki przyrodnicze, biologiczne, humanistyczne, antropologiczne, psychologiczne, statystyczne oraz techniczne. Jednak czy to naprawdę zjawisko drenażu mózgów czy coś innego? Celem artykułu jest zbadanie istnienia zjawiska drenażu mózgów w Finlandii na podstawie oficjalnie dostępnych danych. W artykule przeanalizowano również główne przyczyny drenażu mózgów oraz jego skutki dla fińskiego potencjału badawczo-rozwojowego i fińskiej gospodarki. Jest to artykuł przeglądowy, dotyczący zjawiska drenażu mózgów na podstawie wcześniejszych badań i oficjalnych danych ilościowych z fińskiego urzędu statystycznego (*Statistics Finland*). Niniejszy artykuł posłuży jako podstawa do opracowania instrumentu badawczego i przyszłych badań w celu przeanalizowania rzeczywistej sytuacji w przyszłości.

Słowa kluczowe: drenaż mózgów, ucieczka kapitału ludzkiego, innowacje, B+R, Finlandia