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A photograph of a cityscape at dusk, featuring a prominent red brick church tower with a spire, several multi-story buildings with lit windows, and a white ferry boat docked at a pier in the foreground. The sky is a mix of blue and orange.

Government Innovation Funds – Recent Developments in Finland and Sweden

*By Laia Gonzáles Frixach, Paulina Płuciennik, Marisa Schmitt
and Julius Schuler*

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Abstract

The aim of this essay is to give an overview about recent developments of the government innovation funds of Sweden and Finland. In order to discover recent developments basic knowledge regarding innovation funds, funding structures and information about the two big funding agencies Vinnova Sweden and Business Finland is presented. Building on this information, the developments of the two funding agencies are compared and examined for similarities and differences. Both countries have a very similar structure in terms of the R&D sector and are striving with the same issues. Just as sustainability is a leading issue, the collaboration between the different shareholders is another main challenge. Both topics were negatively affected by the COVID-19 pandemic. Both Sweden and Finland had to really push forward innovation with financial support and political, strategic goals. Even though there are strong recent developments, the countries are facing the same challenges, do have similar funding structures and therefore have no big comparative strengths or weaknesses to each other.

1. Introduction

Innovations are one of the most important competitive advantages of a company and a country (Chursin et al., 2017; Holz-Hart & Rohner, 2014). Especially small and middle-sized enterprises (SME) have a big innovation potential. But due to the monetary intensity of Research and Development (R&D), many SMEs are not able to pursue their capabilities. (Holz-Hart & Rohner, 2014; Mina et al., 2021) Hence, other (external) investment structures are needed. One of these monetary frameworks that support researchers to develop innovations are the so-called innovation funds. (Holz-Hart & Rohner, 2014; Mina et al., 2021) With these funds, the government sets the framework for innovation funding through policies and stimulates innovations with a long-term interest towards competitiveness by overcoming the financial gap (Torregrosa-Hetland, 2019). Hence, every country has an incentive to provide an optimal investment structure for the resident innovation performers to position their country in the best possible way (van Steen, 2012; Welsch, 2005). According to the European Innovation Scoreboard (EIS) of 2020 Sweden and Finland belong to the innovation leaders in Europe. The EIS “provides a comparative assessment of research and innovation performance of EU countries” (EC, 2020a).

The aim of the essay is to give an overview of the structure of government innovation funding in the European countries Sweden and Finland (Chapter 2). In a further step the structure and the policies in the chosen countries will be compared with a focus on the most important funding agency in each country (Chapter 4). Furthermore, there will be an emphasis on the topics sustainability and collaboration to assess the development of the two countries in these areas, since these two are considered as the top future trends (Krys C., 2017; World Economic Forum and PwC, 2021). Funding by the European Union (EU) is not assessed, but the

influence of these funds within the member states of the EU must be noted. The influence of the COVID-19 pandemic is not looked at in detail.

2. Review of Literature

2.1 Definition 'Innovation Fund'

An innovation fund is a money pool that is allocated for a specific purpose to promote a goal which is growing the value of the fund over time (Baregheh et al., 2009). It supports researchers or a group of scientists to develop innovations. The funds can be provided not only by governments or governmental organisations but also by the industry within the country or from abroad and non-governmental organisations. Typically, the enterprise sector is the biggest source and performer of innovation. (BMBF, 2020; Welsch, 2005)

The government system for innovation funds is illustrated in figure 1. It belongs to the “hard” control instruments of the government, which are determined through monetary disbursements. The government is allocating money to the innovation performers directly or through intermediaries like funding agencies. Innovations are primarily forwarded by the government through institutional funding and project funding. Institutional funding refers to funds allocated predominantly to higher education institutions (HEIs). Project funding describes grants or loans that are given to innovation performers within a specific research or development project. (van Steen, 2012; Welsch, 2015)

