How can diplomacy foster sustainable innovations?

A case study of Finnish policies

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Abstract

As sustainable development and innovation diplomacy remain key topics in foreign economic, trade and security policies nowadays, innovation is increasingly linked closely with sustainable development into a compiled concept of sustainable innovation. My thesis addresses the question of how diplomacy can foster these sustainable innovations. The context is that global challenges with regard to sustainable development is a central issue in diplomacy, which call for joint actions and changes in policy in order to address them and achieve sustainable development goals under the Agenda 2030.

Examining Finland as the case study, qualitative research method is applied, and data collection and analysis draw upon official reports presenting Finnish, EU and Nordic policies of sustainable development and innovation diplomacy in addition to virtual interviews with Finnish policy advisors and specialists of the fields. In total, there are 10 reports reviewed, including Finnish Voluntary National Review, Policy brief, Policy report, and Global Competitiveness Report published by Finnish Prime Minister's Office, Nordic Council of Ministers, OECD, Taloustieto Oy, Sitra, World Economic Forum, World Bank Publications, United Nations, and Research.fi from 2009-2020, all that provide data of policy overviews and strategies, national and regional plans, progress and performance evaluation. There are 7 interviewees who are Ministerial Adviser, Senior Advisor, Senior Specialist and Programme Manager that can provide valid insights due to their knowledge and expertise working for Helsinki EU Office, the Finnish Environment Institute SYKE, Ministry of Economic Affairs and Employment, Ministry for Foreign Affairs of Finland, Nordic Innovation, and Nordic Development Fund.

I argue that dimensions of sustainable development be put into the centre of innovation diplomacy policies and hence, the policies can enable global stakeholders to cope with challenges by advanced sustainable innovations generated from the soft power and diplomatic approaches. The outcome of thorough literature reviews and intensive empirical work of this thesis is a framework of diplomacy policies categorised into the domains of innovation diplomacy and sustainable development diplomacy at local, national and regional levels, whose interventions can advance sustainable innovations and simultaneously address key policy challenges of sustainable innovations: balance private sector needs and market dynamics with the global public good; and identify, evaluate and address economic, social or environmental trade-offs among stakeholders doing sustainable innovations.

As a result, the findings from the EU, Nordic and Finland works will proliferate the framework further, complementing the theoretical concepts of international relations and innovation policy, the theory of system thinking in improving mechanism of operation between actors in innovation ecosystems, and adding examples of diplomatic approaches in governance of sustainable innovation from the field work- all together supplementing the previous studies of sustainable innovation, innovation diplomacy and sustainable development diplomacy. In conclusion, the thesis reinforces diplomacy as one strategic governance model that fosters sustainable innovations and comprehensively enables global stakeholders to address sustainable development goals at all levels.

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1 INTRODUCTION

1.1 Background

Development has been a central issue for diplomacy in the post-World War II, accordingly international system and community have treated development as an obligation (Pigman G. A., 2014, p. 7) as no states could deal with global challenges alone with a single state policy and humanitarian joint actions are necessary (Leijten, 2019, p. 7) to achieve sustainable development and sustainable development goals (SDGs) under the Agenda 2030. Moreover, the universality and interconnected nature of SDGs call for changes in policy agendas to oblige all countries to apply a holistic perspective when addressing challenges. Comprehensive policy responses that governance actors need a coherent and integrated approach to sectoral policies at local and global levels (Langenhove, 2016).

The SDGs agenda has been placed at the centre of the European Union (EU)'s diplomacy and solution-oriented cooperation for development. As the global forerunner in sustainable development and innovation, the EU' international promotion of SDGs is now regarded as a key pillar integrated in diplomacy and development cooperation policies. At the same time, the EU has embraced strengthened policy coherence and taken responsibility for global shared problems, for instance collaborating with other countries in addressing negative international spillovers and achieve SDGs (SDSN & IEEP, 2019). European partnerships, diplomacy and soft power are all considered crucial to uphold the values and sustainable development dimensions incorporated in SDGs and guide stakeholders to exchange lessons in how to achieve them when facing major challenges in implementing SDG transformations (SDSN & IEEP, 2019). Apparently, the adoption of SDGs by the international community and particularly the EU has demonstrated renewed global commitment to clarifying the visions to achieve ambitious goals under this framework (Moomaw, Bhandary, Kuhl, & Verkooijen, 2017, p. 73).

Amid these policy directions and community engagements, innovations are observed to be increasingly linked closely with sustainable development that address the global problems with their direct and indirect consequences (Peterkova, 2020). Globally, the topics of innovation

diplomacy and sustainable development are now key topics in foreign economic, trade and security policies (Leijten, 2019, pp. 6-11). Complexity of the issues imply the greatest challenges for sustainable development governance and thus, evolving diplomatic processes are critical to address the linkages across issue areas, scales and actors (Biermann & Pattberg, 2008, pp. 277–294), (Falkner, 2013). Besides, a deep understanding of the problems is vital to proposing feasible solutions, mobilisation of science and technology and translation of inputs into governance practices and goals, and effective partnerships are critical to be concerned (Langenhove, 2016).

1.2 Research objectives/questions

Recent books (Schepers, 2016), (Cetindamar, Lammers, & Sick, 2020, p. 53) respectively discussed about economic competitiveness of innovation and entrepreneurial ecosystems with raising concerns by academia, policy makers and leaders about digital technologies (Dani, 2007), (Helfat, 2018). The usual understanding of innovation (process) is related to efficiency increases (Sartorius, 2005), in addition the competitive advantage created out of innovation in developing countries, and co-creation models between developed and developing countries (Halme, Lindy, Piirainen, Salminen, & White, 2014). The critics have been on capitalism and their motivation for profit and productivity (Jessop, 1997), (Aydin, 2011) in addition to discussion about market failure of innovation (Campbell, 2019; Daly H., 1992; Hart, 1997; Tassey, 2001), and the interventions of governments to address market failure (Fukasaku, 2006), particularly in governance of environmental innovation.

Of sustainable innovation, previous materials (Arrow, 1962; Glauner, 2018; Hübner & Rickert, 2001; Klaus Kotek, 2018) respectively discussed about business models, value propositions, organisational structures and governments' interventions, for instance on negative externalities or undersupply of public goods, and market failures. Set on the economic aspect and economic competitiveness, sustainability agenda is viewed as a source of opportunities to come up with innovation and create competitive advantages for businesses (Fichter, 2006; Hansen, 2009; Hockerts, 2008).

This thesis takes a conceptual approach that is focused on analysing the policy transformation that puts human and environment into the centre along with the economic aspects on the premise that global stakeholders need to cope with challenges, threats and unleash opportunities of sustainable development while acknowledging that sustainable development is compatible with capitalist markets and liberal trading order (Rio accords, 1992). I will undertake a diplomatic perspective to examine innovations and sustainable development dimensions, which compile into the concept of sustainable innovation further studied in the literature review, for its importance in upholding SDGs dimensions and guiding stakeholders in implementation and transformations (SDSN & IEEP, 2019). The thesis acknowledges the global innovation diplomacy agenda, the need to mobilise the innovation community to carry out research and solutions to global challenges of sustainable development, facilitate collaboration for innovation among stakeholders and connect the innovation communities in the realm of policy-making at regional, national and global levels.

Proliferating literature reviews from research papers, books and national reports have shown strong evidence that diplomacy for sustainable innovation has an important position in the portfolio of diplomatic practices and the global innovation agenda (Carayannis & Papadopoulos, 2011). A number of reports have showcased the diplomatic efforts in tackling global sustainable development affairs such as the report by the Ministry for Foreign Affairs of Finland on development cooperation between Finland and developing countries regarding fragility (Julia Betts, 2020), United Nations (2019) on the role of science diplomacy in transformative pathways towards sustainable development led by governments and stakeholders (Secretary-General, 2019), or OECD (2019) on the mission of diplomacy in reaching social interests and mutual benefits (peace, prosperity and sustainability) together with economic growth and trade opportunities and the need for public sector and business community to find shared value in their development investments and catalyse innovations towards sustainable development (OECD, 2019). In addition, there are papers published on partnership models for sustainable development (Beisheim, 2012), negotiation strategies (Elgström, 2017), (Moomaw et al., 2017, pp.78-79) and science diplomacy for sustainable development (Advisory Panel on Science and Technology Diplomacy, 2015; Šime, 2018; The Royal Society, 2010). These reviews discussed the ecosystem framework and their functions, institutional structures, engagement mechanisms

and tools such as foresight and roadmaps facing global challenges. The existing practices presented in the reviews, written in the last 20 years, have embraced diplomacy for sustainable innovation as a potentially strategic governance model to facilitate countries and regions dealing with SDGs priorities.

The study of diplomacy for sustainable innovation in this thesis aims at developing more insights into the regional and national practice of innovation diplomacy of such cases that tackle global challenges under the 2030 Agenda framework. In details, the concepts and various aspects and elements integrated in domains of innovation diplomacy and sustainable development diplomacy that compose "diplomacy for sustainable innovation" will be studied with the notion of policies and ecosystems of the EU, Nordic and Finland and their diplomatic processes related to innovation and sustainable development themes. One important question will be around what diplomacy policies can do and the success factors in addressing sustainable development challenges and accelerate innovations that lead to solutions.

That research question of the thesis is: *How can diplomacy foster sustainable innovations?*

The thesis selects the case study of Finland, one member of the EU and among the countries closest to achieving the SDGs (SDSN & IEEP, 2019). Taking on a broad-based framework to develop their innovation policies in alignment with knowledge-based economic growth and approach education, research, and innovation policy agenda in systemic, coordinated, and engaging manners, with strong R&D- and ICT-oriented activities and combination of material, intellectual, and social capitals (Halme et al., 2014), the country is in transition with an ambition to maintain the living of citizens in harmony with nature, promisingly for sustainability across generations. For Finland, the soft power such as innovation is considered as a handy tool that enables the country to operate and engage in global activities of sustainable development and tackling societal and environmental problems. Moreover, with a high index in innovation in the world map as well as knowledge and expertise in technology and science, Finland has been active in the transfer of knowledge and accelerated activities that recognise the urgency of sustainable development issues and leverage diplomacy approaches and policies to assist

countries and involve stakeholders in addressing the problems and finding solutions in a global innovation diplomacy agenda. (Pelkonen, 2009)

The thesis will potentially contribute to a better understanding of the topic of innovation diplomacy for sustainable development. In addition, a reference framework in which innovation policy and related development are seen in the light of a transformative agenda built around SDGs and deeper insights in the field of innovation management, innovation diplomacy and sustainable development will be developed. The research will also present a prescriptive orientation that is of practical use for stakeholders to enhance their knowledge, awareness of current practices in the regions and country, as well as provide them recommendations and concrete areas to engage themselves in different activities, policies and strategies for sustainable innovation.

Engagements have been noticed among innovation policy actors from Ministry of Education and Culture and Ministry of Employment and the Economy, Research and Innovation Council, Sitra, Academy of Finland, Business Finland (Tekes), ELY, Finnvera, TESI, Finpro, companies, education and research institutions, and mission-oriented PROs (Team Finland). This thesis will continue the review of the critical themes of contemporary Finnish innovation policy and diplomacy which acknowledge the global movement into a sustainable future. The insights from Finland will be valuable to not only local stakeholders but also other nations, particularly neighbouring Nordic countries who share the similar social values of diversity, transparency and equality as well as challenges of sustainable development and presenting understanding of the problems and practices by this Northern country for global learning. As a result, organisations, communities and individuals in the Finnish society and beyond will move forward towards a future of sustainability with long-term values generated from sustainable innovations and policy of sustainable development diplomacy and contribute to the global efforts to achieve SGDs.

1.3 Structure of the thesis

This thesis will take on an analytical perspective with focus on innovation diplomacy policies and ecosystems related with sustainable development. In Chapter 2, I will present the literature reviews that conclude the main elements of diplomacy for sustainable innovation. Accordingly, the overview of sustainable innovation and diplomacy for sustainable development are introduced, based on which a general framework is to be developed that links established theories and highlights the main challenges of diplomacy for sustainable innovation. In Chapter 3, data, methods, ethics and quality of the study will be introduced. Following in Chapter 4 is the empirical work that consists of an analysis of the existing policies published in the reports by highly esteemed organisations, policy specialists and policy advisors with a view into the practices of the EU, Nordic and Finland. In addition, consultations from the interviews with experts working with the relevant topics will be compiled into a collection of findings. These findings in regard to the same questions/themes introduced in the framework will ultimately lead to answers of the research question as well as generate valuable conclusions and practical advice for policy makers for further strengthening innovation diplomacy policies. In Chapter 5, discussion around the meaning of findings and how they help to answer the research question and in Chapter 6, theoretical and practical implications, limitation of the study and suggestion for future research will be summarised.

2. LITERATURE REVIEW

Diplomacy for sustainable innovation links the two main domains: innovation diplomacy and sustainable development diplomacy. In section 2.1, the literature review will first cover the concept of sustainable innovation as the core stone, successively followed by the reviews of innovation diplomacy and sustainable development diplomacy in section 2.2 that together compile the concept of diplomacy for sustainable innovation. In summary, a clear overview of diplomacy for sustainable innovation will be presented, answering what it means and identifying its configurational elements, the areas/themes to focus for successful implementation and key challenges. In section 2.3, a framework will be introduced as a reference and foundation for policy interventions and evaluation of the Finnish context in contrast with EU/Nordic regions.

2.1. Sustainable innovation

In this session, the main aspects of sustainable innovation, including definition, classification, implementation, actions involved and measurements will be thoroughly reviewed. The core challenges will then be identified from these comprehensive perspectives of the concept exploration.

2.1.1 Definition of sustainable innovation

The integrated concept of sustainable development and innovation, i.e. sustainable innovation, is defined as an purposed introduction of radical/new or incremental/improved products and services or entire systems that outperform the previous ones (Nancy, Paavo, Robert, Laura, 2019, p.6)**,** which will then benefit the present and future generations, in consideration of their constraints and pressures regarding economy, society and environment (Hall & Vredenburg, 2003).

Basically, sustainable innovation can be defined as ordinary innovations, yet its efficiency increase must not violate sustainability (Sartorius, 2005). Interconnectedness of environment, society and economy will principally determine a strong sustainability model, in which industrial, human, natural and social capitals do not substitute (Gray, 1992) but rather complement each other (Daly, 1990). In terms of values, there is a linkage between sustainable innovation and respect for people and natural environment, a defence of equal opportunities for all people, and confidence and solidarity within a global community (Antti, 2010, p. 27).

2.1.2 Targets and outcomes

Aim, classifications and mix of sustainable innovations

Complementing sustainable development at micro and macro levels, innovations are supposed to improve economic, social and environmental efficiency and empower human beings to satisfy their needs and also drive their own future in more sustainable ways. Under the SDGs

framework, innovation is featured in Goal 9 which aims at resilient infrastructure and inclusive, sustainable industrialisation, and in Target 9.5 where the role of research and innovation policy is highlighted. (Enrico, Ingeborg, Måns, Françoise, & Michael, 2015)

Ultimately, sustainable innovation aims to eliminate negative impacts from the production process and consumption, and hence, customers and other stakeholders benefit in sustainable development sense (Klewitz, Johana, & Hansen, 2014) at multiple levels: products, services, business models and system-level transitions (Nancy et al., 2019, p.14). Incremental innovations result from product- and process-related innovation activities, which lead to significant changes over a long span of time and yet cannot optimise the global system configurations (Hekkert, 2007; Larson, 2000; Schaltegger, 2011; Wagner, 2012). On the other side of the spectrum, breakthroughs occur over irregular intervals and may lead to disruptions in economy and society (Ulrich, et al., 2005, p. 36).

Sustainable innovations can be classified by the innovation type, namely technology, process, product/service or business model; the dominant targets (ecological and/or social, coupled with economic) (Hansen, Grosse-Dunker, & Reichwald, 2009); and level of disruption (incremental, radical) (Plieth, 2012). They can also be classified as institutional innovations which bring about new framework conditions and socio-cultural innovations which are respectively related to banks, regimes, national plans and changes in values, lifestyles, consumption and working patterns, needs and preferences among citizens (Ulrich, et al., 2005). Figure 1 (Nancy et al., 2019, 5) demonstrates the development spectrum and levels of impact in the environmental dimension: over a period of time with various stakeholders, product, business models, systems and networks are involved to develop what will result in the reduction of environmental impacts. In terms of diffusion phases and challenges, sustainable innovations encounter double externality problems (Jason & Gerard, 2015).
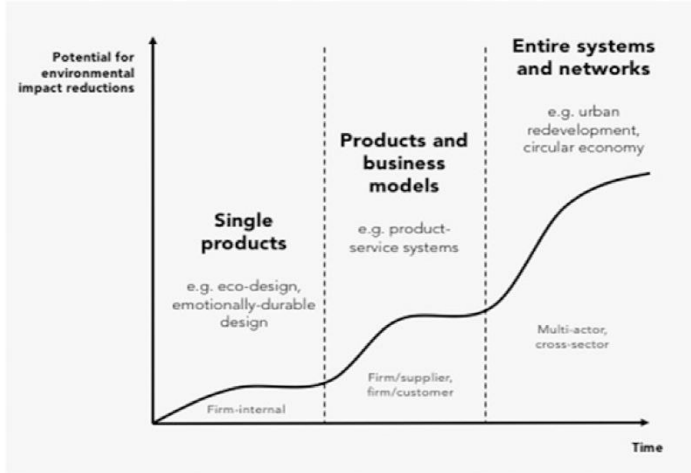
Figure 1: Innovation for sustainability spectrum

Outlined as follows in Table is the innovation mix for sustainable development (on the left column) drafted by (Miedzinski, 2017), (Miedzinski et al., 2017), listed with various policy instruments on the right column, depending on the maturity of the innovation systems and the nature of the challenge (Trade and Development Board, 2018). A comprehensive system for assessing risks and allocating responses is vital (Achim & Hannah, 2014).