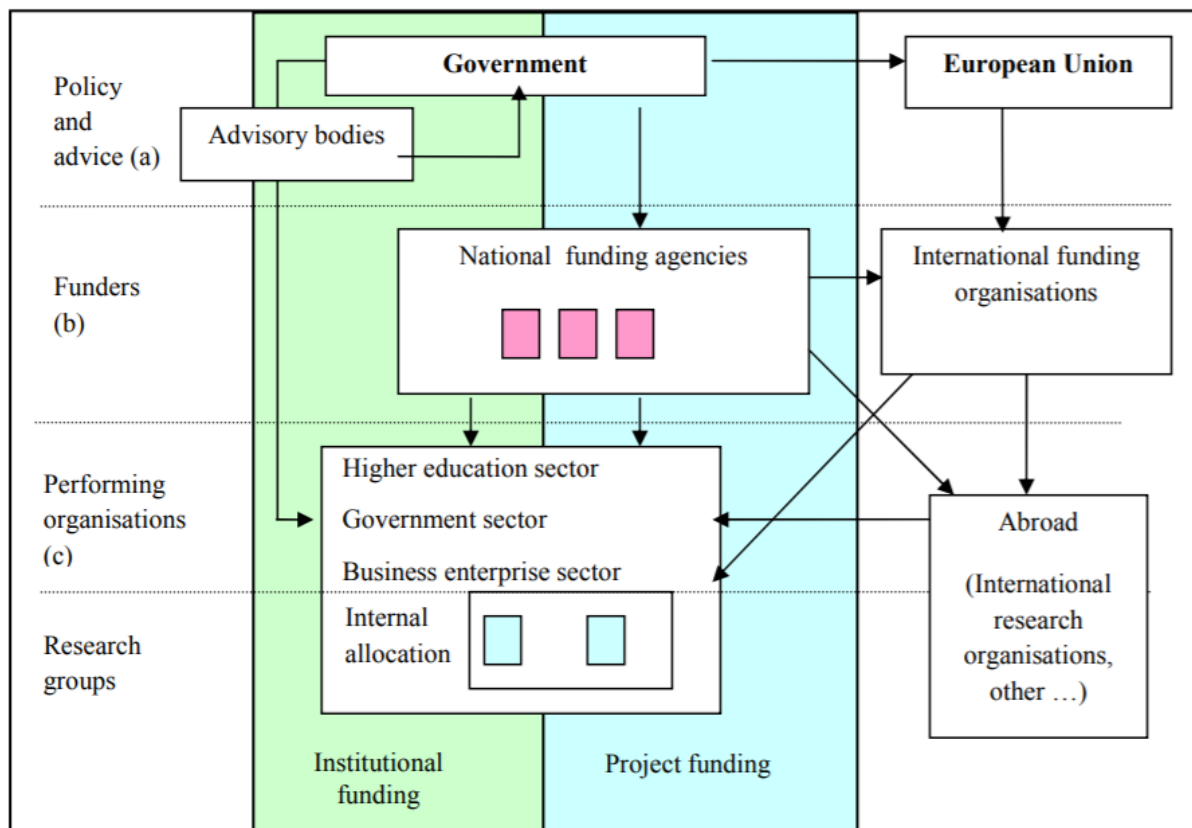


Fig. 1: System of government innovation funding for EU members (van Steen, 2012)

2.2 Finland's economy and innovation system

Finland's economy is mainly dominated by the industry, respectively the manufacturing sector. Since not many natural resources except wood are available, the strength of the economy lies especially within the human capital (Worldatlas, 2018). Overall, the government of Finland focuses on the topic of sustainable growth. Carbon neutrality, a strict and transparent law system and a dynamic and thriving system are just a few strategic aims of the government to achieve a long-term growing economy (Finland's Ministry of Environment, 2021).

Figure 2 shows the development of the gross domestic expenditures for Research and Development (GERD) and the shares of the source sectors in the GERD. The GERD of the year 2019 is after the lowest point with €5,926 million in 2016 approximately at the same level as in the year 2009 (Eurostat, 2021a). In 2019 the GERD was €6,715 million (Eurostat, 2021a), which corresponds to 2.8% of the GDP (Eurostat, 2021b). The GERD was financed primarily through the business enterprise sector, even when the share of the sector in the GERD continuously decreased within the last 10 years. In 2019 the share was 54.3%. In contrast to that the share of the government sector increased slightly since 2009 to 27.8% in 2019. (Eurostat, 2021c). The highest proportional growth had the investments from abroad with an increase of approximately 9.0%. In 2019 15.5% of the GERD was financed from abroad (Eurostat, 2021d).

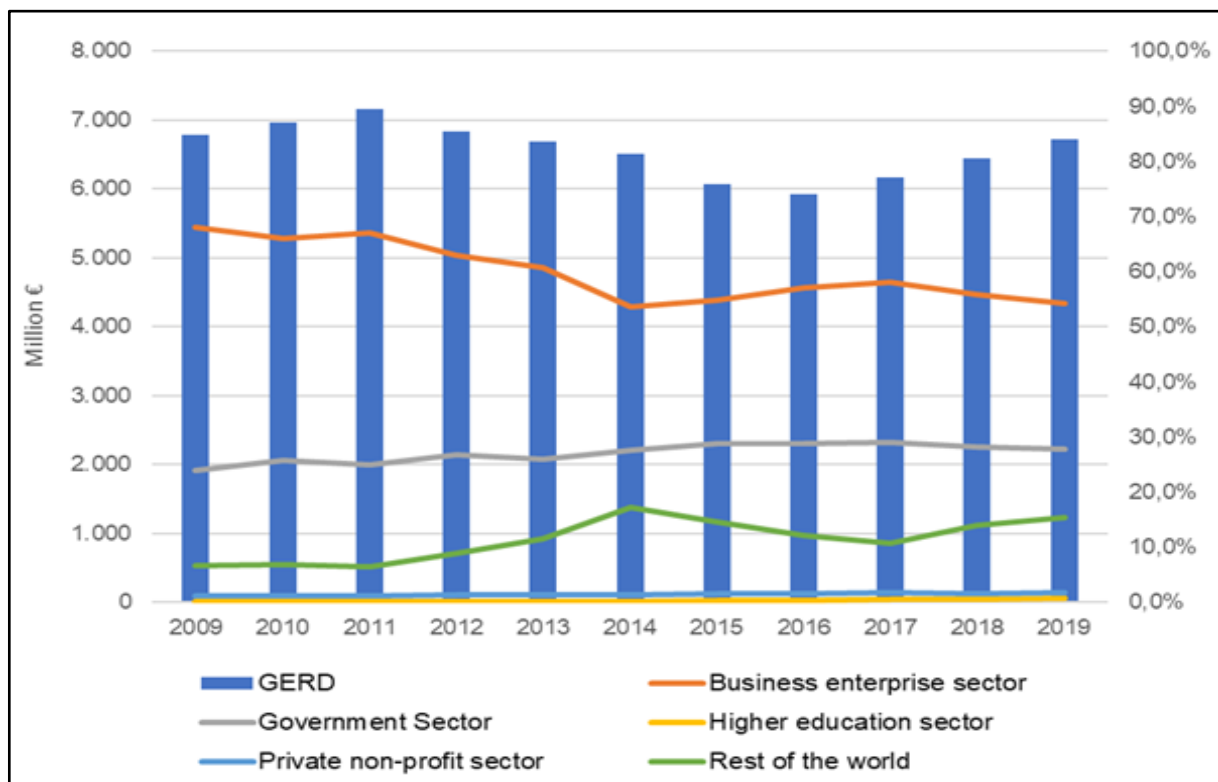


Fig. 2: Development of the gross domestic expenditures for Research and Development (GERD) in million euro and the shares of the sectors in percent in Finland (own figure based on Eurostat, 2021a; Eurostat, 2021c; Eurostat, 2021d)

The R&I system of Finland has multiple players (see figure 3), which can be categorised by four levels. The first and highest level consists of the parliament and the government and sets

the national guidelines for innovation policies and strategies. It is advised by the Research and Innovation Council (RIC) (Naumanen & Hyvönen, 2015; OECD, 2017).

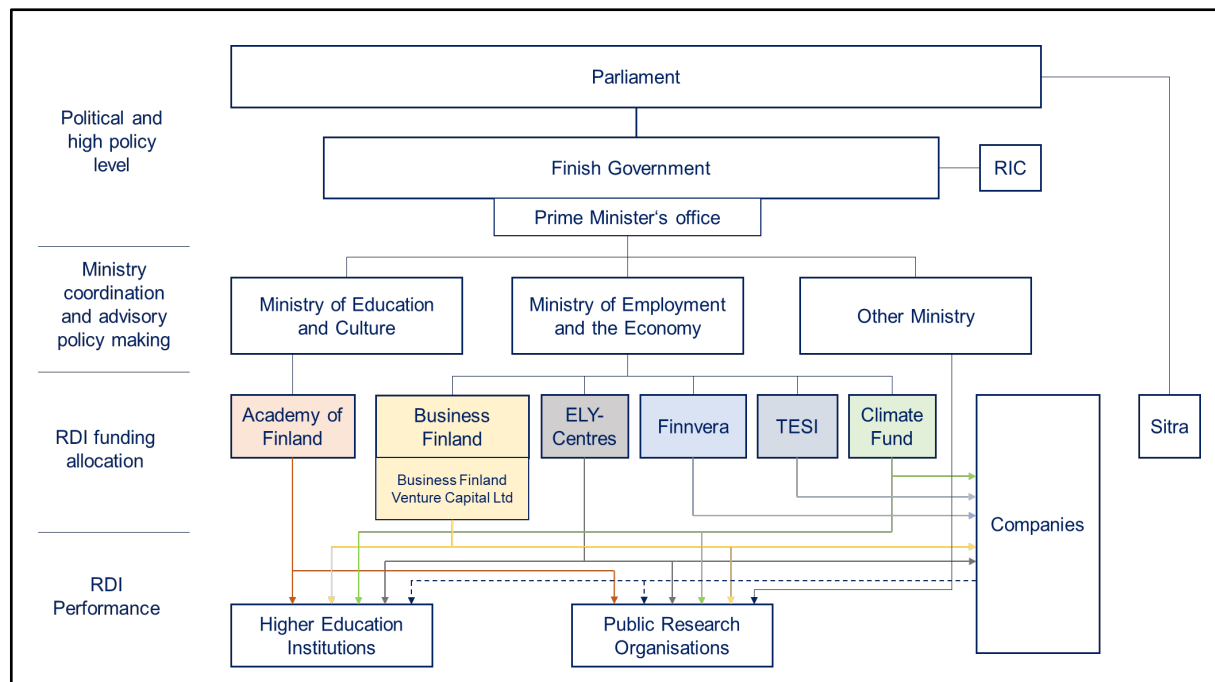


Fig. 3: Finland's R&I system (own figure based on Halme et al., 2018; OECD, 2017)

The second level is represented by the ministries, which allocate the national fund directly or indirectly to the RDI performers. (Halme et al., 2018; Naumanen & Hyvönen, 2015) The main actors are the Ministry of Education and Culture (MEC) and the Ministry of Economic Affairs and Employment (MEE). With 60.0% the MEC disposed of the majority of the budget in 2019. The MEE allocated 28.7% of the government R&D funding. (Statistics Finland, 2020a)

The third level is built by the funding agencies. Finland has seven governmental funding agencies: Academy of Finland, Business Finland, Finnvera, TESI, Sitra, the ELY-Centres and the Climate Fund. (Halme et al., 2018; Naumanen & Hyvönen, 2015) The most important players are the Academy of Finland and Business Finland. Hence, only these two funding agencies are described in more detail. The Academy of Finland funds research in high education institutes and public research institutes (Halme et al., 2018; Naumanen & Hyvönen, 2015). In total 23.4% of the governmental R&D expenditures are allocated to the Academy of Finland through the MEC in 2019 (Statistics Finland, 2020b). Business Finland was founded in 2018 by a merger of the two funding agencies Tekes and Finpro (Business Finland, n.d.a). It is the state-owned agency of innovation (MEE, n.d.a). In 2019 the MEE allocated 23.1% of the national fund to Business Finland (Statistics Finland, 2020b). The main target group are innovative small and middle-sized enterprises (Business Finland, n.d.a; Halme et al., 2018). In 2018 51.9% of the total funding was given to start-ups and SMEs (Business Finland, 2019a).

The last level are the organisations that actually perform the RDI. The biggest Finnish research organisation that must be named is the Technical Research Centre of Finland (VTT). (Halme et al., 2018; Naumanen & Hyvönen, 2015)

2.3 Sweden's economy and innovation system

The main industries in Sweden are metal and steel manufacturing as well as the trade with wood (Elchburger, n.d.). The Swedish government plans to raise their R&D budget significantly in the next three years to become “one of the world's foremost research and innovation countries and a prominent knowledge nation” (Ministry of Education and Research and Ministry of Enterprise and Innovation, 2020).