Table 1: The Mix of Sustainable Innovations (Miedzinski, 2017), (Miedzinski et al., 2017)

Product and service innovation	• Innovative technologies: technologies that set foundations for sociotechnical systems • Innovative products: products that have sustainable characteristics, positive sustainable impacts, or are made out of sustainable materials • Innovative services: business-to-businesses or business-to-consumers models
Process innovation	• Having technologies that deliver or contribute to health and environmental benefits • Reduction or management of waste that bring out economic, health and environment benefits • Processes that have resource efficiency, leading to socioeconomic and environmental benefits

Organisational innovation	• Corporate social responsibility (programmes and initiatives) by companies • Systems to manage and audit sustainable/environmental management • Extend the current producer to embrace higher responsibility for sustainable development
Marketing innovation	• Using labels that well inform customers and their choices • Conduct science-based campaigns and similar initiatives to raise awareness of sustainable consumption • Innovation of business models that improve firms' value propositions • Pro-poor and grass-root innovations that are customised for marginalised groups
Frugal innovation	• Design/re-design sustainable products to lower their complexity while keeping their core functions • Products that potentially reduce environmental impacts throughout their life cycle, reusing or reducing resources, energy, materials and components
Social innovation	The solutions that are much aligned with social and environmental benefits
System innovation (multi-actor models)	Radical changes happen through actors engagement in product–service systems, who are functionally connected: • Multi-actor product-service systems • Waste management systems • Integrated mobility systems

In general, at the micro-economic level, innovation is a growth driver and companies have incorporated sustainable development into their strategies by initiating measures and projects aimed at social responsibility and adopting management practices concerning environment, quality assurance, logistics (Wu & Dunn, 1995), (Fernandez, 2009), and the "loyalty effect" (Reichheld, 1996), to name a few. At the macro-economic level, the practices of sustainable development by the politics are realised to have enhanced competitiveness of companies and

advanced economic and societal conditions among communities (Porter & Kramer, 2011, pp. 62-77).

Measurement of sustainable innovation

Performance of innovation has been related to the achievement of the expected economic, social and economic innovation outputs/results, or the degree of success of the innovation (Acs & David, 1993; Alegre, Joaquín, Lapiedra, & Chiva, 2006; Arundel & René, 2009; Calik & Badurdeen, 2016). Driving sustainable innovations are leading indicators which are identified as the input measures whereas producing sustainable outcomes at all levels are lagging indicators, namely intermediate output measures, direct output measures and indirect impact (Arundel & René, 2009). A mixture of leading and lagging measures for sustainable innovations is recommended (Kaplan & David, 1996). Another recommendation is to use a set of core and supplemental indicators (Nancy et al., 2019, p.239) to get the ideas of interactions within the whole system and among subsystems (Krajnc, Damjan, & Glavič, 2003); (Gunarathne & Peiris, 2017).

Typically, companies are interested in micro-effects of sustainable innovations, which can be assessed by taking a life cycle or value chain perspective (Hansen, Grosse-Dunker, & Reichwald, 2009). Policy makers are interested in the meso (sectors)- and macro-level impacts (Nancy et al., 2019, p.237). However, there are no comprehensive frameworks consisting of selected indicators that have been created to be standardised, transparent and methodologically sound enough to clearly define policy targets in all sustainable development dimensions, at all social levels (Spangenberg, 2002).

2.1.3 Implementation of sustainable innovations

According to Jason and Gerard (2015), the realm of sustainable innovations involves private, corporate, knowledge, infrastructure and public-problem holders responding to the private, corporate and public needs in a broad sense of environment and society (Jason & Gerard, 2015). The process of sustainable innovation is complex and ambiguous, typically involving issues of

contradictory demands among diverse stakeholders (Hall & Vredenburg, 2003). One principle is that the expertise required for sustainable innovation lies outside organisations, taking place within informal networks, where companies personnel, users, subcontractors, customers, and voluntary experts collaborate with one another (Antti, 2010). In general, sustainable innovation should be regional rather than global, and humanist rather than technocratic (Achim & Hannah, 2014).

The governance of sustainable innovation has required governments to balance between the private sector needs and market dynamics with the public good (OECD, 2018); (OECD, 2017). That means, while regions, countries, cities and companies are competing for the power of innovation, they concurrently share the power and responsibility to support the global value chain and build the global capacities to solve challenges (Leijten, 2016) under national policies, investments and mechanisms that ensure effective facilitation and transfer of technology. In any case, innovations involve economic, social or environmental trade-offs that should be identified, evaluated and addressed (Trade and Development Board, 2018). The next session will cover how diplomacy can address these policy challenges and advance sustainable innovations all together.

2.2 Diplomacy for sustainable innovation

Diplomacy is a holistic endeavour that embraces state and non-state actors, domestic and foreign, seeking estrangement mediation and overcoming alienation (Constantinou, Derian, & James, 2010). In the following sections, the realm of diplomacy for sustainable innovation will be furthered studied under details of the sub-domains: innovation diplomacy and sustainable development diplomacy.

2.2.1 Innovation diplomacy

The discussion of innovation diplomacy has been based on the presumption that opportunities for innovation will increase out of sharing knowledge and collaboration, whereas cultural, socioeconomic, technological divisions and distances can be resolved with focused and properly

targeted initiatives (Carayannis & Papadopoulos, 2011). Furthermore, innovation diplomacy can connect markets and investors with ideas and solutions who appreciate and nurture them in full potential (Leijten, 2017, p. 2).

2.2.1.1 Definition of innovation diplomacy

Innovation diplomacy combines two sub-domains: international relations that are power-oriented, and innovation policy that are economy- and intellect- orientation. During the past decades, the output of innovation has been thriving quickly. (Leijten, 2019, p. 6)

In innovation policies, states utilise innovation diplomacy and its full spectrum of tools to achieve national, international or global interests (Leijten, 2019, p. 17) in the global geopolitical arena, facilitate innovation and improve the relations between countries (Leijten, 2017, p. 2). Moreover, innovation diplomacy can leverage entrepreneurship and innovation means to unleash opportunities and help realise potentials of creativity and aspirations of people so that markets will serve global individuals of society to highest degree (Carayannis & Papadopoulos, 2011).

2.2.1.2 Targets and outcomes

Elements, characteristics and principles

Nowadays enterprises can no longer afford to mobilise internal resources and competences necessary to innovate. Coordination of innovation systems is thus getting dependent on external sources, networks and collaboration in the typical fields of information and communication technology (ICT), nanotechnology and biotechnology. This interplay of various actors and forces externally and internally is now driving innovation to become systemic. (Leijten, 2019, p. 7)

Knowledge is a growing factor in driving economic prosperity for countries and an important matter in international relations. Increasingly, knowledge-based opportunities for innovation are

arising. Moreover, competitive thinking is becoming more of an influential element in regional, national and foreign innovation policies, whose orientation is to strengthen innovation system of the countries or regions. (Leijten, 2017, pp. 1-2)

Another important constituting element of innovation diplomacy is proximity. Increasingly regions, countries and cities are coordinating, directly investing for comparative advantages and improving industrial capabilities on the basis of local and/or regional resources, expertise, and networking on global platforms and value networks (Leijten, 2016). Streamlined globalisation of innovations on technology platforms and innovation networks is considered contributing to the need of integrating the global complex system of trade and supply together in the global value chains over the past decades (Leijten, 2017, pp. 1-2).

Simultaneously, collaborative innovation and open innovation are guiding policies in research and innovation of the EU (European Commission, 2017). Collaboration among researchers, research organisations and companies are important nowadays to develop new products, services and systems whereas user involvement or collective intelligence in research is being revisited as valuable inputs in many different settings of research (Saunders & Mulgan, 2017). The broadened configurations of knowledge inputs in research, technology and innovation from actors and stakeholders have been highlighted in the triple helix model which embraces interactions between science, industry and government, the quadruple helix which acknowledges the wider public or civil society, and the quintuple helix that takes nature and environment as independent sources of knowledge. (Leijten, 2019, p. 6)

Targets, impacts and expected outcomes of innovation diplomacy

The outcomes of innovation diplomacy are shaped through the developments in innovation and developments in international relations (Leijten, 2017, p. 2).

In most cases the outcome of innovation diplomacy will be a complex mixture of policies aiming at collaborating, protecting and strengthening strategic interests, and establishing international

coalitions and agreements of joint interests (Leijten, 2019, p. 11) such as bilateral and multilateral agreements, and alliances (Leijten, 2017, p. 2).

Particularly, the EU has followed the global public good scenario which is dedicated to creating an international innovation system for global prosperity and for solving pressing global problems. This scenario is the continuation from the past strong internationalisation forces to innovation and growth benefiting all global public good. Critical technologies, trade in high tech products, intellectual property ownership and protection, and standardization are the incurred concerns, which are believed to drive the changes in the realm of innovation diplomacy on the foreign policy agenda. (Leijten, 2019, p. 6)

2.2.1.3 Implementation of sustainable development diplomacy

Coordination of innovation systems

First and foremost, innovation diplomacy could be guided by the innovation systems' thinking that encompasses a series of processes and developments (Leijten, 2017, pp. 2,3), namely the functions of innovation systems (Hekkert, et al., 2007). The fractal framework of systematic thinking is a representative mechanism of operations and interactions between actors for both micro- and macro- levels of governance that can help national innovation ecosystems to connect, develop protective measures (Leijten, 2017, pp. 2-9), and determine market success or failure respectively. This system is comprised of four setting elements that impact innovations based on how they take advantage of them: (1) stakeholders relationship coordination and synergy; (2) ICT powers; (3) production and commerce efficiency as a result of managerial and organisational systems; and (4) international agreements, rules, and regulations (Elias & Charalampos, 2011, p. 271).

In the following Table 2, Leijten (2017) maps the potential innovation diplomacy actions according to different innovation ecosystem functions and their most relevant dimensions. Fundamentally, there are seven functions of innovation ecosystem outlined by (Hekkert, et al., 2007) and further discussed by (Hekkert, 2010). The detailed interpretation of these functions

is presented in the second column, and in the third column potential diplomacy actions are realised in linkages with the functions and their dimensions (Hekkert, et al., 2007), (Tahereh, 2016). The functions are not necessarily directly related to innovation policy and its international dimensions, but they provide a very useful schematic reference to map potential policies (Leijten, 2017, p. 10) and a better overview of how the functioning of ecosystems can be related to and aligned with diplomacy actions.

Table 2: Innovation system functions and potential innovation diplomacy actions (Leijten, 2017, p. 10)

Innovation System Function	Relevant Dimensions	Innovation Diplomacy Actions (examples)
Entrepreneurial discovery	• Capacity to create business opportunities out of new knowledge, technology, networks, and markets	• Support industries developing innovation networks and value chains, • Publicise and defend national outstanding projects and industries
Knowledge development	• Formal and less formal education, skills development and research provided by institutions and resources	• Facilitate international collaboration of research and education • Uphold IPR • Get access to strategic research facilities
Knowledge diffusion (networks)	• Promote maximisation of new knowledge and it effects; support standardisation and regulation of policy processes	• Develop a culture of innovation • Build strategies for inclusion/exclusion
Guidance of the search (role of national priority setting)	• Select focal investments in science, technology and innovation, build on long-term vision and need-based approach • Set priorities among regional, national and hub actors	• Understand the strategies of potential collaborators and competitors • Position for common or global challenges strategically • Clarify on visions and strategies of national strength and advantages

Market formation	• Create and encourage (public) demands such as public procurements • Give space for testing, piloting and niche markets	Identify strategies of market access for innovative products/services: • Import/export tariffs • Innovation mercantilism • Experiment environment (legal)
Resources mobilization (budgets, finance)	• Improve capital available for innovation, such as human resources (from within or abroad)	• Enable Public-Private Partnerships • Exchange programmes • Special mobility and tax-rules for knowledge workers
Creation of legitimacy; fighting resistance to change	• Enable coalitions and deal with vested interests, frictions of transition, legal frameworks	• Standardisation • Policy consistency • Responsible rule of research and innovation

In the global public good scenario presented in Table 3, the functions of innovation ecosystems are distinguished between the state- driven and policy-dependent schemes. More or less, these functions are independently governed through other interactions in the ecosystem, existing in both weak and strong presence. (Leijten, 2019, p. 14)

Table 3: Innovation system functions in global public good scenario (Hekkert, 2010)

Functions	Innovation as global public good
Entrepreneurial discovery	• Establish and nurture international value networks • Develop strong local ecosystems
Knowledge development	• Reinforce open science internationally • Seek complementarities
Knowledge diffusion (networks)	• Exchange programmes • Share IPR in collaborative ventures
Guidance of the search (role of national priority setting)	• Build on global challenges thinking/ perspectives • Benchmark competitiveness internationally
Market formation	• Set up global public and public/private initiatives • Facilitate the global playing field in business with/for innovation
Resources mobilization (budgets, finance)	• Collaborate globally and pool resources together • Strengthen governance institutions worlwide
Creation of legitimacy; fighting resistance to change	• Support and build support for global challenges • Communicate and escalate innovation thinking, behaviours

At the intersection of international relations and innovation are the five key types of actors: (1) national or multinational firms offering new products, processes and services as solutions to pressing global problems, rising productivity and increased wealth for all; (2) individuals and the public; (3) universities and public research centres; (4) governments including individuals, organisations, and nations, and (5) national defence and military organisations (Archibugi &

Iammarino, 2002). As every actor has their own goals and holds different ideas on political, cultural, and diplomatic matters, tensions or conflicts may appear (Klasa, Trump, Linkov, & Lambert, 2020), affecting their existing and future international collaborations. From a foresight perspective, the configuration of these actors yet changes (Leijten, 2017, p. 2).

Among these actors, institutions and networks of institutions have an important role for innovation, in terms of activities and interactions, import, modification and diffusion of new technologies, supportive mechanisms for developing and funding innovations in different development stages, diversified consultancies on business matrix, and assistance for start-ups, such as loan facilities and IPR-support. Subsequently, innovation thinking is fostered and the right institutions and policy instruments are built. (Leijten, 2019, p. 7)

Arising is the limited yet increasing number of global clusters, innovation hubs or mega-regions established when companies, knowledge institutions collaborate through protectionist measures. Receiving recognition and support to strengthen from politicians for their importance and economic growth, this model has implied intensification of economic, social, and political powers and forced many nations to prioritise technology on their political agendas, in parallel with diversified national policies and regulation of technology-based powers and consideration of ethical issues (Regulation of stem cell research in Europe, n.d.). In some case, these policy developments are believed to contribute to international negotiated collaborations or outright competition or power struggles. Yet these clusters have also injected into international relations a new concern: uneven spread of capabilities to develop, manipulate and use knowledge and technology, their applications and related social, political and economic powers around the world. (Leijten, 2019, pp. 4-7)

Remarkably, many international organisations have been established out of the importance of international collaborations in innovation and their operations are supported (Jana, 2020). Often as part of a broader mission and agenda, the long-established bodies such as NGOs and UN bodies continue negotiations for global governance. They are becoming increasingly important in foreign policy, who can a facilitate setting up a number of multinational trade agreements that deal with the international dimensions of innovation, build the global innovation economy,

foster innovation economy thinking and build the right institutions and policy instruments in a collaborative atmosphere for innovation development and diffusion of SDGs. (Leijten, 2019, p. 7)

Multilateral solutions also arise from increasing engagement of new stakeholders in international relations around innovation on different levels. On a regular basis, major cities and regions around the world are meeting to discuss innovation strategies and experiences, being active on new platforms where they can develop informal and formal shared visions as well as rules of behaviour. (Leijten, 2019, p.6-11)

Capability development is a requirement for domestic institutions and enterprises to tap into the global innovation ecosystems, essentially in the four themes: technology, governance, politics, and openness. In this regard, policies need to support the domestics to develop specialised knowledge in internationally linked industries (Herstad, Bloch, Ebersberger, & Velde, 2010). Deliberate local measures aimed at building up capacity for innovation beyond production and execution are paramount in this catching process and actors are forced to find ways to balance trade-offs and complementarities in global arenas. (Kyung-Min, 2011)

Policy approaches of innovation diplomacy

Alignment is critical within government and within society as a whole to build a foreign innovation policy vision and goals that guide activities of innovation diplomats and develop a clear foreign policy view on innovation. To achieve this, there are the two steps called for globally: a "whole-of-government-approach" that addresses the linkages between science, technology, innovation and other policy areas such as trade, education, social affairs, health and environment. The second step, so-called "whole-of-society-approach", is pushing this even further (Rieffel, 2018). These approaches are legitimate in today's society as relatively independent actors have connections with international politics or with powerful stakeholder groups globally. (Leijten, 2019, p. 15-16)

Moreover, different models of partnerships are arising and the influence, legitimacy and accountability of civil society in global governance and of the networked governance have

drawn attention from scholars (Keck & Sikkink, 1998; Friedman, Hochstetler, & Clark, 2005; Scholte, 2002). Though remaining nascent in research agenda partly due to their departure from traditional models of hierarchical accountability (Bäckstrand, 2006), these models have challenged the legitimacy of intergovernmental treaty-making, international regimes and organisations well recognised in the research fields of international relations.

In highlight, scientists are expected to be major actors, with higher influence, capability to provide data and evidence to identify challenges, advise on needed policy actions, and innovative solutions to global issues. In global agendas and some world initiatives of innovation diplomacy, foresight is viewed as a valuable tool with insights being generated to enhance the strategies and policy making processes. Some of the world initiatives have embraced foresight as one mechanism to build internationally shared visions and bring innovation and technology into the international security situations. (Leijten, 2019, p. 10-12)

Development of innovation diplomacy

Competitive thinking and its effects on global challenges continue to be the globalisation trends, putting innovation under pressure while rising populism adds to the growth of de-globalisation politics. Furthermore, focus of diplomats is being shifted from relatively neutral scientific collaborations to the technology and innovation interests of their nations in the increasingly knowledge-driven world. (Leijten, 2017, p. 1-2)

In this context, the future roles and development of innovation diplomacy will be dependent of the outcomes of interactions between science, technology and innovation and their evolving characteristics, of international relations and foreign policies, and of changing configuration of actors involved in the innovation system. At the same time, innovation and innovation policies are growing important in foreign relations, explicitly driving a number of changes to: 1) Innovation diplomacy due to issues in the domain of science diplomacy and the growing importance of national economic interests and issues regarding ownership, protection, and standardisation; 2) Stakeholder configurations: companies and their representative organisations and local/regional public bodies are becoming increasingly important players in the domain of

foreign policy; 3) Set of policy instruments and working methods relevant for innovation diplomacy: a wide range of economic and social policy instruments relating to economic power is added to the field. (Leijten, 2017, p. 1-2)

2.2.2 Sustainable development diplomacy

Sustainable development diplomacy is postulated to advance sustainable development with its new forms of governance and innovative approaches having emerged and been utilized to identify human and ecological needs as well as incorporate those interests into agreements and their implementation (Moomaw et al., 2017, p.75).

2.2.2.1 Definition of sustainable development diplomacy

Sustainable development diplomacy encompasses the process of SDGs negotiation and implementation at all scales. During these processes, multiple agreements regarding implementation policies, strategies and actions from international to local scales, across sectors of society and the economy are required. (Moomaw et al., 2017, p.73)

Having global and regional policy programmes, sustainable development diplomacy has taken a leading role in convening ventures and incorporating expertise to define the cause-and-effect relations, from then to create and potentially solve global problems. Sustainable development diplomacy can also guide policy actions and establish the mechanisms and social practices of cooperation and coordination between stakeholders and their partners in transnational policy communities. (Leijten, 2019, p. 6)

In principles, policies are more likely to be implemented if they consider mutual benefits of all parties and create a sense of ownership among them via engagement and incorporation of common agendas of sustainable development. By deliberately having mutual values and interests placed, and utilising a needs-based approach, sustainable development diplomacy can also facilitate stakeholders to negotiate on workable solutions, adjust themselves to address uncertainty and changing conditions, and ensure effective and flexible implementation.

2.2.2.2. Targets and outcomes

Sustainable development diplomacy has been mostly discoursed based on the theory of social-ecological systems, which are about system properties, how they change, and their meaning in relation with the actors operating within those systems (Feola, 2015, pp. 376–390), in addition to the opportunities and constraints afforded by social-ecological parameters of the systems (Gunderson & Holling, 2002) and transformative agency in line with the adaptive cycle phases, reviewed from a dynamic perspective (Westley et al., 2013, s. 27), (Moomaw et al., 2017, p.75).

Policy coherence in balance with flexibility, redundancy and robustness will offer a greater variety of options for actors to choose. Furthermore, the appropriate political and social scales and levels of implementation, review and monitoring need to broaden beyond the global level of the high-level political fora in meeting the goals. (Moomaw et al., 2017, p.79)

2.2.2.3 Implementation of sustainable development diplomacy

Of the international ecosystem, internal and external actors focus on diplomacy practices and strategies to tackle global challenges together rather than the policy-makers themselves, or in a substantial degree of hybrid (Elias & Charalampos, 2011, p. 361). Strategically, implementation of sustainable development requires a governance system that matches the ambition and complexity of the goals, and evolving diplomatic processes that address the linkages across issue areas, scales and actors (Biermann & Pattberg, 2008, pp. 277–294), (Falkner, 2013).

Multilateral solutions are arising from the growing stakeholder engagement in the international relations around innovation on different levels in parallel with national/regional negotiations by global governance bodies. Multilateral engagements, in this regard, encourage two or more nations to join over time, who can all equally govern their established agreements. This multilateralism is inevitable also due to the global and multidimensional nature of technological challenges, wide-spread distribution of research experts and facilities around the world, large amount of data generated, and increasing costs of conducting innovation (National Research Council, 2012). Yet in a broader sense, the responsibility of implementing multilateral solutions

regarding sustainable development calls for commitments and national coordination and facilitation from governments, business, civil society, international organisations, media (Moomaw et al., 2017, p.73) in a collaborative endeavour and in varying degree of interactions to enable multilateral cooperation and the delivery of global public goods. (Bäckstrand, 2006, p. 297)

In 2011, Van Langenhove introduced Multilateralism Mode 2.0 as a development of this multilateral engagement that allows other actors than policy makers, such as regimes, intergovernmental organisations, NGOs, scientific organisations and international organisations, regional organisations and the sub-and supra-national regions, to involve and influence policy-making regarding global problems. In recent years, a networked and less state-centric mode (Van Langenhove, 2011) is open to public realm, where the public can debate and decide on issues. The operational mechanism of this mode has been evident on the inter-government basis, via autonomy in the exercise of stakeholders' competences, or by taking a legal personality as states (Langenhove, 2016).

One of the most important type of partnership that allows foreign policy to facilitate partnerships among investment institutions, the private sector, and the civil society while balancing the vested interests via the modes of brokering or mediation is multi-sectoral partnership (Bäckstrand, 2006). Structured as a decentralised network that hold diverse expertise (Harvey, 1989), multi-sectoral partnership is believed to link global multilateral norms and local actions regarding the pressing problems of sustainable development. Also, due to the nature of voluntary cooperative arrangements between local actors, multi-sectoral partnerships display minimal degree of institutionalisation and encourage non-hierarchical decision-making structures (Steets, 2004) addressing public policy issues. The logic of argument and persuasion is highlighted as the rule making for implementation and joint problem-solving in this partnership (Risse, 2004a). However, issues of power, representation and voice remain critical in the analysis of this modes of governance. Multi-sectoral networks are also argued to not fulfil traditional accountability expected from international organisations, transnational companies and non-governmental actors. (Bäckstrand, 2006, pp. 291-294)

When multilateral institutions fail, public-private partnership is one kind of regional sustainable development diplomacy that has received attention, reflecting deeply the whole-of-society effort of 2030 Agenda (Bäckstrand, 2006). Recent research on regional public-private partnerships for sustainability has not filled the gap of knowledge in functioning of regional networks, the roles of different actors, as well as the outcomes of the networks, the kinds of innovations and their sustainable development impacts (Andonova, 2005).

More specifically, public actors voluntarily initiate public-private partnerships as a response to functional demands for better governance (Andonova, 2005). Under the auspices of international organisations (Bäckstrand, 2006), public actors correspondingly support private companies to develop their organisational capabilities in sustainable development policy and management. As a result, governance of the regional economic and social structures will improve and enhance local and regional business development, and synchronously companies and regions become more competitive while performing sustainable development (Malmborg, 2007).

Prominently, partnerships in research collaboration between countries, companies and universities have been conducted as a result of the increasing costs and business risks from developing new technologies. In practice, research and development activities are performed in different modules such as bilateral and multilateral engagements on sustainable development challenges, trade agreements, investments, and relocation of experts that encompasses state-to-state relationships. As one form of Multilateralism Mode 2.0, these partnerships call for a deep understanding of the issues and an open, networked, participatory and less state-centric mode for actors at transnational, regional and institutional levels to involve and influence policy-making with autonomy. (Klasa, Trump, Linkov, & Lambert, 2020)

Partnerships in research collaboration can be supported by a robust science attaché programme, done by getting more knowledge of society, politics and cultures of the newcomer countries, their internal aspects including openness and IP protections, state-of-art signals from academic institutions, the technologies, the corporate and private actors/sectors; as well as understanding external factors and their influence on development of science, the internal degree of

sustainability in research developments, and the stability of the politics necessary for sustainable diplomatic partnerships. (Klasa, Trump, Linkov, & Lambert, 2020)

To facilitate sustainable development governance, seven principles of negotiation and implementation have been explored for governance actors at all scales (Moomaw et al., 2017, p. 73-74): 1) In a coordinated manner, a focus should be placed on identification and prioritisation of unsustainable practices and issues underlying environmental, social or economic problems considering human, ecological needs and their linkages (Noone & Persson, 2009, pp. 472–475), (Rockström, Sachs, Öhman, & Schmidt-Traub, 2013); 2) Mutual-gain negotiation techniques should be utilised to benefit state and non-state parties, taking a need-based approach, while effectively addressing the issues of concern (Ury & Fisher, 2011), 3) Agreements should extend to sustain a future trajectory, i.e. via broad engagement and participation by multiple state and non-state stakeholders while state actors and intergovernmental organisations are playing crucial roles in identifying an aspirational direction, establishing agreements as guidelines to meet goals and increasingly giving out governance functions to the private sector and social change organisations (Abbott & Bernstein, 2015), (Hawkins, Lake, Nielson, & Tierney, 2006); 4) Information of science, economics and politics should be assembled to identify root causes of issues (Moomaw et al., 2017, p.77); 5) A portfolio of actions and instruments can be created to address challenges effectively, understanding thoroughly the interactions of policy instrumens (Gunningham & Sinclair, 1999) and designing the instruments to deal with complexity of the problems (Moomaw et al., 2017, p.77-78); 6) Multi-scalar mode is one nature of sustainable development with every scale bringing in benefits (Ostrom, 2010) is needed; 7) Use the framework of international engagement to secure effective multilateral arrangements to promote SDG implementation and cushion risks in multiple levels of forums and arenas, laws and treaties. (Moomaw et al., 2017, p.73-79)

Multi-stakeholder partnership and roadmaps of SDGs

Extended as a more pluralistic governance than multi-sectoral partnership, multi-stakeholder partnership can be properly designed for future success and enhanced accountability, well monitored performance of multiple stakeholders, incorporated legitimacy of issues such as

public scrutiny, transparency and clear guidelines for monitoring effectiveness (Bäckstrand, 2006, pp. 291-294).

One powerful multi-stakeholder engagement tool has been studied are the roadmaps that help with action plans, progress follow-up, and learning environment setup, based on that innovations to achieve the SDGs can be generated. Internationally, SDGs roadmaps recognise the roles of international and supranational policy guidance and assistance, as well as innovation strategies by donor countries and agencies. Accordingly, regional and cooperation bodies are having more influence on national strategies and pathways via stimulating governments to adhere to policy standards, providence of technical assistance to build capacity, finance of projects and investments, and facilitation of spillovers and peer learning. Internally in these donor countries, public spending for innovation has elevated faster than official development assistance. (United Nations Interagency Task Team on Science, 2018)

One challenge of implementation of roadmaps is inclusion. Since donors and agencies, remarkably UN agencies such as UNCTAD, UNESCO, WB and Regional Commissions, can assist per year a number of countries, they may not fulfil the closing the gaps among countries in due course and support could be inadequate that fail to deliver the commitment of "leaving no one behind" by 2030. Still, many developing countries have been supported by these agencies to diagnose and strengthen their foundations of innovation systems and capabilities, utilising their function-/sector-/goal-specific innovation assistance. (United Nations Interagency Task Team on Science, 2018)

2.3. Summary and analytical framework

The summary and framework of diplomacy for sustainable innovation are now compiled from the study of sustainable innovation, innovation diplomacy and sustainable development diplomacy. This framework fundamentally entails the key areas of focus, policy directions and actions of diplomacy that can potentially foster sustainable innovation, i.e. what diplomacy policy can do, and what are the key success factors to achieve SDGs as a result of advanced sustainable innovations, a balance between private sector needs and market dynamics with the

global public good, and management of economic, social or environmental trade-offs. This framework will afterwards be reference for the empirical work to be evaluated and the key insights outlined and analysed.

What is sustainable innovation?

Sustainable innovation is a purposed introduction of radical/new or incrementally/improved products and services or entire systems that outperform the prior products, services, or systems (Nancy et al., 2019, p.6), brining environmental and/or social benefits to present and future generations in consideration of their constrains (Jeremy & Harrie, 2003). Classification of sustainable innovation could be based on the innovation type, the dominant target (Gunnar, Grosse-Dunker, & Reichwald, 2009), level of disruption (Plieth, 2012), or the institutional and socio-cultural nature of innovation (Ulrich, et al., 2005). The mix for sustainable innovation includes product and service innovation, process innovation, organisation innovation, marketing innovation, frugal innovation, social innovation, and system innovation (Miedzinski, 2017), (Miedzinski et al., 2017).

Implementation of sustainable innovations involves micro- and macro-levels actors. The process of sustainable innovation requires expertise taking place within informal networks, with the outcomes being regional and humanist (Antti, 2010, p. 27). Input measures (Anthony & Kemp, 2009), intermediate output measures, direct output measures, indirect impact measures (Arundel & René, 2009) are indicators of sustainable innovation performance. To measure and also motivate sustainable innovations, a mixture of measurements is recommended (Kaplan & David, 1996). Typically, companies are interested in micro-effects, taking a life cycle or value chain perspective (Gunnar, Grosse-Dunker, & Reichwald, 2009), whereas policy makers in the meso (sectors)- and macro-level impacts.

Moving forward, the governance of sustainable innovation requires governments to balance private sector needs and market dynamics with the public good (OECD, 2018); (OECD, 2017) and identify, evaluate and address economic, social or environmental trade-offs emerging as the

stakeholders are competing for the power to innovate and also share the power to strengthen the global value chain and build capacities to solve global challenges.

How innovation diplomacy can foster sustainable innovations:

Innovation diplomacy and its full spectrum of tools can be used to achieve national, international or global interests, facilitate innovation and improve the relations between countries via policies, international coalitions and agreements of joint interests (Leijten, 2019, p. 17). Additionally, innovation diplomacy can leverage entrepreneurship and innovation means to unleash opportunities and help realise the creativity and aspirations among people so that markets will serve global individuals to the fullest degree (Carayannis & Papadopoulos, 2011).

Knowledge-based opportunities for innovation are arising and competitive thinking in the field can strengthen a countries' or region's innovation system with its orientation. Also, by embracing proximity, foundations of the past strong internationalisation, and the philosophy of innovation diplomacy for all global public good by Leijten, regions, countries and cities are coordinating, combining local and/or regional resources, expertise, and networking to improve industrial capabilities, discussing innovation strategies and experiences, collaborating and performing direct investments, and bringing innovations onto international platforms. (Leijten, 2019, p. 6)

Innovation diplomacy can accelerate the innovation ecosystems to develop through performance of diplomacy actions that support the operations and mechanisms of ecosystems (Hekkert, et al., 2007) particularly towards the direction of innovation for all global public good (Leijten, 2019, p. 14)., including "functions of entrepreneurial discovery, knowledge development, knowledge diffusion through networks, guidance of the search, market formation, resources mobilisation, creation of legitimacy/fighting resistance to change". On that premise, stakeholders connect and interact for innovation outcomes and national ecosystems interconnected with protective means. (Leijten, 2017, p. 10)

New opportunities for multilateral solutions are arising on different levels that foster cross-border discussion (Hekkert, 2007; Larson, 2000; Schaltegger, 2011; Wagner, 2012) for innovation strategies and experiences, informal and formal shared visions as well as rules of behaviour. Noticeably, NGOs and local/regional public bodies are helping with negotiations, facilitation and set up of multinational trade agreements that cover international dimensions of innovation, build the global innovation economy, further develop innovation economy thinking and the right institutions, policy instruments for innovation development and diffusion to the pressing global problems. (Leijten, 2019, p. 6-11)

Moreover, policies can potentially support the domestic institutions and enterprises embedding internationally linked industries and develop specialized knowledge in technology, governance, politics, and openness themes (Kyung-Min, 2011).