Between 2009 and 2017 the Swedish GERD averaged €13,730 million per year (Eurostat, 2021a). Figure 4 shows the development of GERD over the last decade with the distinction of the five source sectors. The report does not include data on the government sector and the rest of the world for the year 2015. For this reason, the data for this year is estimated. As can be seen in the bar graph, GERD has an upward trend and in 2017 it reached its highest value of €16,142.23 million, thus increasing by 51% since 2009 (Eurostat, 2021b). The main sector of investment was constantly the business enterprise sector, accounting for approximately 60% of the GERD each year. The government sector is the second biggest source of the GERD with approximately 22%, followed by investments from abroad. The HEI sector was the smallest source of funds and had never exceeded €140,000.



Figure 4: Development of the gross domestic expenditures for Research and Development (GERD) in million euro and the shares of the sectors in percent in Sweden (own figure based on Eurostat, 2021a; Eurostat, 2021c; Eurostat, 2021d)

The Swedish government builds the first level of the innovation system, which is shown in figure 5. The government is advised by the NIC, the Swedish National Innovation Council (Prime Minister's Office, n.d.). The second level is represented by the Swedish ministries. The Ministry of Education and Research and the Ministry of Enterprise and Innovation are the main players on this level and allocate the majority of the national innovation funds (Chaminade et al., 2010; EC, n.d.). In the Swedish innovation system, the academic sector receives a

significant part of the funding. The sector absorbs about two-thirds of the resources allocated to R&D, which are mainly financed by the central government (Naumanen, 2015).

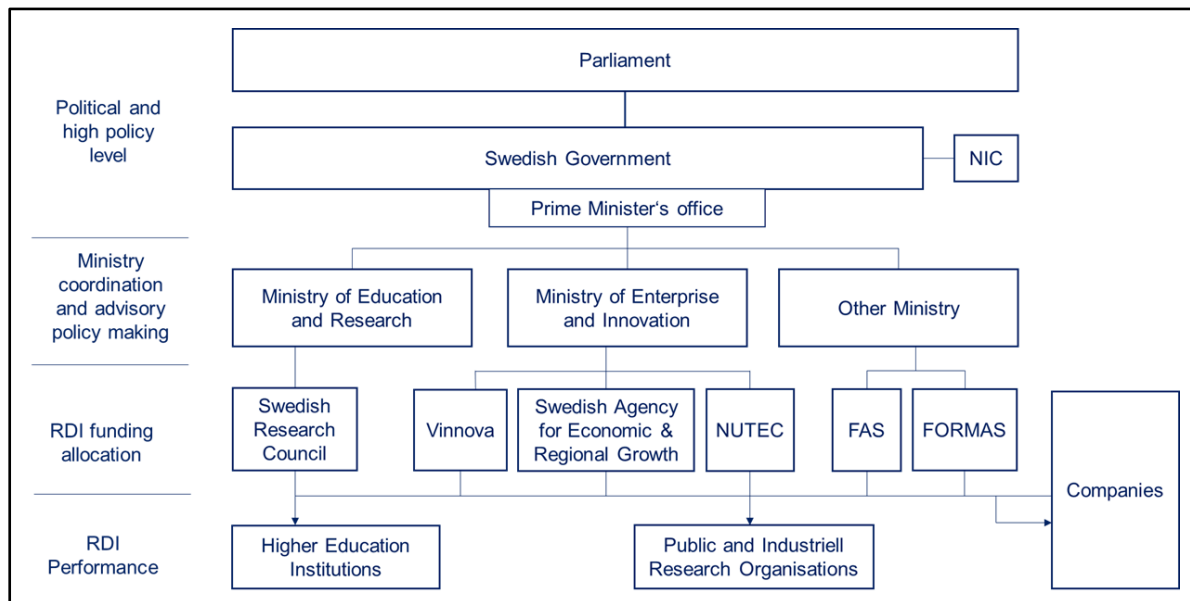


Fig. 5: Sweden's R&I System (own figure based on Chaminade et al., 2010; EC, n.d.; Naumanen, 2015; OECD; 2016)

The entities responsible for managing the R&D budget in Sweden are government agencies, which are represented on the third level. The major player is the Swedish Innovation Agency Vinnova. Its main objective is to promote sustainable development and to make Sweden a leader in research and development as well as a country that is attractive to investors. To achieve this, Vinnova funds RDI performers and stimulates cooperation between universities, companies, research institutes and the public sector. (Hallonsten & Slavcheva, 2017)

Besides Vinnova there are more intermediate agencies that allocate the innovation funding to the RDI performers. For example, the Swedish Research Council invests in basic research. Apart from that, other actors, e.g., the Swedish Agency for Economic and Regional Growth and the Swedish Energy Agency, provide venture capital and fulfil an advisory role across the different innovation stages. (Naumanen, 2015)

The last level is built by the actual RDI performers. There are multiple institutes and organisations that perform R&D. For example, there are the Research Institutes of Sweden (RISE), which represent a network of (partially) state-owned Swedish research institutes (EC, n.d.; Government Offices of Sweden, 2020; Naumanen, 2015). The main objective of RISE "is to be internationally competitive and to work for sustainable growth in Sweden by strengthening competitiveness and innovation in the business sector" (Government Offices of Sweden, 2020).

3. Methodology

In the conclusion the R&D spending, the structure of the innovation systems as well as the major governmental funding agencies will be compared. Since sustainability and collaboration are very important topics regarding innovation funding, these will be discussed as well. In order to do the comparison both source categories, literature and personal interviews, are used. In

addition to the literature, semi-structured interviews are held in order to get more in-depth information. For this, a prepared guideline with open questions that can be chosen situation-related gives the opportunity to lead the interview into the desired direction but also the option to react spontaneously to the answers of the interviewee. This increases the chance of a broader topic range (Kaiser, 2020; Maylor & Blackmon, 2005). The Interview partners are Mika Pikkarainen, a ministerial advisor of the Finnish Ministry of Economic Affairs and Employment and Peter Eriksson, the head of the department Operational Development at the Swedish intermediate agency Vinnova.