The "whole-of-government-approach" and "whole-of-society-approach" can be utilised to develop a clear view of foreign policy regarding innovation and guidelines for innovation diplomats. Their alignment and the policy goals identified and agreed on can support this vision and set a condition to arrive at the policies and actions that are effective and coordinated. (Leijten, 2019, p. 15-16)

Last but not least, various partnerships models are arising and involving civil society in global governance with increasing influence, legitimacy and accountability. The role of science and scientists in delivering data/evidence to identify challenges, giving advice on policy, and coming up with original solutions is being highlighted for sustainable innovations' success in addition to such tools as foresight, futures studies and related methods leveraged by private and non-profit organisations to feed strategy and policy making processes, build international shared visions in international relations, and bring innovation into the international security situation. (Leijten, 2019, p. 10-12)

How sustainable development diplomacy can foster sustainable innovations:

Sustainable development diplomacy approach offers an overarching framework, governance forms and innovative pathways to meet SDGs at international, local and sectoral scales; incorporation of mutual benefits and a sense of ownership into stakeholder engagement, and incorporation of the common agendas and dimensions of sustainable developments, all together enabling stakeholders to agree on feasible solutions, adjust themselves along the way to cope with uncertainty and changing conditions, and ensure effective and flexible implementation as well as follow-up and incorporation of new information and conditions. (Moomaw et al., 2017, p.73-79)

Moreover, sustainable development diplomacy can convene ventures and incorporate expertise to define the cause-and-effect relations and solutions to global challenges. Sustainable development diplomacy can also guide policy actions and introduce mechanisms and social practices of cooperation and coordination in transnational policy communities. (Leijten, 2019, p. 6)

Policy coherence, flexibility, redundancy and robustness offered by effective sustainable development diplomacy can generate a greater variety of options for actors to select. The linkages across issue areas, scales and actors can be addressed via expansion and consistent development of diplomatic processes. (Moomaw et al., 2017, p.73-79)

Multiple agreements on implementation policies, strategies and actions around innovation could be performed at international, local and sectoral scales to meet SDGs, negotiated to advance mutual benefits and common agendas for global public good in a larger collaborative endeavour. The model of multilateralism Mode 2.0 will enable transnational policy networks (Stone D. , 2013) and states, through which the civil society can be involved and impact policy-making in an open, networked and less state-centric mode (Van Langenhove, 2011). The governments can ensure a national coordination and facilitation by bringing in a dialogic approach that is open to the public and ensure effectiveness of these multiple agreements (Moomaw et al., 2017, p.73).

Multi-sectoral partnerships, public-private partnerships and research collaboration partnerships as well as science attaché programmes have been conducted through activities or trade agreements, investments and human resource relocation, and bilateral and multilateral engagement on sustainable development challenges that encompass state-to-state relationship. In this regard, foreign policy and their multi-stakeholder partnerships can balance the vested interests with distributional implications among international communities and diplomacy has a pivotal role to play in balancing interests with ambitious actions by tapping into its capabilities, either via the modes of brokering or mediation. (Bäckstrand, 2006)

In practice, there are seven identified diagnostics that can facilitate negotiation and implementation of the SDGs at all scales from the international to the local, securing effective multilateral arrangements to promote SDG implementation: identification and prioritisation of unsustainable practices and issues underlying sustainable development; utilisation of mutual-gain negotiation techniques; long-term agreements; assembly of scientific, economic and political information that are pertinent for cause-and-effect identification; a portfolio of actions and instruments; multi-scalar mode that benefit all; flexible laws and treaties that allows modification of provisions and response to changing contexts and additional information with actions. (Moomaw et al., 2017, p. 78-79)

Last but not least, roadmaps of SDGs are considered a compelling form of multi-stakeholder engagement that helps with action plans and implementation, progress tracking, and learning environment setup so that innovation to achieve the SDGs could be advanced under guidance and assistance of international and supranational policy and innovation strategies by donor countries and agencies. For roadmaps to be implemented, peer learning, identification of pilot countries, dialogue promotion for international assistance programmes and multi-stakeholder participation, as well as knowledge and advocacy by experts to mainstream SDGs roadmaps, future development of research agendas and proposals for global innovation roadmaps development are all recommended. (United Nations Interagency Task Team on Science, 2018) *Framework*

Table 4 presents the framework of diplomacy for sustainable innovation which includes policy goals of sustainable innovations (left column) and their collating interventions by innovation diplomacy and sustainable development diplomacy policies, developed from the literature review. With these interventions, sustainable innovation can be advanced, private sector needs and market dynamics can be balanced with the public good, and economic, social or environmental trade-offs be identified, evaluated and addressed.

Table 4: Framework of diplomacy for sustainable innovation

Goals	Interventions by innovation diplomacy policies	Interventions by sustainable development diplomacy policies
Advancement of sustainable innovation	• Multilateral solutions involve stakeholders in the international relations around innovation on different levels based on proximity, foundation of the past strong internationalisation, and the philosophy of innovation diplomacy for all global public good: Utilising Multilateral 2.0 approaches and engagement in parallel with national/regional negotiations by global governance bodies to facilitate multilateral cooperation • Establish policies, international coalitions and agreements of joint interests and leverage entrepreneurship and innovation means to unleash opportunities and help realise the creativity and aspirations of people around the world • Establish partnerships models that involve civil society in global governance with their increasing influence, legitimacy and accountability	• Set up an overarching framework, forms of governance and innovative approaches to meet SDGs • Convene ventures and incorporate expertise to identify causes, effects and their relations and find solutions to global challenges • Give guidance on policy actions and establish the mechanisms and social practices of cooperation and coordination among stakeholders • Ensured policy coherence, flexibility, redundancy and robustness offered by effective sustainable development diplomacy

	• Capability development of domestic institutions and enterprises to engage in global innovation ecosystems and develop specialized knowledge in technological, governance, political, and openness themes through international linkages, policies support, deliberate local measures and a balance of trade-offs and complementarities in global arenas • Innovation diplomacy activities in support of functions of innovation systems in the relevant dimensions of sustainable development • Leverage foresight and acknowledge the roles of scientists in finding solutions and contribute ideas to policy making • Effective research collaboration and partnerships that embed a deep understanding of the issues and allow an open, networked, participatory and less state-centric mode • Encourage knowledge-based opportunities for innovation are arising and competitive thinking in the field can strengthen a countries' or region's innovation system with its orientation	• can generate a wider range of options for actors to select • Consistently develop diplomatic processes to address the linkages across issue areas, scales and actors • Advocacy experts to mainstream innovation for SDGs roadmaps
Balance of private sector needs and	• Alignment of the "whole-of-government-approach" and "whole-of-society-approach" that align on a clear foreign	• Utilise private-public partnerships and flexible, decentralized, voluntary market-

market dynamics with the public good	policy view of innovation visions and guidelines for innovation diplomats	oriented approaches, in addition to multi-sectoral and multi-stakeholder partnerships, to problem solving of social and environmental problems
Identification, evaluation and addressing of economic, social or environmental trade-offs	• A systematic perspective that guide the representative mechanism of operation between actors in the innovation ecosystems for both micro and macro levels of governance • Engage with NGOs and local/regional public bodies in the domain of foreign policy who can organise and facilitate negotiations and lessen potential tensions/conflicts of the innovation ecosystems	• Utilise roadmaps of innovation for SDGs to engage multiple stakeholders that acknowledge international and supranational policy guidance and assistance, and innovation strategies by donor countries and agencies globally

3. DATA AND METHODS

3.1 Research method

Qualitative research is leveraged as the main research method, which focuses on exploring the complexity of the phenomena, i.e. a systematic perspective of diplomacy for sustainable innovation. New knowledge will be developed based on empirical work of report analysis and interviews with policy advisors who engage themselves in the ecosystem and activities related to policy making and who will be answering how they work in some specific ways, lessons for improvement as well as future direction, development and strategies of diplomacies. Qualitative research allows open discussion relevant to the research problem and thus, this research method is justified to be a proper choice for the thesis with its explorative basis.

3.2 Data collection

To ensure scientific rigour, the empirical work is conducted in reference with the developed conceptual framework in the previous section, which consists of relevant themes and concepts for comparison and analysis.

Secondary data is gathered from policy documents, including reports and policy guidelines related to European, Nordic and Finland policy development in the past 20 years, published by the Finnish, EU and Nordic experts and policy makers in the field. The innovation policies of the EU and Nordic can be used as guidelines and reference for Finland as there are significant similarities between the EU, Nordic and the new Finnish policy formulations (Pelkonen, 2009).

Primary data is gathered through semi-structured interviews with policy advisors of the field in Finland to compile solid insights added to the framework, acknowledging expansion in the sphere of innovation diplomacy policies regarding sustainable development.

This study relies on a purposeful sampling strategy and used criterion-based selection (Patton, 2015). The main criterion is to find reports of the studied regions and country, in addition to the quotes from policy advisors with traceability. Their backgrounds could be from academia, the corporate sector, and government agencies within the priority domains of Finland.

3.1.1 Research context

The research context is the Finnish innovation ecosystem and diplomacy policies related to sustainable development and innovation. Explicitly, the EU's legislation and policies have a significant impact on Finland's national decision making and legislation as well as their decisions made at the EU level (The Prime Minister's Office, 2020).

3.1.2 Reports

Reports that cover the topic of diplomacy for sustainable innovation researching Finnish, EU and Nordic are to be assessed. Reports are compiled from trustworthy research sources such as Aalto Finna, Research Gate, Google Scholars and official publications of the governments and international organisations.

These selective reports provide high quality data on the topic, including activities, strategies of the EU and Nordic regions and Finland as a member. Namely the reports are:

Reports	Authors and year of publishing
Voluntary National Review 2020 Finland report on the implementation of the 2030 Agenda for Sustainable Development	The Finnish Prime Minister's Office, 2020
Finland aims to become a sustainable development leader- Policy brief 10/2016	Prime Minister's Office, 2016
Sustainable Development Action – the Nordic Way	Nordic Council of Ministers, 2017
OECD Reviews of Innovation Policy	OECD, 2017
Evaluation of the Finnish National Innovation System-Policy Report	Taloustieto Oy (on behalf of the Ministry of Education and the Ministry of Employment and the Economy), 2009
Sustainable innovation- A new age of innovation and Finland's innovation Policy	Antti, Hautamäki, Sitra, 2010
The Global Competitiveness Report	World Economic Forum, 2013
Finland as a Knowledge Economy 2.0: Lessons on Policies and Governance	World Bank Publications, 2014
United Nations Conference on Trade and Development	United Nations, 2018
Research and Innovation System	Research.fi, 2020

3.1.3 Semi-structured interviews

Data is gathered and analysed via conduction of 7 semi-structured interviews with policy advisors from public authorities in the case country Finland and Nordic/EU, who have been working with the topic of diplomacy for sustainable innovation. Their expertise, knowledge, views and experimentation will be taken noted, from which exciting and educating perspectives and insights could be drawn upon and added to the current framework. The timing of this research should be acknowledged, as internal and external changes in the ecosystem might

reflect new contexts and affect interpretation of data, notwithstanding the timeless principles and specific ones that could unchangeably be applied in certain contexts and periods.

The interviewees are supposed to hold fully or partly knowledge and expertise of sustainable innovation, innovation ecosystem, innovation diplomacy and sustainable development diplomacy. The interviews range from 30-45 minutes and are conducted face-to-face virtually. Participants are encouraged to expand, illustrate, and digress from a list of proposed questions. All interviews scripts are recorded/taken down and transcribed for systematic analysis (Dhalla & Oliver., 2013) (Miles & Huberman, 1994). A certain list of questions (Appendix 3) is supposed to be similar for all participants to provide a common direction. Still there will be room for comparisons and unique sharing acknowledging the fact that the interviewees will bring a complex mixture of data from their own backgrounds, knowledge, experience and contexts of the organisations they have worked for. In essence, the data could be used to develop new insights and theoretical constructs that would help describe, crystallize, and explain the dynamics of diplomacy for sustainable innovation.

This thesis will take on the views of a variety of expert organisations and policy advisors to ensure comprehensive overviews. Particularly, interviewees 1 will provide internal insights into the Finnish ecosystem and policies, interviewees 2,3,4,5 into the (not limited to) external policies and internationalisation, and interviewees 6, 7 into cooperation for common good and global responsibility. The details of policy advisors interviewed and their organisations are as follows:

Perspective	Name and Title	Organisations
Internality	**Interviewee 1:** Ms. Furman Eeva Director, Professor, Doctor of Philosophy	Environmental Policy Centre Finnish Environment Institute SYKE
Externality and internationalisation	**Interviewee 2:** Mr. Ilkka Myllymäki Senior Advisor, EU Affairs	Helsinki EU Office

	Interviewee 3: Ms. Leena Pentikäinen Ministerial Adviser	Department of Enterprise and Innovation, Ministry of Economic Affairs and Employment
	Interviewee 4: Ms. Riikka Astala Senior Specialist	Unit for Innovations and Enterprise Financing, Ministry of Economic Affairs and Employment
	Interviewee 5: Ms. Silja Leinonen Senior Adviser, Innovation and Digital Development	Department for Development Policy Ministry for Foreign Affairs of Finland
Cooperation for common good	**Interviewee 6:** Ms. Trine Moa Senior adviser	Nordic Innovation
Cooperation for global responsibility	**Interviewee 7:** Ms. Isabel Leroux Programme Manager	Nordic Development Fund

3.2 Data analysis

As the main interest of this study is to explore performance of sustainable innovations as a result of diplomacy and configurations leading to sustainable innovations, opportunities, challenges and future development, it makes sense to focus on systematic perspectives and diplomacy practices related to innovation and sustainable development. It is also logical to encourage strategies and frameworks that benefit all stakeholders taking a diplomatic perspective.

Data analysis: Data were gathered from reports that introduce the topic of diplomacy for sustainable innovations written by international organisations, policy makers/advisors and governments. The key insights and messages from the report texts are outlined and analysed in

reference to the outlines from the developed framework. Data will be reviewed from different acute perspectives to an extent that new and unique insights are captured.

Thematic method will be leveraged for interview analysis. Accordingly, meanings, concepts, and patterns are collected from interview scripts. The next step will involve the development of initial codes, defined as "the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon" (Boyatzis, 1998, p.63). The following step involves using semantic maps and considering how to combine different codes under an overarching theme (Braun & Clarke, 2006) that systematically consist of exact elements or those that can be related to the developed framework of diplomacy for innovation. The sub-themes can be combined and grouped into the most relevant overarching themes with clear definitions (labels) and patterns that are unique for each context and most related to the outlines from the framework.

Data collected can be viewed as instruments to explore specific insights that can be used to develop further diplomatic approaches for sustainable innovations and formulate possible recommendations for the Finnish practice. The ideal outcome is a framework that is a better version of the last one, or a completely new one. It should be strategic and action-oriented that add values to stakeholders of the innovation system in Finland, particularly policy makers, who could move forward with more refined ideas and insights in both internal and external terms.

3.3 Ethics and quality of the study

The three concepts of reliability, validity and generalisability provide a basic framework for the evaluation of research in business research. Evaluation criteria would be acknowledged from the very beginning throughout the process of my research to ensure that the insights provided will be useful for readers, especially those mentioned in the first session- why this research is conducted. The data should be accurate and elaborated scientifically and the process of data gathering and analysis should be conducted with proper methods and consistency. Notably, good-quality research is more like to be defined through obtaining of materials from interviews, quality of interviews and the logic of choosing certain interviews. (Kovalainen, 2008)

Analysis in this thesis are based on accurate data from academic research from esteemed papers and the report and interview documentation by policy makers/advisors, international organisations and governments, their representative institutions and civil society. This triangulation of data will be especially appropriate in examining different empirical data and cross check information from the reports and interviews. This cross-check of viewpoints by different experts both in literature (reports) and in field (interviews) will enhance validity of interpretations and conclusions.

There might be ethical concerns from both parties- the interviewees and interpreter. The biggest concern for the interviewees could be over the privacy of their sharing and the limitation that they could follow during the sharing process, especially those connected with their organisation's data. To mitigate this, I will make sure our non-disclosed agreement and consent be signed by both parties before proceeding with the interviews, agreeing on how data should be proceeded, documented and shared afterwards. On the other hand, one concern is that I could limit the interpretation of data with my humble knowledge of the topic and limited cultural understanding of Finnish, Nordic and EU. To mitigate this, I will get my transcription reviewed by the interviewees after doing interview with them and validate the data using the framework and theories as key reference.

4. FINDINGS

Findings of the empirical work will be presented into three main sections mentioned in the framework, i.e. advancement of sustainable innovation, balance of private sector needs and market dynamics with the public good, and identification, evaluation and addressing of economic, social or environmental trade-offs, under each evident intervention at the different levels of regions (the EU, Nordics) and country (Finland) will be specified in details. Findings from the reports and interviews will be combined together. An overview of the EU, Nordic and Finnish strategies of innovation and sustainable development is outlined prior to the key findings as a reference.

The findings from this empirical work may not be new or striking exploration, but rather add more evidence to the key points/policy interventions identified in the framework. Only the most

relevant and valuable empirical evidence from the EU, Nordic and Finland will be presented to complement the prior knowledge.

As the result, the question of "How diplomacy can foster sustainable innovation" could be answered, and also a deeper understanding of the framework and its application is the outcome of this section. Unless the reports and interviews provide enough information in certain themes or sections, insights could be absent at any levels.

4.1 Strategy overview

EU strategy overview

The EU Commission emphasised that innovation policies should be enhanced in alignment with the aspirations of the 2030 Agenda, making innovation for sustainable development policies key asset for the EU (Enrico et al., 2015).

Priorities have been made in the three areas of cut-crossing changes: 1) Switch the focus, reorienting mindsets and behaviours towards sustainable development, reframing the EU's innovation challenges, and redirection from technology transfer to capacity development; 2) strengthen partnerships, enhance engagement with developing countries and engage all stakeholders, especially the private sector) in collaboration of tailor-made international innovation initiatives; 3) addressing causes of implementation gaps, ensuring domestic SDGs integration with innovation, improving policy coherence and creating opportunities to benefit from the data revolution, and appropriately setting up monitoring, evaluation and assessments of innovation for SDGs. (Enrico et al., 2015)

This chosen orientation of innovation towards sustainable have resulted in changes related with the priority-setting process (Trade and Development Board, 2018). Specifically, the EU's main policy foundations for a sustainable future now include a decisive transition towards a circular economy; striving for climate neutrality and tackling climate change under Paris Agreement; protection and restoration of biodiversity and ecosystems; the sustainability of the agriculture and food systems; safe and sustainable low carbon energy; buildings and mobility sectors;

enhancing European cohesion. In 2020, the comprehensive economic policy agenda of Europe 2020 indicated priorities of concentration: smart, sustainable and inclusive growth delivered through effective investments in education, research and innovation, sustainable and decisive movements towards a low-carbon economy, and inclusion in job creation and poverty reduction in line with the European Pillar of Social Rights and EU's common values, i.e. democracy, the rule of law and fundamental rights. The EU's Strategic Agenda for 2019–2024 was established to guide the general work of the EU Institutions in the next five years around the four main priorities targeted at: 1) citizens protection and freedoms; 2) a strong and vibrant economy; 3) a climate-neutral, green, fair and social Europe; and 4) European interests and values promoted on global meetings. (The Prime Minister's Office, 2020)

In general, the Europe's lessons and expertise are deeply integrated in their internal and external SDGs implementation (SDSN & IEEP, 2019). The overarching direction, policy cohesion and focus from all EU institutions have allowed the members and regions to make tangible achievements and impacts in collaborative manners (Ruslan, 2014, pp. 213,214).

Nordic strategy overview

Nordic countries are a central reference group for Finland, who have been doing sustainability works under the framework of Nordic Council of Ministers (The Prime Minister's Office, 2020). With both informal roots and formal institutional structures shared together, Nordic co-operation is claimed to be one of the most extensive regional partnerships worldwide in terms of culture, history, development, and socio-political norms. On that basis, Nordic governments and policymakers often act together and coordinate standpoints on international issues, creating a coordinated system of policy. (Institute for Security and Development Policy, 2016, p. 6)

The Nordic Region has set a goal to become a global innovation hub, and their co-operation is ready for international markets (Nordic Council of Ministers, 2018, p. 13). The framework of intervention and transformation in Nordic cooperation have inclusively guided actions for business and civil society. Similar to the EU, the focus is driven towards circularity of resources and efficiency of decoupling environmental impacts from human wellbeing in industry, food systems, and public services. (SDSN & IEEP, 2019)

Regarding goals of sustainable development, Nordic countries have been assessed among the top most "SDG-ready" countries. Engaging seriously in the works of Agenda 2030 at the highest national and international levels, cooperation work between Nordic parliaments, governments and almost all sectors of society have expanded. (Mikko Halonen, et al., 2017, p. 29) They aim to make the Nordic region the most sustainable and integrated region in the world by 2030. Hence, the Nordic vision for 2030 was adopted in 2019 that prioritised three strategies of the Nordic Council of Ministers' work up to 2024: a green, competitive and socially sustainable Nordic Region. (The Prime Minister's Office, 2020)

Since 2017, the Generation 2030 programme has been the framework for joint Nordic actions with the Nordic Council of Ministers being active in implementation of the 2030 Agenda, setting three main objectives: 1) implementation of the 2030 Agenda via relevant policy and projects; 2) involvement and sharing knowledge related to the 2030 Agenda in the region; and 3) improvement of visibility of its work regionally and globally. (The Prime Minister's Office, 2020).

The sustainable development strategy of Nordic cooperation responds directly to the SDGs, in linkage with other programmes of the Nordic welfare model and Green growth. Apart from SDGs, the region also has their own set of indicators to monitor joint progress on sustainable development. Furthermore, governance models have been established to reinforce joint actions within the region with 10 thematic Councils of Ministers cooperating to achieve SDGs, namely Business, Energy and Regional Policy, Culture and Youth, Education and Research, Fisheries and Aquaculture, Forestry, Food and Agriculture, Environment, Health and Social Affairs, Gender Equality, Finances, Labour, Legislative Affairs. (Mikko Halonen, et al., 2017, p. 29).

Finnish innovation policies

The development and utilisation of new knowledge and expertise was raised as the central organising concept of science and technology policy (Science and Technology Policy Council, 1990); (Miettinen, 2002) that can further promote the development of innovations and competitiveness of the Finnish economy (Pelkonen, 2009) in a broad-based sense (The Prime

Minister's Office, 2007); (Ministry of Employment and the Economy, 2008), across sectors of the society (Pelkonen, 2009).

The government's national and regional development priorities have been by strategic centres for science, technology, and innovation, higher education institutions and public research institutions, regional centres, regional councils, and the Funding Agency for Technology and Innovation (Halme et al., 2014) increasingly integrating sustainable development into their strategy and focus of research, in principles of long-term planning, policy coherence, transformation, global partnership, inclusiveness and participation, reinforced follow-up and reviewed mechanisms, organisation models and Government's actions (The Prime Minister's Office, 2020).

The Finnish innovation system has been nurtured by research and development activities, education and training, technological know-how and innovations, in addition to the new policy mechanisms applied to support and govern innovation ecosystems and communities on broad-based consensus, enabling alignment of public policies to tackle structural change and economic transformation of the national objectives (OECD, 2017). The significance of Finnish innovation ecosystems has been into functioning circular economy ecosystems and promoting circular economy and resource-wise solutions, featured in industrial material flows, consumer business, in urban centers and urban-rural cooperation in sustainable consumption and production (The Prime Minister's Office, 2020). Activities towards sustainable and inclusive outcomes have been directing the priorities towards: assessing the potential of the innovation system to address the challenges; establishing a process for deliberation of innovation priorities for sustainability that is evidence based, while engaging with stakeholders with different interests that are fairly represented; selecting areas with innovation potential in which common goals can be established and new partnerships built. (Trade and Development Board, 2018)

Regarding SDGs implementation, Finland has achieved, or is about to achieve, the SDGs related to poverty eradication, health and well-being, quality education, clean water, energy, decent work and economic growth, industry and innovation, reduction of inequalities, and the functioning of institutions and the judicial system. Finland's biggest challenges are related to

the need for changes in consumption and production patterns, climate action, conservation of biodiversity, the state of the seas and waters, and supporting other countries in implementing the 2030 Agenda. Finland's priorities under 2030 Agenda are in sync with the six headline ambitions for Europe over the next five years and well beyond: A European Green Deal; An economy that works for people; A Europe fit for the digital age; Promoting our European way of life; A stronger Europe in the world; A new push for European democracy. (The Prime Minister's Office, 2020).

Finland has been actively working on the 2030 Agenda framework, continuing their global partnerships and negotiations; on financial, regulations and instrumental development initiatives; long-term action and transformation; policy coherence, ownership and participation (The Prime Minister's Office, 2020). The mainstreaming SDG 5 (Gender equality) and 13 (Climate action) have been promoted in the regulation and financial programmes. Their strategy and focus to achieve SDGs have been: internal priorities, diplomacy and development cooperation, and tackling negative international spillovers (Leijten, 2019, p.12).

The Finland's national strategy for sustainable development "Society's Commitment on Sustainable Development – the Finland we want 2050" is based on the concept of "sustainable development doughnut", designed by Kate Rawort and presented in Figure 2 that embraces the values of inclusiveness and sustainability. The tool grasps the multidimension and nature of interlinkage among sustainable development dimensions, and also conveys policy challenges: reaching the social foundation and societal goals that ensure well-being of Finnish citizens and development of the Nordic welfare society; globally ensuring the environmental ceiling or planetary boundaries/global responsibility. (The Prime Minister's Office, 2020)
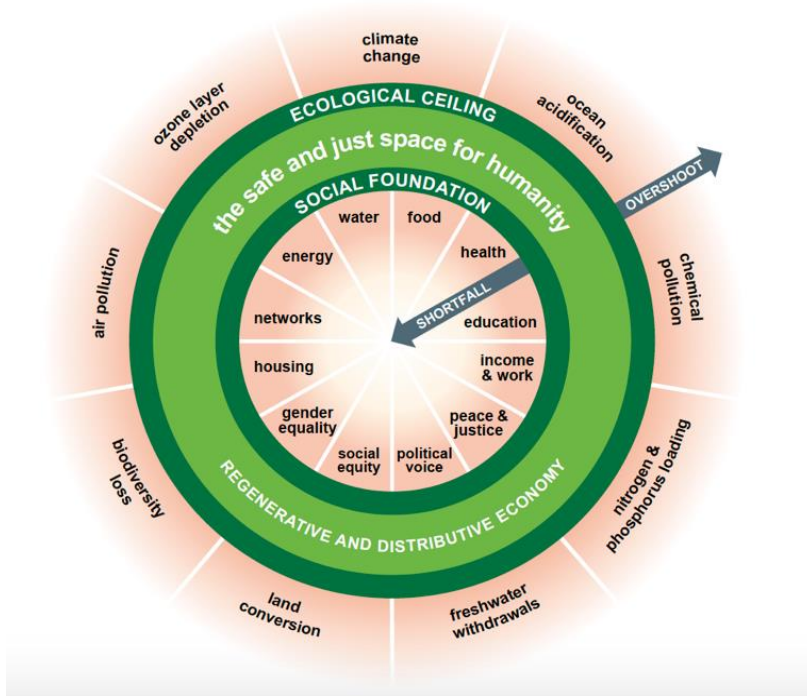
Figure 2: The doughnut economy of Finland

4.2 Advancement of sustainable innovation

4.2.1 Innovation diplomacy interventions

Multilateral solutions involve stakeholders in the international relations around innovation on different levels based on proximity, foundation of the past strong internationalisation, and the philosophy of innovation diplomacy for all global public good: Utilising Multilateral 2.0 approaches and engagement in parallel with national/regional negotiations by global governance bodies to facilitate multilateral cooperation

- **EU/Nordic**

Multilateralism continues to set the base for European innovation diplomacy and its future, with increasing investments being directed into R&D and innovation, and the EU remaining a strong

player in certain technologies and global economic sectors (Leijten, 2019, p. 12). In practice, the EU has recognised the necessity of increased public and private investments in sustainable infrastructure and capability building of innovation for sustainable development via education and job skills, concentrating on science, technology, engineering and mathematics (STEM) education at all levels and R&D for sustainable technologies (SDSN & IEEP, 2019).

A core value of the EU is its well-designed multilateral cooperation, which enables development cooperation to work best. At the country level, active EU diplomacy is regarded as critical for multilateralism to retain their role in fostering international collaboration, helping and encouraging multilateral and bilateral partners to work better together. (SDSN & IEEP, 2019). European development cooperation is suggested to tackle the root causes and consequences of climate change and other environmental degradation in order to address wider security risks which will require targeted supports (Kettunen, Noome, & Nyman, 2018), (Schaik, Born, & Bruin, 2019). Also, in addition to their full multilateral SDGs financing mechanisms, the EU is advised to consider technical and financial cooperation with other large emitters of greenhouse gases to mobilise greater volumes of concessional and non-concessional development finance, and the Commission and member states take prompt actions due to recommendations by European financial institutions, who have critical expertise and know-how to offer recommendations that enhance effectiveness of external development financing (SDSN & IEEP, 2019).

Priority development initiatives are recommended, dependent on country-specific characteristics or areas of priorities (Presidency of the Council of the European Union, 2019). In this regard, strong EU diplomacy and long-term financing solutions of global public goods will ensure legitimacy. At the same time, communication between the EU and all its partners will strike the balance of the EU's co-responsibility to enhance international finance and that of governments outside the EU to tackle environmental destruction. (SDSN & IEEP, 2019) The EU's Structural Funds was established to enhance the synergies of policies and investments across regions and sectors (Carayannis E. G., 2014, pp. 213,214).

Noticeably, a Resolution of the Council on the Cultural Dimension of Sustainable Development was prepared in 2019, which emphasises the responsibility of all policy areas in achieving the SDGs and asks the Commission to prepare, together with the Member States, an EU Action Plan on the cultural dimension of sustainable development and its action plan being integrated in the EU's implementation strategy for the 2030 Agenda (The Prime Minister's Office, 2020).

Nordic governments and non-government actors such as NGOs, the private sector and local level actors have been active in exchange of experiences, learned lessons, best practices, tools and joint actions in cooperative endeavours, including defining when a target is met; balancing actions at home with actions abroad; conveying the domestic priorities and accomplishments of the SDGs their national political settings and more broadly across societies in Nordic (Mikko Halonen, et al., 2017, p. 29).

- **Finland**

Finland very much believes in multinational cooperation, which means that they are active in the EU level. Finland has tried to practice diplomacy together with groups in other countries in Nordic and influence the UN at the governmental level (Interviewee 1).

In the EU-level discussion, the Ministry of Economic Affairs and Employment, together with the Ministry of Education, Science and Culture, have been involved in EU work and benchmarking discussions where EU member states share their insights, experience and practices with each other about bilateral policies and bilateral cooperation with other countries, including SDGs (Interviewee 4). Moreover, Finland supports consistently the strengthening of the cultural dimension of sustainable development in the implementation of the 2030 Agenda that comes along with the EU Action Plan on the cultural sustainable development (The Prime Minister's Office, 2020).

The new strategy of Business Finland is the main policy instrument of Finland in advancing sustainable innovations, who have integrated sustainable development and SDGs and had development co-funding and innovation funding with the Ministry of Economic and

Employment Affairs and the Ministry for Foreign Affairs that support projects to find new markets in developing countries and develop solutions to global challenges (Interviewee 4).

In addition, public and private funding in R&D has been raised to 4% of GDP by 2030 while the funding from the EU Framework Programme is being utilised to finance research, development and innovation activities dedicated to solving sustainability challenges, though investments have been scattered and it is challenging to identify joint priorities across sectors (Mikko Halonen, et al., 2017, p. 29). One direction of funding instruments in Finland is not to merely emphasize on one sustainability area and ignore the rest. (The Prime Minister's Office, 2020)

Establish policies, international coalitions and agreements of joint interests and leverage entrepreneurship and innovation means to unleash opportunities and help realise the creativity and aspirations of people around the world

- **EU/Nordic**

Selective engagement, people-to-people contacts and regional cooperation continue to be in the EU's best (Jana, 2020). In its external relations, the EU is suggested to have a vision that can direct the development of international innovation policy in four territories of actions which will involve: a) open research and innovation models; b) level playing grounds for powers of commerce, technology and innovation; c) cultivated and nurtured technological strengths and critical technologies; and d) key social values and goals of sustainable development communicated in internal and external policies and collaborations. (Leijten, 2019, p. 6)

- **Finland**

Globally Finland has quite intensive collaboration with multilaterals on innovation. Finland is one key contributor of the UN's work on innovation of new solutions to development problems and innovation initiatives, including work with agencies of UN Women, UNDP, UNICEF, UNFPA. For instance, Finland has funded the UNICEF innovation fund, and the UNFPA innovation fund since 2016 to build the global capacity on innovation. (Interviewee 5)

Finland's strength and strong hold in research and innovation is offering high technologies in any case. The country is itself motivated to give them to the world, which in these days are very much relevant to addressing the global challenges. Concurrently, the country is actively supporting their companies to compete in the global markets and collaborate for innovation in target markets, with enclosed SGs. (Interviewee 4)

Establish partnerships models that involve civil society in global governance with their increasing influence, legitimacy and accountability

- **Finland**

The Finnish National Commission on Sustainable Development has engaged stakeholders, including civil society, into intensive networking with supportive funding. Besides, communication and engagement programmes have been organised through which the national capabilities of innovation are simultaneously built. (The Prime Minister's Office, 2020)

Related to the emerging innovation policy paradigm, the legitimacy and public participation impose important challenges. An increasing number of ethical questions related to new technologies and innovations tend to call for broader public discussion and engagement related to these developments. (Pelkonen, 2009) Explicitly, there have been some indications of increased integration of non-governmental organisations, for instance into biotechnology policy (Rask, 2008) and information society policy (Pelkonen, 2008).

Capability development of domestic institutions and enterprises to engage in global innovation ecosystems and develop specialized knowledge in technological, governance, political, and openness themes through international linkages, policies support, deliberate local measures and a balance of trade-offs and complementarities in global arenas

- **EU/Nordic**

The Nordic region has been focused on developing expertise and capabilities with the establishments of partnerships and cooperation programmes since 2017 till 2021 that enable policy transfer and knowledge translation in a transnational policy process. The activities have been aimed at practices, research, capacity building, knowledge sharing, advocacy, apart from other services and cooperation programmes. Nordic cooperation especially supports companies in digitalisation and automation, providing existing companies with the use of digital solutions or developing their business models in order to increase resource productivity, develop and apply new green business models and thus maintain jobs, create new jobs, or bring jobs back from abroad. (Nordic Council of Ministers, 2018, pp. 11-12)

- **Finland**

Typically, the public funding for cutting edge research and innovation are directed through various modes and resources (OECD, 2017). On an annual basis, open calls are provided by Business Finland, Academy of Finland, higher education institutions, and public research institutions who have been increasingly integrating sustainable development as part of their strategy and focus of research (The Prime Minister's Office, 2020).