4. Comparison

Figure 6 shows the Finnish and Swedish GERD and the share of the sources of the funding by sectors in percentage of the respective GDP. For Sweden the shares of the government sector and investment from the rest of the world are estimated for the year 2015, since no data is available for this year. In both countries the business enterprise sector contributes the most to the R&D expenditures, followed by the government and investments from abroad. While the Swedish GERD stays relatively stable over the years, the Finnish GERD decreased by approximately 1% from 2009 till 2017. This can be explained by a reduction of R&D spending by the business enterprise sector. According to Mika Pikkarainen this was caused especially by a decline of the telecommunication cluster. The shares of the other fund sources on the GDP are similar in both countries and are rather constant over the years. Further analysis of the R&D spending can be found in chapter 2.

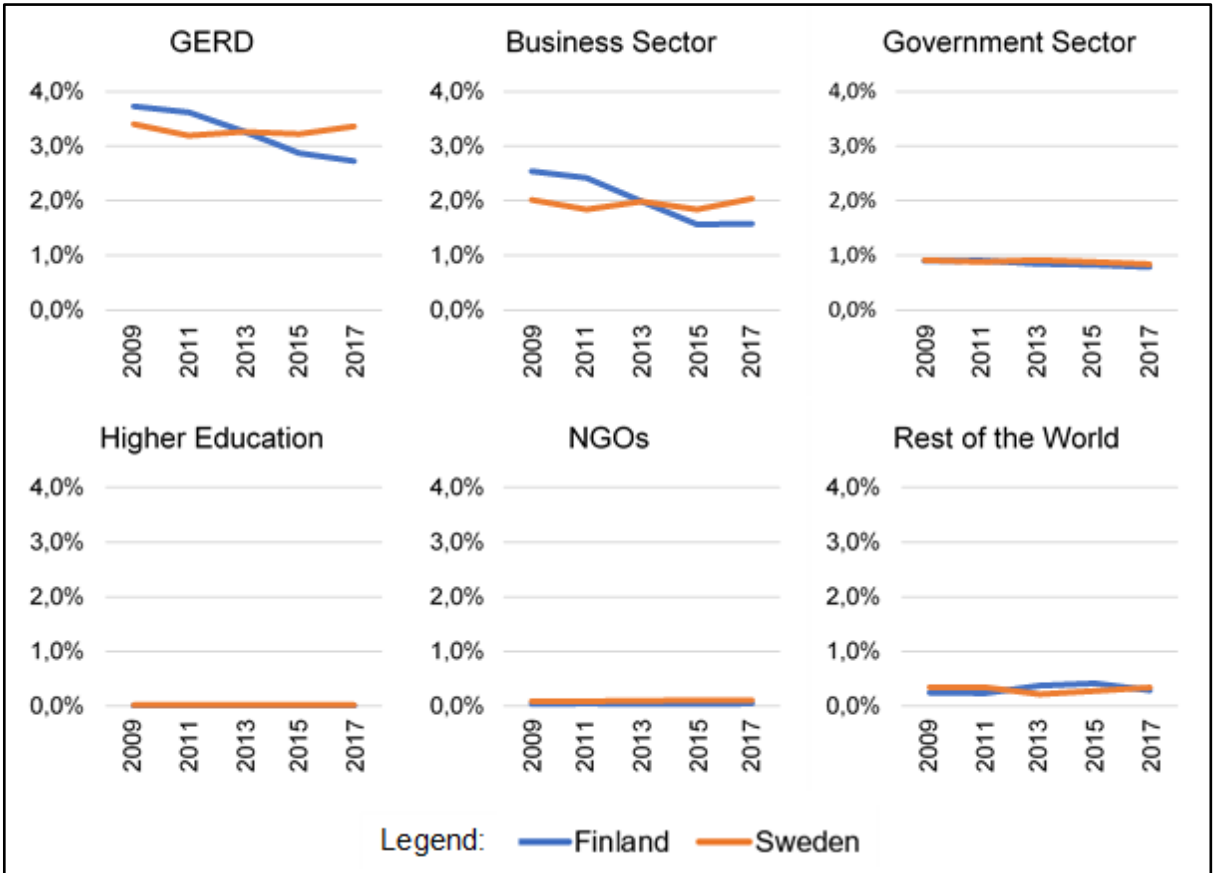


Fig. 6: Comparison of the Finnish and Swedish GERD and the share of the source of fund by sectors in percentage of the respective GDP (own figure based on Eurostat 2021d)

Both countries want to increase their R&D spending. The Finnish government is planning to raise the R&D expenditures to 4% of the GDP till 2030, which corresponds to an additional spending of €600 million each year. Two-thirds of the increase shall be funded by the private sector and €200 million by the government sector. (Ministry of Finance, 2021) As mentioned earlier, the Swedish government plans to increase their budget for R&D. While Sweden will be spending additional 3.4 billion SEK (equals €333 million) in 2021, the country plans an increase of 3.75 billion SEK (equals €362 million) till 2024 compared to the year 2020 (Ministry of Education and Research and Ministry of Enterprise and Innovation, 2020). According to the Research and Innovation Bill of 2020 the high increase in 2021 is influenced by the lower private R&D spending due to the COVID-19 pandemic (Mansfeld, 2012).