Besides, there is a SDGs booster theme where public support is given to the companies based on the challenge-driven approach, accordingly there is an increase of public funding to integrate business interests in public good. For instance, regarding climate change, health, circular economy, direct funding is located for public good and companies would create solutions for public good and make business out of it. (Interviewee 3)

Innovation diplomacy activities in support of functions of innovation systems in the relevant dimensions of sustainable development

- **EU/Nordic**

The EU has advanced innovation with international collaboration at hand, evident in all functions of the innovation system (Leijten, 2019, p. 6). The focus is put on policies

identification and institution of regulations (Leijten, 2019, p. 15-16) and meaningful diplomatic actions (European Commission , 2008).

The EU has identified and transmitted the key social values and goals of sustainability in its internal and external innovation policies via collaborative activities, such as the transfer of European thinking about innovation ecosystems, the related smart specialisation strategies and regulation of the social impacts of the platform economy business (Leijten, 2019, p. 14).

The Nordic region has taken a green transition to sustainable growth while offering great solutions around the world, sharing a broad frame of interests and challenges regarding SDGs agenda (Nordic Council of Ministers, 2018, pp. 9-12).

Development financial institutions such as Nordic Development Fund (NDF), the bilateral financial institutions such as Finnfund, West fund, North fund in Finland, and multilateral development banks such as The World Bank, Asian Development Bank, and regional development banks are providing official development aid funding (ODA) directly from the government of Finland (and Nordic countries) as part of development policy with the mandate to finance climate change mitigation and adaption projects in lower-income countries and countries in fragile situations. From the diplomacy perspective, NDF is owned by the 5 Nordic countries, and final decisions are made through the parliamentary process of each member country as well as alignment between these member countries. (Interviewee 7)

- **Finland**

Diplomacy is one Finnish strength, which is performed mainly through the works by the Ministry for Foreign Affairs (Interviewee 1). The Finnish approach is very much based on the idea that when they do diplomacy, they listen to everyone and they do not close the ears from those who have different views, but rather try to, whether with Finnish or Africa politicians, progress together acknowledging that both sides have challenges, leave no one behind and build the trust without taking anything for themselves or hiding anything (Interviewee 1).

As a remote country from the middle of Europe, it is increasingly important for Finland to be part of EU networks and find partners that bring added values to their work. Being actively implementing diplomacy, public relations, and international relations for subnational actors, it is important for Finland to understand that the global/EU arena is a broad network of stakeholders and lots of activities, collaboration and cooperation are being played in project works funded by EU from city to regional levels. (Interviewee 2)

Finnish government's spearhead projects frequently have a regional dimension and the government has started to sign development contracts with major cities. Systematically central government has maintained different generations of representative offices at the level of the regions while other key organisations having Finnish regional implementation. Typically, the 15 centres for economic development, transport, and the environment (ELY centres) have provided regional outposts for the work of a constellation of national ministries spanning work, industry and development issues and serve as a key interface for regional development planning between the regions and the central state. (OECD, 2017) (Appendix 2)

Finland continues to work actively towards strengthening the UN and its ability to operate effectively towards implementation of the 2030 Agenda while taking into account international law, democracy and human rights via promotion of the rule of law, and promoted action on human rights such as human-rights- centred artificial intelligence, protection of civilians, preventing sexual violence in conflicts, the rights of women and children; international crisis management and participation of women and youth in peace processes. Climate change is an overarching principle that is considered in all policies and activities. (The Prime Minister's Office, 2020)

Finland has participated in the UN high level political forums on annual basis. The country reports yearly one or two SDGs and once to the Government the whole SDGs agenda. One important element of diplomacy to be acknowledged is that on a yearly basis Finland has shared globally their experiences under UN leadership in the global Agenda through reports and also very high-level discussions. In other political forums there are states leaders, presidents and ministers discussing these SDGs agenda. (Interviewee 3)

Public policy has a leading role in fostering innovation through demand-enhancing regulatory development as well as public procurement legislation that specifically supports environmental aspects spurring innovative products and services of the system in Finland. Other framework conditions such as fostering competition, easing entry of firms, co-ordination of policies fostering innovation and internationalisation by fostering international trade and FDI are also in place. (OECD, 2017)

The international scale programmes by Business Finland and Technical Research Centre of Finland Ltd (VTT) are to boost innovations for international markets within sustainable development themes of clean energy, renewable raw materials, the circular economy, health, and digitalisation. In addition, Finland has actively promoted international policy discussions on the integration of the 2030 Agenda to result-based management of development cooperation. (The Prime Minister's Office, 2020)

Leverage foresight and acknowledge the roles of scientists in finding solutions and contribute ideas to policy making

- **EU/Nordic**

Nordic Innovation has intelligence space where foresight analysis, policy analysis, and scenario processes are conducted on the problem-solution base, which all help various stakeholders to see the possibility of the future. Especially with businesses, it is important to have this type of analysis to help them look into the future and see where they can go via different types of dialogues and partnerships. Also, the analysis might be used to create attention around an issue that innovative solutions are in demand and for that to happen, partners need to meet and fora are arranged. (Interviewee 6)

- **Finland**

In Finnish context, the role of scientists is considered important but other actors are becoming important as well. The key is that actors work together rather than having separately very high-

quality science. In essence, it is not that one group or individual will be stronger or more important, but rather framed as innovation needing support from the science. The recommendation is that scientists come up with the ideas and other actors join the co-creation in the most sustainable innovation system, as the science changes towards transformation. (Interviewee 1)

Effective research collaboration and partnerships that embed a deep understanding of the issues and allow an open, networked, participatory and less state-centric mode

- **EU/Nordic**

The strategic priority for the EU is to strengthen international cooperation in research and innovation via strategic priorities such as access to the latest knowledge and the best talent pools, effective tackling of global societal challenges, creating business opportunities in new and emerging markets and leveraging science diplomacy in external policy (European Commission, 2016).

The Commission continues the implementation of Horizon Europe, the world's largest transnational research and innovation programme to boost their systematic changes and push the frontiers of knowledge to tackle economic and social challenges including solutions for healthier living, driving digital transformation and fighting climate change. On this scientific and technological base and well-developed solutions, the EU is expected to become more resilient. This collaborative research model to societal challenges is also reinforcing technological and industrial capacities, particularly in such specific thematic clusters that address the full spectrum of global challenges as climate energy, mobility, digital industry and space cluster, quantum research, culture, creativity and inclusive society, health. (European Commission, 2020)

In practice, Horizon Europe have been accelerating a streamlined number of European partnerships that encourages wide participation of public and private sectors/partners in the EU, with new features being added to provide support small and medium-sized enterprises, start-

ups, and midcap in their business endeavours of emerging and breakthrough innovations (European Commission, 2020).

- **Finland**

In different countries, there is a huge capacity in research and also in the science policies, i.e. who is advising the policy makers, and who can have diplomacy. In other words, the link between scientists and policy makers is not really working that well in most countries while the capacity in most poor or low and middle-income countries is very poor. Therefore, it is really important and ethically important, also from rational point of view, that rich countries take part in helping countries to build capacities and get open access to science from the fact that scientific papers may not be reached when they are locked in certain universities in EU or US/Northern Asia and database availability is thus very limited. In this case, diplomacy will help the countries to direct their money and understand that research is really a tool for competition, and also to build collaboration between North, South, East, West to develop scientific qualities within the countries. (Interviewee 1)

Encourage knowledge-based opportunities for innovation are arising and competitive thinking in the field can strengthen a countries' or region's innovation system with its orientation

- **Finland**

Innovation system governance have been practiced in Finland in a participatory and inclusive way that involve a diversity of stakeholder groups from inside and outside the country, including governments to end-users who are exposed to the societal inputs of the innovation processes. When creating and enabling opportunities for knowledge-based innovations that can flourish and bring up new kinds of business for local and global markets, OECD (2017) recommends that Finland takes a forward-looking strategy and vision at the highest level of their policy decision making. (OECD, 2017) On the other hand, Interview 1 emphasised that we need to also look at the past as the future is important to move forward, but the past is also.

4.2.2 Sustainable development diplomacy interventions

Set up an overarching framework, forms of governance and innovative approaches to meet SDGs

- **EU/Nordic**

The EU has practiced political movements at high levels, including implementation, review and monitoring. In 2017, the Council established a working party on the 2030 Agenda that assists the Council in reviewing and monitoring implementation of the Agenda by the EU across policy sectors, in both internal and external spectrums and systematic, effective, participatory, transparent and integrated manners. The mandate of the party is also to address cross-cutting issues while implementing the 2030 Agenda and follow up on improvements made at EU level, playing a leading role in coordination and preparation of EU approaches and positions, for instance in relevant international dialogues, processes and fora on sustainable development. (The Prime Minister's Office, 2020)

Development financial institutions such as Nordic Development Fund (NDF) strongly rely on partnerships and they work very closely with other institutions and similar types of organisations in co-financing projects such as multilateral development banks, European Development Finance Institution, with the countries who have been long-term recipients of their funding and with other large environmental organisations. What is most important for them in their partnership is that motives and sustainable development objectives are aligned and shared by all of these organisations, much guided by the SDGs. They also have the principle, when it comes to environmental issues for example and to governance, that they always do the best practices with the highest international standards. Harmonisation, very clear guidelines from the World Bank, and their values such as transparency, gender equality, poverty reduction and so on, are all shared by all the partners. In essence, there really needs to have a strong alignment and clarity of objectives and what financial institutions are doing. (Interviewee 7)

Convene ventures and incorporate expertise to identify causes, effects and their relations and find solutions to global challenges

- **EU/Nordic**

Nordic programmes have enabled businesses to achieve sustainability while share their responsibility of the issues on a global scale, through encouraging the private sector to become solution providers and a transparent communicator of sustainability issues in value chains (Nordic Council of Ministers, 2018, pp. 12,13).

New sources of (cross border) risk capital are in need while the risks are being reduced and opportunities are open to various stakeholders by financial institutes (public and private funding). Such programmes as transition to circular economy are also open by Nordic Innovation for businesses in the Nordic to join as everyone has a part in the value chain. (Interviewee 6).

- **Finland**

Cities and businesses are the forerunners in sustainable innovations. They see where the business opportunities are and they do it faster than the governments can do it. In Finland, businesses are collaborating between countries in a way that they buy in the others or start to compete each other. Yet regarding sustainable development and sustainable innovation, we need to accept that we cannot get the results today even though the situation is urgent. We still need to make it in a controlled way so it is not collapsing, and if we go too fast, there will always be groups who feel that they have been mistreated and they will bring it up, and then we are again back in the old. That's the reason we cannot go as fast as we would like to. (Interviewee 1)

In reality, there are many who are frustrated with business communities and in this regard, we need strong governments, fulfilling their roles once things are moving. They need to make sure that sustainable innovations will become mainstream and at the beginning when the businesses

are taking risks, governments and policies have strong responsibility to share their risks of trying new things, doing diplomacy inside and outside the countries. (Interviewee 1)

Give guidance on policy actions and establish the mechanisms and social practices of cooperation and coordination among stakeholders

- **EU/Nordic**

To achieve the broad themes of SDGs, policy specialists have suggested deployment of comprehensive and deep transformations, long-term plans and policies in addition to an assortment of direct regulations, public infrastructure provisions, and private businesses and consumers incentives: both positive (e.g. feed-in tariffs) and negative (e.g. taxes on CO_2 emissions) (SDSN & IEEP, 2019).

EU has implemented one important initiative- the European Green Deal that covers sustainable development dimensions and calls for large-scale changes in public and private investments and technologies. Based on a multidimensional analysis, the European Green Deal includes technological pathways to identify one or more technology scenarios to reach climate neutrality by 2050, including intermediate milestones for five-year periods; financial planning to identify efficient and low-cost pathways among the possible alternatives; frameworks to create a feasible mixture of regulations, public investments, and incentives; subsidiarity analysis to assign policy and financing responsibilities across levels of governments: the EU (Commission, Council, Parliament, European Investment Bank), member states, and regional and local governments; mission-oriented research and innovation to identify public-private research and development priorities to achieve the SDGs and the objectives of the Paris Agreement; metrics and monitoring to identify a set of indicators to assess progress towards the 2050 goal and intermediate milestones, and to create an ongoing feedback process from metrics to policy. (SDSN & IEEP, 2019)

Globally, the EU has undoubtedly played an active and leading role in mobilising countries around ambitious outcomes, promoting climate neutrality by 2050 by all signatories and suitably revising climate strategies (SDSN & IEEP, 2019).

Nordic cooperation has founded large joint programmes and pooled resources from different sectors into larger establishments, for example the Nordic Prime Ministers' Initiative of Nordic Solutions to Global Challenges (2017), that contribute to Nordic response to the attainment of the SDGs as a whole. This model of partnership in the SDG context has vividly show the readiness for Nordic co-operation on sustainable development, their political will and interests in joint actions for SDGs among diverse groups of stakeholders from all sectors of the society, covering representatives of government, the private sector and civic society. Also, it has set a foundation for cooperation, coordination and will add value to the current national and international work carried on by the Nordic countries. (Mikko Halonen, et al., 2017, p. 29)

A challenge and also the success factor of these cooperation programmes is the consensus on the priorities for owners of cooperation programmes, as they will have fewer options to be optimal when there is so much top-down. Another challenge is that lots of projects are under co-financing from businesses, which means they have to be relevant. Moreover, Nordic added values should be embedded in the programmes when the national representatives from the Ministries come with their national interests rather than Nordic-added-values-points of view. The answers to these challenges is to ensure that it is overarching enough to make it from the Nordic when developing instruments, incorporating Nordic added values while discussions of promotion of the national interests and consensus for Nordic interests move stakeholders forward. (Interviewee 6)

Ensured policy coherence, flexibility, redundancy and robustness offered by effective sustainable development diplomacy can generate a wider range of options for actors to select

- **EU/Nordic**

Policy cohesion in different EU policy fields is really important, meaning that ambitious climate targets are in favour. At the same time, EU Commission does not fund unstainable ways of producing energy. Instead EU funding is allocated and geared towards low carbon technology, research and innovation. (Interviewee 2)

The EU continues promoting coherent external SDG strategies via international conventions and multilateral national partnership agreements, its leadership in multilateral forums, bilateral forums and discussions with key partners in trade agreements, investment, technology, apart from the other domains, regulatory leadership and international collaboration for sharing problem solving and exchanging lessons internationally in how to achieve SDGs while implementing SGD transformation, particularly the climate and biodiversity conventions (SDSN & IEEP, 2019). These engines of policy built on a mutually beneficial transformative approach towards the SDGs has indicated that innovation and growth are dedicated for the benefits of global public good.

Flexibility of course is very vital, a value reflected in various project sides and initiatives. In essence, EU support is important to make sure implementation takes place to reach ambitious targets while the actors on the ground receive enough support. Consultation at subnational levels, so to speak regional stakeholders, is also needed in EU policies. (Interviewee 2)

The EU, and also Nordic, has added new tools to promote coherent strategies for financing and implementing the SDGs, including necessary policy changes and phasing out of harmful subsidies, such as giving free ODA. Harmful subsidies create negative externality and distortion in the market, when free money is rejected into the private sector for example. There will be distortions and incentives will be distorted if companies will not use money to actually innovate but they will lose the money just to take that money and to use that money how they want to use it. (Interviewee 7)

- **Finland**

SDGs are strategically present in all of the goals and policy programmes that the Ministry of Economic Affairs and Employment do (Interviewee 4) in coordination with other ministries and sub-national institutions (Appendix 1), and thus enhancing policy coherence. The Finnish Government and Parliament have engaged in regular dialogues on 2030 Agenda implementation, and the National Audit Office has integrated the 2030 Agenda into its audit programmes. All line Ministries are included in the Sustainable Development Coordination Network, which enhances policy coherence across sectors. Additionally, a sustainability assessment has been incorporated into the annual cycles of policy planning, budgeting and reporting of the Government. (The Prime Minister's Office, 2020)

Consistently develop diplomatic processes to address the linkages across issue areas, scales and actors

- **EU/Nordic**

Measurement and understanding of spillovers pose significant challenges (The Prime Minister's Office, 2020). As part of the global value chain, EU and Nordic countries hold themselves certain responsibility to diagnose and address international spillover effects and a significant role as a producer of global positive and negative spillovers. The EU is suggested to be in frontline in developing indicators for monitoring spillovers and the EU information concerning the spillovers generated by the EU's policies around the world needs to be improved, including ways to measure the global footprint (negative impact) and global handprint (positive impact). (The Prime Minister's Office, 2020)

Working on a lot of clusters, such the national clusters as Nordic partners and value chains, Nordic Innovation has had potential initiatives in support of the objectives of sustainable growth in all economic, social, and environmental dimensions (Nordic Council of Ministers, 2018, p. 11).

Moreover, Nordic Innovation has had initiatives aiming to make the Nordic region a global innovation hub and enhance their cooperation in international markets and global market opportunities: In addition to export modules, Nordic Innovation also utilised tools doing research and research work with businesses. Each of the programmes has a portfolio of different elements implemented in an ecosystem approach, on the basis of political policy. Further, the organisations spread awareness around the challenges to attract various partners and stakeholders in matchmaking events, conferences, workshops as platforms for people to meet as well as the programmes of accelerated types, where for instance, circular business models can be developed. Nordic Innovation also has the financial space that encompasses proposals of innovation challenge competitions and innovation prizes. They are now working on 8 initiatives in the next 4 years, all towards to mission 2030. (Interviewee 6)

In general, authorities, businesses, and organisations in Nordic are nowadays working together and challenging each other, leveraging the potential of Nordic co-operation and focusing on those areas where their co-operation yields the greatest values. Hence, Nordic co-operation not only complements and promotes national initiatives, but also collectively creates the conditions for a Nordic testbed infrastructure. (Nordic Council of Ministers, 2018, pp. 7-13)

- **Finland**

Structural weaknesses, weak incentives and downstream competences such as weaknesses in technology transfer mechanisms, export competences and strategy in business, as well as shortfalls in intellectual property and value-chain management have been complemented by Finland's substantial R&D effort in interactive processes of innovation and diffusion. As other countries in Nordic, to improve linkages between the research sector, innovation intermediaries and technology transfer agents/institutions, industry and government, continued improvement of framework conditions for innovation and business activity are recommended (OECD, 2017), (Interviewee 6).

Advocacy by experts to mainstream innovation for SDGs roadmaps

- **EU/Nordic**

The EU continues consistent advocacy for policies and strategies to achieve SDGs besides their internal leadership on sustainable development and integrated approaches. In bilateral discussions, trade agreements and other forms of collaboration under recognition of mutually beneficial transformative change towards the SDGs within the region, and other parts of the world to cope with international spillovers, SDGs have been integrated. Besides, regulatory standards in support of SDGs considered in cooperation with other countries. (SDSN & IEEP, 2019)

EU leadership on the SDGs continues to be crucial in their works supporting the UN General Assembly, the High-Level Political Forum on the SDGs, the 2020 UN Nature Summit, meetings of the G7 and G20, as well as the Annual Meetings of the IMF and the World Bank. Drawing on their experiences from implementation of the European Green Deal, the EU has been negotiating an ambitious post-2020 framework for biodiversity and promoting integrated approaches to decarbonising energy systems, ensuring sustainable land use and food systems. (SDSN & IEEP, 2019)

- **Finland**

Focusing on urban and research policies, research innovation, transport, environment, energy policies as well as digitalisation, healthcare, Helsinki EU Office is aiding and support for Finnish stakeholders in terms of government relations, for instance advocacy to EU institutions, EU Commission, or EU Councils through networks where their organisations are active. The office has provided strategic support and influenced policies actively, particularly when they are based-in Brussels. (Interviewee 2)

Embassies and diplomats that are following science and innovation affairs remain Finland's main networks and the widest networks for advocacy. Plus, Business Finland, who works mainly

on export and innovation collaboration with other countries, has the global network where Finland has presence. In some countries, Finland has innovations or special innovation counsellors, for example in China, Japan, Korea, United States, where they have special dialogues and bilateral projects as well. (Interviewee 4)

4.3 Balance of private sector needs and market dynamics with the public good

4.3.1 Innovation diplomacy interventions

Alignment of the "whole-of-government-approach" and "whole-of-society-approach" that align on a clear foreign policy view of innovation visions and guidelines for innovation diplomats

- **EU/Nordic**

Active EU diplomacy supports the "whole-of-government" SDG strategies. At the country level, the EU helps and encourages multilateral and bilateral partners to work better together to support these strategies. To further this, the EU has developed the Multistakeholder platform since 2018 for SDG transformations based on the "whole-of-society-approach", which identifies and recognised the multiple roles of governments, businesses, social partners, academia, civil society and individuals. Accordingly, governments will take the role of setting the broad guidelines; businesses changing their performance metrics; social partners integrating the SDGs into the social dialogues; academia providing sustainable development education, research, and policy analysis; civil society holding governments and businesses accountable; and citizens supporting the SDG transformations, consumers, and managing their own households and behaviours. (SDSN & IEEP, 2019)

In Nordic, there are ongoing efforts to promote and integrate inclusion into all three dimensions of sustainable development as a commitment by the regions and municipalities, particularly the inclusion of vulnerable groups who are to overcome the current challenges in a broad perspective, in relation to the Nordic welfare model (Mikko Halonen, et al., 2017, p. 29).

As businesses are there upfront, one challenge for Nordic Innovation is to actually make the politicians understand and accelerate valid conditions for businesses to work towards sustainable development because the businesses are moving fast. A lot of messages are being delivered in its new programmes, calling for different rules and working framework conditions for the technology and inventions being already available. Trine Moa (2020), the Senior Advisor from Nordic Innovation comments that regulations and frameworks will take time, and it makes sense that they are done at the Nordic level that lays the different bases for different programmes launched to scale. (Interviewee 6)

Also, as businesses obviously have their own agendas, priorities should be agreed on and later translated into common good as the focus is obviously now on sustainable matters. Regarding general public, tax-paid money is being spent for achieving a common good, and not for some business' interests. In this context, Nordic Innovation has been actively working with the theory of change and using a sustainable measure that help building the narratives, thus everyone can attract different stakeholders where they find their place. (Interviewee 6)

- **Finland**

According to OECD review of innovation policy (2017), Finnish stakeholders have extensively relied themselves on innovation-driven collaboration so as to enhance technological and economic outputs and utilise their resources and competences to create values in all sustainable development dimensions (OECD, 2017).

Embedding exclusive corporatism into decision-making model, Finland has particularly developed sustainable development strategies and multi-stakeholder forums where the government has valued multi-stakeholder approach, adopting the Society's Commitment to Sustainable Development as a tool for public participation and contribution, suggesting their concrete actions for SDGs. This "whole-of-society" approach has deeply incorporated into public governance when over 300 signatures were collected for operational commitments by actors from the public sector, businesses, civil society and private individuals, and thus committing further to the Finnish Society's Commitment to the SDG process. During the

preparation of the new national innovation strategy, over 500 persons participated in an open online consultation. (The Prime Minister's Office, 2020) Obviously, public sectors policy has been combined with strategic choices by business, finances, individual collective actions, science and technology- who all jointly need to work about technological, social and political innovations. There is scientific evidence that the local communities are actually innovating far more that their innovations become mainstream. It is because we need to try doing the totally different things, and yet the big enterprises/bodies are much slower to make radical changes. Startups, small-scaled startups and communities or collective groups of people, children and young people then come, rebel and change. In short, the best innovations are to be picked up from these collective actions and changes of behaviours in different groups of people, especially with the help of global connection via the internet. That is the moment when the policies pick innovations and mainstream them. (Interviewee 1)

The centres are responsible for promotion of regional competitiveness, well-being, and sustainable development and for curbing climate change. On the other hand, decentralised implementation enables Finland to review regional characteristics geographically, harmonise and uphold the development of regional expertise via an implementation networks of regional and provincial innovation actors, such as private companies, sector research institutes and universities across. Furthermore, the Finnish Ministry of Economic Affairs and Employment came up with the innovation network concept in 2005, accordingly trainings, seminars, data sharing, pilot projects, and networking are organised. (Halme et al., 2014)

Moreover, the public entities such as the Ministry of Economic Affairs and Employment and Finnpartnership give companies subsidies domestically, tutoring and networks to respond to SDGs. Through domestic regulations, basically the government expects Finnish companies in terms of environmental and social impacts and therefore, they develop solutions which then they are enable to take abroad. Tax solutions also direct how companies develop their solutions. (Interviewee 4)

The policy lesson from Finland is that a wider range of sectors and technologies involved together will allow Finland to build on its advantages and to diversify. On the basis of a forward-

looking strategy and vision, governments will back up mobilisation of innovation for a wider set of users in the economy, society as well as abroad while sectors should be open to new technology adoption and new industrial applications, widening their market portfolio and even reorienting their business strategy while harnessing or building on existing assets. (OECD, 2017)

For governments to actively engaged actors in the system together and address the issues of power, representative, voice and accountability in multi-sectoral governance, it should start from education as it is for long term and Finland has had a long tradition of education with its library system of long tradition. Gradually moving Finland to that direction of sustainable development, education is very important, starting from the day-care, when they listen and share from the very early stage. Though the issue of discrimination traditionally exists when the sauna traditions justify that men make decisions, the hierarchy in Finland is low in a sense that people eat together for instance in the office and quite commonly, people sit together and that does not discriminate women and men. (Interviewee 1)

Addressing these issues, it is also very important to understand the positions of different actors, to understand how to convince and make the voice heard, and how to find arguments which make the goals and positions convincing and persuasive to those actors who are not familiar with certain factors. Multicultural knowledge and international knowledge are needed to understand sensitivity of different actors instead of focusing on some actors' own strength and position. In that sense different interests are to merge together to overcome them economic, social or environmental trade-offs. (Interviewee 2)

Moreover, there are elements in Finnish legislation that allow different parts of the society to give the comments in discussions. In case of existing tension, for instance regarding combination of sustainable development and innovation cooperation, which kind of projects getting funded most or whether there are more traditional projects or some new projects that companies will devote, there needs a principle that: in a clear manner, there is no distrust in how the participants can compete with each other. (Interviewee 4)

4.2.2 Sustainable development diplomacy interventions

Utilise private-public partnerships and flexible, decentralized, voluntary market-oriented approaches, in addition to multi-sectoral and multi-stakeholder partnerships, to problem solving of social and environmental problems

- **EU/Nordic**

Private-public partnerships to tackle global issues have been established in order to address them in an appropriate way. For instance, in climate policy, sub-national actors are forerunners in comparison to traditional nation states and regional actors, and thus, it is important to implement this strategy of partnerships through projects, cooperation and collaboration so that ambitious SDGs targets can be integrated into reality. In this context, international networks particularly play a crucial role. (Interviewee 2)

A new partnership model responding to the wishes by the private sector for a radical renewal is through public funding to further development of ecosystems in research, development and growth (funding is made on a competitive basis), in addition to the new models of operations set up for testing, piloting and scaling innovations. Targeting both identified ecosystems and key growth areas, these new models' better group the national programme financing with the EU as well as with other international funding. (Research.fi, 2020)

- **Finland**

Embedding a human right- based approach in its policies, Finland has that call for more multi-stakeholder partnerships and engagement in innovation. It is very important for the Finnish government and private sectors, NGOs and research institutes to work together in enhancing solutions and strategies that can enable these kinds of collaborations to happen. In the UN, EU and Nordic spheres, it is quite easy to talk about these issues. Still, it is crucial to bring this up to different tables globally and hope for more like-minded partners to join and apparently to slowly change their mindsets towards this type of collaborative thinking. In essence, the talks

are being shifted to more policy sides and global collaboration should be enhanced rather than talks about high tech single innovations, which is often the case about innovations for SGDs. (Interviewee 5)

Finland has established strategic centres for science, technology, and innovation (SHOKs) as public-private partnerships since 2006 with the objective to narrow the gap between the inputs and outputs for Finland, accelerate the processes of innovation and revitalise the Finnish industry clusters by creation of competencies and radical innovations. Apart from national implementation and policies for regional and local environments, SHOKs facilitate cross-sectoral implementation and demonstrate outstanding coordination and management mechanisms, taking on their roles and responsibilities inside the institutional environment, as well as the interplay between the spatial dimensions, namely global and international industries, cross-sectoral and location-specific innovation ecosystems. (Halme et al., 2014)

The long-term issue is critical because ownership of the partnerships should be found on all on sides involved. One key challenge in all these innovation works is bringing these solutions to scale following the piloting of exciting new solutions. Apart from developing the mechanisms on how to ensure the local ownership as solutions, this requires funding most of the time and desires projects to be built towards scale and their solutions respond to the local needs of long-term actions and visions. (Interviewee 5)

4.4 Identification, evaluation and addressing of trade-offs

4.4.1 Innovation diplomacy interventions

A systematic perspective that guide the representative mechanism of operation between actors in the innovation ecosystems for both micro and macro levels of governance

- **EU/Nordic**

Setting their clear direction and a system of policy coordination with a guided vision from the Nordic Council and Ministers, Nordic governments and policymakers often act together and coordinate standpoints on international issues (Nordic Council of Ministers, 2018, pp. 9-12).

According to Trine Moa, Senior Advisor from Nordic Innovation, countries should adopt the systematic approach, especially now when we are dealing with grand challenges and changes are happening so much more rapidly than before. It is necessary to see how things are interlinked, to see where they have to take in the cooperation programmes and more approaches to how we work can be explored, and to see the leverage point and understand the dynamics as well as how to intervene in the system. (Interviewee 6)

- **Finland**

Because we need to do big changes, innovation is very crucial. When we innovate things, we do the master step level, and very much looking much at things from scientific perspective. The only way to move forward is to take a systematic approach, which means when we do innovation, it is not only the single solutions but rather big systematic solutions, which can be a combination of technological and social, political and cultural innovations, learning innovations and communicative innovation. (Interviewee 1)

It is natural to take a systematic transformation in a way that the governments put the rules for people and people can also address their voice to buy or not buying, putting pressure being together in the table. For instance, transformation in energy and food systems are linked together and things become a network. The big difference is that in modern society we want to see black and white, what's the right decision and what comes to the end. But in sustainability there is no end because there is always something where we need to just continue and it is about accepting the complexity and the messiness of the world, and that we do not get the exact result but it is important that we go to the correct direction. The most important is to get people on board and in a way get them work together in roundtables where different actors discuss. For instance, Finland are now building the new climate law that the Prime Minister is leading and she meets the scouts, children, and so on. It is quite cross-cutting that even the Prime Minister can

collaborate with the youth and so forth. That means people are not kept in separation with politics. (Interviewee 1)

OECD acknowledges that Finland take an integrated and systemic approach towards the making of their innovation policy and introduce innovative policy mechanisms to support innovation ecosystems and communities. Accordingly, the traditional roles of businesses and the higher education sector as well as scientific communities are being challenged. New interactions and more open modes of innovation are needed, which will involve wide networks and communities of knowledge and practice. (OECD, 2017)

All in all, the balancing of the economic and welfare targets would require a strong capability for horizontal collaboration across policy sectors or policy coordination from the government, ministries and various state agencies involved in innovation policy development. And yet different policies and measures should work together as a coherent whole rather than in conflict with each other. (Pelkonen, 2009)

Engage with NGOs and local/regional public bodies in the domain of foreign policy who can organise and facilitate negotiations and lessen potential tensions/conflicts of the innovation ecosystems

- **Finland**

Acting similarly to the embassies of national states or different governmental levels at a subnational level, Helsinki EU Office has been representing a big platform of 16 Finnish member organisations who are very much interested in EU projects and funding, including Helsinki-Uusimaa Region Councils, regional members (Kymenlaakso and Päijät-Häme Region), cities as such as City of Helsinki, City of Espoo, City of Vantaa, and universities such as Aalto University, University of Helsinki, Hanken and Swedish-speaking schools, Universities of Applied Sciences, and research institutes which are nationwide and regionally bound. Basically, the organisation supervises member organisations' interests, and promotes their visibility in different unique forms such as different networks, organising events or representing

them in meetings and reaching out the EU institutions. One big part of its work is providing information and communicate to the members EU legislation and EU initiatives that have been happening by publishing newsletters or other content in Finnish and English languages. Its member organisations cooperate not only within EU but also with other stakeholders in Asia, South America, and Africa. (Interviewee 2)

One important part and factor of Helsinki EU Office is to analyse the impacts of the EU policies on member organisations, communicate that in Finland, and then assess whether to conduct policy advocacy or measurement. Furthermore, it facilitates the wishes from member organisations to meet EU policymakers to talk with them or bring them some points, for instance forest policies or climate-related issues. Helsinki EU Office also tries to facilitate partnerships between EU policymakers and member organisations. In a broader sense, it has projects works, networks for Finland and Finnish stakeholders. (Interviewee 2)

Finland has close collaboration with the UN, especially in Finland the UNTIL is established. Besides, from the beginning of this year (2020), the country has the UNOPs investment programme and there are now discussions with UNICEF in order to strengthen cooperation with them. All these examples indicate that Finland is interested in strengthening the UN presence in the country, in addition to local public organisations such as Business Finland and VTT programmes who work very closely with the SDGs. (Interviewee 3)

In addition, there are some high-level committees, for example the Committee of Sustainable Development who are representative of different groups of people or Committee of Developing Policy which is run by the government. Especially there are NGOs who can express their views very openly and many times, they disagree with the government. Yet they have a floor where they can present their ideas in front of different parties, who are part of the government, and also the political parties who are in the opposite positions. NGOs also include their statements when Finland drafts the reports to the UN. In this way, Finland Government tries to make sure that everyone is heard and the government works very closely with the NGOs. (Interviewee 3)

When engaging different actors, there exists trades-offs of sustainable development dimensions. To address this, different groups of people: social partners, NGOs, entrepreneurs, enterprises, representatives of industries, and the representatives of workers (employees, employers) are consulted (Interviewee 3 & 4) when a new legislation is launched or initiative developed. To deal with them and encourage people to work together would also require interventions of domestic policy and consideration, international work and environmentally, socially and ecologically sustainable solutions offered internationally. (Interviewee 4)

4.4.2 Sustainable development diplomacy interventions

Utilise roadmaps of innovation for SDGs to engage multiple stakeholders that acknowledge international and supranational policy guidance and assistance, and innovation strategies by donor countries and agencies globally

- **EU/Nordic**

European institutions and governments at all levels are suggested to engage with academia and civil society more generally in designing pathways for SDGs. Encouraged as incubators of new sustainable businesses and technologies, academia is recommended to adopt SDGs as key topics for the higher education curriculum in business, engineering and policy schools, research activities, and policy advisory work with governments. At the same time, civil society should be invited as a full interlocutor in the design of SDG policies and programmes, which is expected to play its vital oversight role in holding governments and businesses accountable for their SDGs commitments while the business sector needs a new orientation and business metrics for the SDGs that address four dimensions of product, production process, supply chains, and tax compliance in their business performance. (SDSN & IEEP, 2019)

Globally the EU continues collaborative programmes with many developing and innovation-following countries worldwide and help them build the institutional frameworks for innovation (Leijten, 2019, p. 7). Multiple objectives have been supported via a new framework for

sustainable development finance that includes more and better targeted development assistance (Gaspar & Soto, 2019), (SDSN, 2019) to achieve the SDGs across countries.