The research and innovation systems of both countries are rather similar, as illustrated in chapter 2. Both have the same four levels, the main policies are adopted by the government and have multiple intermediary agencies. In Sweden the biggest funding agency is Vinnova, in Finland it is Business Finland. Since Business Finland was founded in 2017 by a merger of Tekes and Finpro data is only available since the business year 2018. With a relatively stable amount of funding applied and awarded in the years 2018 (€958 million, €565 million) and 2019 (€844 million, €589 million), it tripled in 2020 to €2,772 million applied funding and €1,734 million awarded funding. (Business Finland, 2021b; Business Finland, 2020a; Business Finland 2019b). The high increase is caused by the COVID-19 outbreak. Business Finland was granted an extra amount of financial resources by the government to support companies that are hit by negative effects of the pandemic (Business Finland, 2021b). Vinnova invested around 2.7 billion SEK (equals €264 million) each year and its primary task is the allocation of subsidies from this annual budget (Vinnova, 2014).

Another similarity is, that in both countries the main proportion of government expenditures for RDI is distributed through two main ministries and thus are described as “two pillar” systems. According to the MEE of Finland this system changes because cross-sectoral strategies in areas such as sustainable development, digitization and healthcare will gain in importance. Thus, other ministries will also play a significant role in the future, e.g., the ministry of the environment. Furthermore, the ministry states that this is essential in order to respond to societal challenges addressed in R&I agendas.

Both the Swedish and Finnish governments adopted an agenda for sustainable development. In April 2021 the Finnish government decided to “strengthen growth, to continue on the path to carbon neutrality and to reduce inequality” (Ministry of Finance, 2021). Important drivers in all activities are climate change, bio- and circular economy, technological development and urbanisation, declared Mika Pikkarainen. As sustainability often goes hand-in-hand with digitization, according to the MEE of Finland, a big share of the GERD is spent on these topics, which will even increase in the next few years. In 2020 also Business Finland presented their new strategy till 2025. The core areas are to enhance economic growth especially through sustainable solutions and competitiveness ensuring (Business Finland, 2020b). As stated by the MEE of Finland, Business Finland has already increasingly funded low-carbon and cleantech projects in recent years: €191 million in 2018, €189 million in 2019 and €305 million in 2020. The Finnish Government also installed a climate fund in 2020, that focuses on the areas of climate change and digitization. “The fund’s task is to reduce the carbon footprint, strengthen the carbon handprint and promote innovative climate and digital solutions.” (MEE 2020) Sweden states that sustainability is one of their core commitments. The government adopted an agenda 2030 to promote sustainable development in the country. (Ministry of

Environment, 2018; Swedish Institute, 2021) Nationwide the focus is on the topics “climate and the environment, health and welfare, digital development, skills supply and working life, and a democratic and strong society” (Ministry of Education and Research and Ministry of Enterprise and Innovation, 2020). Also, Peter Eriksson states that the topic that is researched the most is sustainability and the shift on what to focus is much clearer than ever. Vinnova pursues the objective that at least 80% of their investments should contribute to sustainable development (Vinnova, 2014). The Eco-Innovation Scoreboard from 2019 ranks both countries among the leaders. But Finland could score slightly better than Sweden. The Eco-Innovation provides a comparative assessment about the performance of members of the EU in the field of innovations that contribute to a sustainable development. (EC, 2021)

According to Peter Eriksson another major challenge of the innovation system worldwide is that the complexity of its environment rises due to globalisation, climate change and the increasing number of restrictions and policies. Taking this into account, he also stated that because of the increased complexity more knowledge and resources are needed. Hence, cooperation between RDI-performers is essential because large-scale challenges, like the green and digital transition, can be better addressed collectively (OECD, 2017; Zegel et al., 2021). Peter Eriksson specified that international cooperation is also a main part of Vinnova’s strength and method to achieve innovation. In accordance with this Mika Pikkarainen stated that a main problem about Finland’s innovation activities is that in recent years collaboration between research institutes and larger enterprises has waned and partly transferred abroad. That is why, according to the MEE of Finland, the public sector must find new kinds of partnerships and collaboration models between industry and academia, as well as more predictable public funding for enterprises. In 2018 the ecosystem policy initiative started to address this challenge in innovation activities in Finland (Zegel et al., 2021). In this context, “ecosystem” is understood as a cooperation between enterprises, researchers and public administration (MEE, n.d.b; Zegel et al., 2021). “Evaluations show that the participating firms grow faster than they would have done without the funding.” (Sunesen, 2019) According to Mika Pikkarainen, focus areas of innovation policy are different kinds of ecosystems, i.e., innovation ecosystems and business ecosystems. He also states that especially ecosystems driven by large multinationals seem to have great potential.

5. Conclusion

A clear trend can be identified. Both countries, Sweden and Finland, are planning to further increase their R&D spending in order to push forward innovation and the associated added value. Both countries are very similar in terms of their structures and provide equal funding possibilities for several actors. The expenditure measured in relation to the GDP are slightly different due to a decrease of private spending in Finland till 2009. The funding structures and future goals and challenges are comparable. Both countries not only subsidize innovation funds financially, but also use them as a social and political instrument to promote innovative strength. Significant developments are equally evident in both countries, which is why neither country has a clear comparative advantage in its culture of innovation.

Mainly there are two important developments in funding: On the one hand, the development in the area of sustainability is in the foreground. This includes subjects such as energy, mobility, digitization, carbon neutrality and further sustainability topics. These goals are strongly shaped by the state agendas, which not only pursue the goal of improving the quality

of life in the countries, but also actively fight against climate change. Finland was evaluated in the Eco-Innovation Scoreboard of 2019 slightly better than Sweden.

Another big topic in governmental innovation funds is cooperation. Connecting stakeholders and working together in an economically efficient manner has become more of a challenge. But also, cooperation is becoming inevitable due to many new issues in recent years. Cooperation is considered a major source of innovations that address societal challenges. The topic has been gaining relevance for several years and has only become more difficult due to the Covid 19 pandemic.

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Laia Gonzáles Frixach is an International Bachelor student and **Paulina Płuciennik** is a international Master student at Offenburg University. **Marisa Schmitt** and **Julius Schuler** are Master students at Offenburg University.

List of References

BMBF - Federal Ministry of Education and Research (2020) Research funding system [Online] Available at: <https://www.research-in-germany.org/en/research-funding/research-funding-system.html> (Accessed 28 May 2021).

Baregheh, A., Rowley, J. & Sambrook, S. (2009) Towards a multidisciplinary definition of innovation. *Management Decision*. 47 (8), 1323-1339.

Business Finland (2021a) Dashboard: Funding granted in 2010-2020. Helsinki, Finland.

Business Finland (2021b) Tilinpäätös 2020. Helsinki, Finland.

Business Finland (2020a) Tilinpäätös 2019. Helsinki, Finland.

Business Finland (2020b) Business Finland Strategy: Finland Defining the Future - Our Strategy for 2025. [Online] Available at: <https://www.businessfinland.fi/en/for-finnish-customers/strategy> (Accessed 13 June 2021).

Business Finland (2020c) Social Responsibility Report 2019. Helsinki, Finland.

Business Finland (2019a) Business Finland: Results and Impact 2018. Helsinki, Finland.

Business Finland (2019b) Tilinpäätös 2018. Helsinki, Finland.

Business Finland (n.b.a) About us. [Online] Available at: <https://www.businessfinland.fi/en/for-finnish-customers/about-us/in-brief> (Accessed 03 May 2021).

Business Finland (n.d.b) Funding services. [Online] Available at: <https://www.businessfinland.fi/en/for-finnish-customers/services/funding> (Accessed 02 May 2021).

Chaminade C., Zabala J.M., Treccani A. (2010) The Swedish national innovation system and its relevance for the emergence of global innovation networks. Lund, Sweden, Lund University.

Chursin A., Makarov, Y. & Vlasov Y. (2017) Innovation as a Basis for Competitiveness - Theory and Practice. Springer International Publishing, Switzerland.

EC - European Commission (2021) The Eco-Innovation Scoreboard and the Eco-Innovation Index. [Online] Available at: https://ec.europa.eu/environment/ecoap/indicators/index_en (Accessed 21 June 2021).

EC - European Commission (2020a) European Innovation Scoreboard 2020 [Online] Available at: https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_1150 (Accessed 15 May 2021).

EC - European Commission (2020b) European Innovation Scoreboard 2020. European Union, Luxembourg.

EC (n.d.) Private Sector Interaction in the Decision Making Processes of Public Research Policies - Country Profile: Sweden. Luxembourg.

EC (n.d.) RISE Research Institutes of Sweden [Online] Available at: <https://rio.jrc.ec.europa.eu/country-analysis/organisations/rise-research-institutes-sweden> (Accessed: 15 May 2021).

Elchburger (n.d.) Die Wirtschaft Schwedens im Überblick [Online] Available at: <https://www.elchburger.de/schweden/land-und-leute/wirtschaft> (Accessed 10 June 2021).

Eurostat (2021a) GERD by sector of performance and source of funds [Online] Available at: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdfund&lang=en (Accessed 02 May 2021).

Eurostat (2021b) Gross domestic expenditure on R&D (GERD) [Online] Available at: https://ec.europa.eu/eurostat/databrowser/view/t2020_20/default/table?lang=en (Accessed 02 May 2021).

Eurostat (2021c) GERD by source of funds [Online] Available at: <https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do> (Accessed 02 May 2021).

Eurostat (2021d) Intramural R&D expenditure (GERD) by source of funds [Online] Available at: <https://ec.europa.eu/eurostat/databrowser/view/tsc00031/default/table?lang=en> (Accessed 02 May 2021).

Finland's ministry of environment (2021) Government's climate policy: clima-neutral Finland by 2035 [Online] Available at: <https://ym.fi/en/climate-neutral-finland-2035> (Accessed 17 June 2021).

Hallonsten O. & Slavcheva M. (2018) RIO Country Report 2017: Sweden. Luxembourg, Publications Office of the European Union.

Halme K., Saarnivaara V-P. & Mitchell J. (2018) RIO Country Report 2017: Finland. Luxembourg, Publications Office of the European Union.

Hotz-Hart B. & Rohner A. (2014) Nationen im Innovationswettbewerb - Ökonomie und Politik der Innovation. Springer Fachmedien, Wiesbaden, Germany.

Government Offices of Sweden (2020) RISE Research Institutes of Sweden AB (RISE) [Online] Available at: <https://www.government.se/government-agencies/rise-research-institutes-of-sweden-ab-rise/> (Accessed: 15 May 2021).

Kaiser R. (2020) Offene Interviews – Von Semistrukturiert bis Narrativ. In: Wagemann C., Goerres A., Siewert M.B. (eds.) Handbuch Methoden der Politikwissenschaft. Wiesbaden, Germany, Springer VS, pp. 288-190.

Krys C. (2017) Megatrends – Rahmenbedingungen für unternehmerische Nachhaltigkeit. In: Wunder T. (eds.) CSR und Strategisches Management - Wie man mit Nachhaltigkeit langfristig im Wettbewerb gewinnt. Berlin, Germany, Springer Verlag, pp. 45-65.

Mansfeld A. (2021) The Government's new Research Bill [Online] Available at: <https://www.staff.lu.se/article/governments-new-research-bill> (Accessed: 23 June 2021).

Maylor H., Blackmon K. (2005) Researching Business and Management. New York, United States, Pelgrave Macmillan.

MEE (2020) Climate Fund starts operations [Online] Available at: <https://tem.fi/en/-/climate-fund-starts-operations> (Accessed 13 June 2021).

MEE – Ministry of Economic Affairs and Employment (n.d.a) Public research, development and innovation (RDI) funding [Online] Available at: <https://tem.fi/en/research-development-and-innovation-funding> (Accessed 02 May 2021).

MEE (n.d.b) Growth ecosystems as a tool in the new industrial and innovation policy [Online] Available at: <https://tem.fi/en/ecosystems> (Accessed 13 June 2021).

Mina A., Di Minin A., Martelli I., Testa G., Santoleri P. (2021) Public funding of innovation: Exploring applications and allocations of the European SME Instrument. *Research Policy*. 50 (1), 104-131.

Ministry of Education and Research & Ministry of Enterprise and Innovation (2020) Considerable boost for Swedish research [Online] Available at: <https://www.government.se/press-releases/2020/12/considerable-boost-for-swedish-research/> (Accessed 17 June 2021).

Ministry of Environment (2018) The Global Goals and the 2030 Agenda for Sustainable Development [Online] Available at: <https://www.government.se/government-policy/the-global-goals-and-the-2030-Agenda-for-sustainable-development/> (Accessed 21 June 2021).

Ministry of Finance (2021) Government decides policy positions for remaining part of its term and for 2022–2025 General Government Fiscal Plan [Online] Available at: <https://valtioneuvosto.fi/en/-/10616/government-decides-policy-positions-for-remaining-part-of-its-term-and-for-2022-2025-general-government-fiscal-plan> (Accessed 03 Mai 2021).

Naumanen, M. (2015) Swedish Research and Innovation Landscape. In: Durocher, L.; Gahery, A.; Hartmann, S.; Hyvvönen, J.; Khan-Malek, C.; Naumanen, M.; Pane, A.; Petersen, R.; Ruecker, G.; Stähle, H-J.; Teichmann, M-C. (eds.) *FRIENZ: Facilitating Research and Innovation Cooperation between Europe and New Zealand, Finland*, VTT, pp. 212-289.

Naumanen, M. & Hyvvönen, J. (2015) Finnish Research and Innovation Landscape. In: Durocher, L.; Gahery, A.; Hartmann, S.; Hyvvönen, J.; Khan-Malek, C.; Naumanen, M.; Pane, A.; Petersen, R.; Ruecker, G.; Stähle, H-J.; Teichmann, M-C. (eds.) *Compendium of innovation measures and national innovation system profiles*. European Union, pp. 5-61.

OECD (2017) *OECD Reviews of Innovation Policy: Finland 2017*. OECD Publishing, Paris, Frankreich.

OECD (2016) *OECD Reviews of Innovation Policy: Sweden 2016*, OECD Publishing, Paris, France.

Prime Minister's Office (n.d.) National Innovation Council [Online] Available at: <https://www.government.se/government-policy/national-innovation-council/> (Accessed: 21 June 2021).

Statistics Finland (2020a) Government R&D funding by administrative sector by Administrative sector, Year and Information [Online] Available at: https://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__t__tkker/statfin_tkker_pxt_11b9.px/table/tableViewLayout1/ (Accessed 02 May 2021).

Statistics Finland (2020b) Government R&D funding by organisation by Organisation, Year and Information [Online] Available at: https://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__t__tkker/statfin_tkker_pxt_11ba.px/table/tableViewLayout1/ (Accessed 02 May 2021).

Statistics Finland (2020c) Government R&D funding according to socioeconomic objective (NABS 2007) by Information, Objective category and Year. [Online] Available at: https://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__t__tkker/statfin_tkker_pxt_11bb.px/table/tableViewLayout1/ (Accessed 02 May 2021).

Statistics Sweden (2020) Increased funds for R&D in several expenditure areas in 2020. [Online] Available at: <https://www.scb.se/en/finding-statistics/statistics-by-subject-area/education-and-research/research/government-budget-allocations-for-rd/pong/statistical-news/government-budget-allocations-for-rd-gbard-2020/> (Accessed 06 May 2021).

Sunesen E.R., Henriksen J.J., Kantanen K., Dressler A., Suárez Buhrmann P. (2019) *World Class Ecosystem and Competitive Business Environment*. Business Finland, Helsinki, Finland.

Swedish Institute (2021) Investment in research pays off - Swedish innovation is ranked in the world top [Online] Available at: <https://sweden.se/work-business/study-research/research-in-sweden> (Accessed 21 June 2021).

Torregrosa-Hetland S., Pelkonen A., Oksanen J., Kander A. (2019) The prevalence of publicly stimulated innovations –A comparison of Finland and Sweden, 1970–2013. *Research Policy*. 48 (6), pp. 1373-1384.

Van Steen J. (2012) *Modes of Public Funding of Research and Development: Towards Internationally Comparable Indicators*. Paris, Frankreich, OECD.

Vinnova (2014) *VINNOVA: Sweden's Innovation Agency*. Stockholm, Sweden.

Welch, J. (2005) *Innovationspolitik - Eine problemorientierte Einführung*. Gabler Verlag, Wiesbaden, Germany.

Worldatlas (2018) What are the biggest industries in Finland? [Online] Available at: <https://www.worldatlas.com/articles/what-are-the-biggest-industries-in-finland.html> (Accessed 08 June 2021).

World Economic Forum & PwC (2021) *Harnessing Technology for the global goals: A framework for government action*. Geneva, Switzerland.

Zegel S., Ploeg M., Guznajeva T., Romanainen J., Salminen V., Piirainen K., Kettinen K. (2021): *World-Class Ecosystems in the Finnish Economy*. Business Finland, Helsinki, Finland.