Regarding spillovers, NDF has projects from Nordic countries that finance the developing countries directly, supporting their national adaption plans (NAPs) or national contribution plans of how they will tackle climate change under the Paris Agreement. In addition, NDF also finances research and innovation projects in lower-income countries and countries in fragile situations that are interesting and innovative from climate change perspectives, for example with private companies, NGOs, and joint ventures from early stage-grant funding to project development, visibility, market assessment and piloting. In addition, there is a need for institutional R&D financing such as policy innovation, regulation innovation and strengthened local institutions, national institutions in developing countries which call for a lot of money and research money/R&D money. During the processes, diplomacy and its alignment ensure that the financial institutes are not either stepping each other toes or competing but rather bring additionality through harmonization of tools. The high-level diplomacy discussing sustainable development and its objectives has made it easier for such financial institutes as NDF to execute what they are doing and to do efficient operations that in the end target sustainable development. (Interviewee 7)

Through this ODA from Nordic, which requires a high level of commitment from the recipient countries to set their own priorities of SDGs that are most important, the sectors and ownership of those plans, capacity building can also be done in developing countries. In practice, NDF finances projects and facilitate capacity building, i.e. building local and national institutions and supporting research and education, training, knowledge, and awareness at all levels. (Interviewee 7)

- **Finland**

The Government's roadmap for research, development and innovation paves the way for Finland towards sustainable development through high-level knowledge, research and innovation. In this regard, the policy interventions are focused on developing the knowledge

base, increasing research, development and innovation cooperation between research organisations, businesses; innovativeness of public sector with concrete steps towards integration of SDGs into research and innovation policies; and taking instruments and initiatives. (The Prime Minister's Office, 2020), on the basis of three building blocks: 1) the focus on sustainable economy in terms of all three sustainable development dimensions; 2) long-term action and transformation in policy making; 3) follow up and review (Halme et al., 2014).

Globally Finland has been a pathfinder in establishing good governance of the national innovation system and in building technological capabilities and advantages that sustained development and growth (OECD, 2017). The country has internationally supported industrial sectors, for example in developing countries, to improve their sustainability and reduce their climate impacts with their solid know-how in the utilisation of bioeconomy, which stimulate sustainability and development in several global value chains. Through development cooperation, Finland also promotes international scaling of sustainable solutions and innovations, supports the development of sustainable infrastructure, business and technology. The balance of exports and development goals is of their concern, while they do not consider development funds as efficient to support Finnish companies in infrastructure, innovation as well as industrialisation of developing countries. (The Prime Minister's Office, 2020)

To support partner countries or work on multilateral levels, NGOs have come up with solutions that solve the challenges and put user needs into the centre of development. Their role is acknowledged and yet the mechanism to include them is partly being developed and remain under-utilised resources. One example is the new programme or platform implemented by Business Finland and co-financed by the Ministry for Foreign Affairs, called Developing Market Platform that funds innovation projects of Finnish companies and their NGOs partners, research partners in Finland and in developing countries to allow the tailoring of Finnish solutions and co-creation between Finnish and developing countries partners on innovation. This is the new initiatives which has tried to enhance NGOs participation in this type of innovation processes. (Interviewee 5)

5. DISCUSSION

The thesis does not provide outstandingly new insights, but rather aims to gather systematically the evidence from different sources: official regional and national reports; and interviews with high-level specialists and advisors whose valuable insights can contribute to the knowledge of innovation policy transformation towards sustainable development. As such, the framework in this thesis is developed on a strong basis of literature reviews and expands further with the validation of concrete actions and pathways taken by the EU, Nordic and Finnish governments and their sub-organisations to enable this transformation.

According to this framework, the main interventions of innovation diplomacy and sustainable development diplomacy that can together answer the question of "How diplomacy can foster sustainable innovation?" are:

Innovation diplomacy to advance sustainable innovations; balance private sector needs and market dynamics with the public good; and identify, evaluate and address economic, social or environmental trade-offs

- Multilateral solutions involve stakeholders in the international relations around innovation on different levels based on proximity, foundation of the past strong internationalisation, and the philosophy of innovation diplomacy for all global public good: Utilising Multilateral 2.0 approaches and engagement in parallel with national/regional negotiations by global governance bodies to facilitate multilateral cooperation
- Establish policies, international coalitions and agreements of joint interests and leverage entrepreneurship and innovation means to unleash opportunities and help realise the creativity and aspirations of people around the world
- Establish partnerships models that involve civil society in global governance with their increasing influence, legitimacy and accountability
- Capability development of domestic institutions and enterprises to engage in global innovation ecosystems and develop specialized knowledge in technological, governance,

political, and openness themes through international linkages, policies support, deliberate local measures and a balance of trade-offs and complementarities in global arenas

- Innovation diplomacy activities in support of functions of innovation systems in the relevant dimensions of sustainable development

- Leverage foresight and acknowledge the roles of scientists in finding solutions and contribute ideas to policy making

- Effective research collaboration and partnerships that embed a deep understanding of the issues and allow an open, networked, participatory and less state-centric mode

- Encourage knowledge-based opportunities for innovation are arising and competitive thinking in the field can strengthen a countries' or region's innovation system with its orientation

- Alignment of the "whole-of-government-approach" and "whole-of-society-approach" that align on a clear foreign policy view of innovation visions and guidelines for innovation diplomats

- A systematic perspective that guide the representative mechanism of operation between actors in the innovation ecosystems for both micro and macro levels of governance

- Engage with NGOs and local/regional public bodies in the domain of foreign policy who can organise and facilitate negotiations and lessen potential tensions/conflicts of the innovation ecosystems

Sustainable development diplomacy to advance sustainable innovations; balance private sector needs and market dynamics with the public good; and identify, evaluate and address economic, social or environmental trade-offs

- Set up an overarching framework, forms of governance and innovative approaches to meet SDGs

- Convene ventures and incorporate expertise to identify causes, effects and their relations and find solutions to global challenges

- Give guidance on policy actions and establish the mechanisms and social practices of cooperation and coordination among stakeholders

- Ensured policy coherence, flexibility, redundancy and robustness offered by effective sustainable development diplomacy can generate a wider range of options for actors to select

- Consistently develop diplomatic processes to address the linkages across issue areas, scales and actors

- Advocacy by experts to mainstream innovation for SDGs roadmaps

- Utilise private-public partnerships and flexible, decentralized, voluntary market-oriented approaches, in addition to multi-sectoral and multi-stakeholder partnerships, to problem solving of social and environmental problems

- Utilise roadmaps of innovation for SDGs to engage multiple stakeholders that acknowledge international and supranational policy guidance and assistance, and innovation strategies by donor countries and agencies globally

The interventions differ in the two domains in a harmonised manner, as innovation diplomacy mainly works on innovation policies for innovation power and sustainable development diplomacy is directed to development works. Regarding SDGs, there is a focus on capability development, research collaboration and partnerships, and strong coordination of policy at the national, strategic level highlighted in innovation diplomacy. On the other hand, sustainable development diplomacy is built much around building the policy guidance, assistance and mechanisms, global agencies coordination and cooperation, as well as advocacy.

Principally, these two domains are implemented at supranational, regional, national levels and sub-levels such as cities, institutions and universities. There are common considerations in performing these interventions, including:

- A strategic focus on sustainable development dimensions of economy, environment, society on both internal and external realms of policies

- A combination of material, intellectual, and social capital in policy making

- Development of agreements of mutual interests and benefits and evolving diplomatic process that cover systematically issue areas, scales and diverse actors in policy making

- Involvement of multiple stakeholders in national and global governance of policy as a strategic approach

- An emphasis on establishment and facilitation of partnership models that embrace the values of transparency, equality and inclusiveness
- The policies are made on the national and regional interests as well as global responsibility in spillovers
- International engagement between UN organisations, NGOs and local/regional public entities

The empirical work particularly added some new insights to the established interventions of the framework. Accordingly, there are key success factors and learnings from the EU/Nordic and Finland to be considered in both domains of innovation diplomacy and sustainable development diplomacy that can be helpful for policy making towards advanced sustainable innovations. They are respectively presented as follows in Table 5 and Table 6. As evidence cannot be found in some areas of interventions due to the research capability of the thesis author, or the fact that the evidence is not available, or the case study of Finland or the EU/Nordic are not having the relevant practices. Apart from their current effective strategies and policies, it is recommended that Finland benchmark and learn from the practices of the EU/Nordic, especially with respect to multi-stakeholder engagement, network coordination, internationalisation and works with the UN, NGOs and other international organisations.

Table 5: Findings of empirical work on innovation diplomacy policies

Interventions	Insights of innovation diplomacy policies	Key success factors and learnings
Advancement of sustainable development: Multilateral solutions involve stakeholders in the international relations around innovation on different levels based on proximity, foundation of the past strong internationalisation, and the philosophy of innovation diplomacy for all global public good: Utilising Multilateral 2.0 approaches and engagement in parallel with national/regional negotiations by global governance bodies to facilitate multilateral cooperation	EU/Nordic: Increase public and private investments in sustainable infrastructure and capability building via education and job skills with focus on STEM and R&D for sustainable technologies Tackle the root causes and consequences to address wider security risks with targeted support Consider technical and financial cooperation with other large emitters of greenhouse gases Priority development initiatives dependent on country-specific characteristics or areas of priorities	EU/Nordic: Well-designed multilateral cooperation Active EU diplomacy at country level is regarded as critical for multilateralism Legitimacy of EU diplomacy and long-term financing solutions of global public goods Communication between the EU and all its partners **Finland:**

	Be active in exchange of experiences, learned lessons, best practices, tools and joint actions; balancing actions at home with actions abroad; communicating the priorities and accomplishments of the SDGs	Utilise funding instruments: not to merely emphasize on one sustainability area and ignore the rest
	Finland:	
	Ministries being involved in EU work and benchmarking discussions	
	Support strengthening the cultural dimension of sustainable development	
	Public entities (Business Finland) integrated sustainable development into development co-funding and innovation funding for local and global solutions	
	Increase public and private funding in R&D	
Advancement of sustainable development: Capability development of domestic institutions and enterprises	**EU/Nordic:**	

to engage in global innovation ecosystems and develop specialized knowledge in technological, governance, political, and openness themes through international linkages, policies support, deliberate local measures and a balance of trade-offs and complementarities in global arenas	Develop expertise and capabilities with the establishments of partnerships and cooperation programmes for policy transfer and knowledge translation Supports companies in digitalization and automation, develop and apply new green business models **Finland:** Public funding for cutting edge research and innovation Higher education institutions and public research institutions integrate sustainable development into strategy and focus of research SDGs booster that directs public support to the companies for integration of business interests in public good	
Advancement of sustainable development: Establish policies,	**EU/Nordic:**	

international coalitions and agreements of joint interests and leverage entrepreneurship and innovation means to unleash opportunities and help realise the creativity and aspirations of people around the world	Selective engagement, people-to-people contacts and regional cooperation Have a vision that can guide the direction of development of the international innovation policy: 1) open research and innovation models; 2) build level playing fields for powers of commerce, technology and innovation; 3) acknowledge and nurture technological strengths and critical technologies; 4) recognise and communicate the key social values and sustainable development in internal and external innovation policies and collaborations **Finland:** Contribute to the UN's work on innovation of new solutions and innovation initiatives Actively support companies to compete in the global market and collaborate for innovation in their target markets, with enclosed SGs	

Advancement of sustainable development: Establish partnerships models that involve civil society in global governance with their increasing influence, legitimacy and accountability	**Finland:** Engage stakeholders, including civil society, into intensive networking with supportive funding from the government Communication and engagement programmes Increase integration of non-governmental organisations into policy making	
Advancement of sustainable development: Innovation diplomacy activities in support of functions of innovation systems in the relevant dimensions of sustainable development	**EU/Nordic:** Identify policies and regulations that prevent a level playing field in competition and market access: impose restrictions or demands on innovation Identify and spread the key social values and goals in relation to sustainability via collaborative activities	**EU/Nordic:** Meaningful diplomatic actions **Finland:** Listen to everyone, progress together, leave no one behind and build the trust

	Take a green transition to sustainable growth while offering great solutions around the world Development financial institutions providing official development aid funding for sustainable development themes **Finland:** Actively do diplomacy and public relations, international relations for subnational actors Have a regional dimension in the government's spearhead projects: Finnish Government signed development contracts with major cities Systematic approach: generations of representative offices at the level of the regions and key organisations have regional implementations	

	Strengthen the ability to operate effectively toward success of the 2030 Agenda while considering international law, democracy and human rights	
	Climate change is an overarching principle that is considered in all policies and activities	
	Participate in the UN high level political forums and report on annual basis	
	Public policy has a leading role in fostering innovation: develop demand-enhancing regulations, framework conditions, public procurement legislation, co-ordination of policies and internationalisation	
	International scale programmes by Business Finland and VTT Technical Research Centre of Finland Ltd to boost innovations for international markets within sustainable development themes	

	Promote international policy discussions on the integration of the 2030 Agenda to result-based management of development cooperation	
Advancement of sustainable development: Leverage foresight and acknowledge the roles of scientists in finding solutions and contribute ideas to policy making	**EU/Nordic:** Foresight analysis, policy analysis, and scenario processes are conducted on the problem-solution base that help various stakeholders to see the possibility of the future and create attention around an issue that innovative solutions are in demand with instruments of dialogue, partnerships and fora **Finland:** Scientists come up with the ideas and other actors join the co-creation in the most sustainable innovation system.	
Advancement of sustainable development: Effective research collaboration and partnerships that embed a deep understanding of the issues and allow an open, networked, participatory and less state-centric mode	**EU/Nordic:** Set strategic priorities: get access to the latest knowledge and global best talents, effectively overcome global societal challenges, create business opportunities in new	**EU/Nordic:** Accelerate a streamlined number of European partnerships (through Horizon Europe for instance) that encourage wide participation

	and emerging markets, and leverage science diplomacy to supplement external policy Implement Horizon Europe to boost systematic changes and push the frontiers of knowledge to tackle economic and social challenges Horizon Europe added new features to provide support for emerging and breakthroughs by small and medium-sized enterprises, start-ups, and midcap **Finland:** Take part in helping poor or low and middle-income countries to build capacities, get open access to science Direct money and understand that research is really a tool for competition Build collaboration between North, South, East, West to develop scientific qualities	of partners from public and private sectors

Advancement of sustainable development: Encourage knowledge-based opportunities for innovation are arising and competitive thinking in the field can strengthen a countries' or region's innovation system with its orientation	• **Finland** Take on a participatory and inclusive way and involve a diversity of stakeholder groups in creating and enabling opportunities for knowledge-based innovations to flourish and bring up new kinds of business in local and global markets	• **Finland** A forward-looking strategy and vision at the highest level of their policy decision making is recommended, while considering the past
Balance of private sector needs and market dynamics with the public good: Alignment of the "whole-of-government-approach" and "whole-of-society-approach" that align on a clear foreign policy view of innovation visions and guidelines for innovation diplomats	**EU/Nordic:** Help and encourage multilateral and bilateral partners to work better Develop the Multistakeholder platform for SDG transformations Promote and integrate inclusion into all three dimensions of sustainable development as a commitment by the regions and municipalities, particularly the inclusion of vulnerable groups	**EU/Nordic:** Make the politicians understand and accelerate valid conditions for businesses to work towards sustainable development Develop regulations and frameworks at the Nordic level that lays the different bases for different programmes launched to scale

	Work with the theory of change and using a sustainable measure that help building the narratives, thus everyone can attract different stakeholders where they find their place	Priorities should be agreed on when working with businesses translate them into common good.
	Tax-paid money is being spent for achieving a common good.	**Finland:**
	Finland:	A wider range of sectors and technologies involved together will allow Finland to build on its advantages and to diversify
	Develop sustainable development strategies and multi-stakeholder forums where the government has valued multi-stakeholder approach	To address the issues of power, representative, voice and accountability in multi-sectoral governance:
	Develop tools for everyone to participate and contribute with their concrete actions for SDGs	• Education
	Public sectors policy has been combined with strategic choices by business, finances, individual collective actions, science and technology- who all jointly need to work about technological, social and political	• Low hierarchy and no discrimination, based on habit setting and traditions.

	innovations: Introduce people into open online consultation during preparation of the new national innovation strategy.	• Understand the positions of different actors to make the goals and positions convincing and persuasive.
	A combination of centralized and decentralised implementation across the regions and sectors	• Multicultural knowledge and international knowledge
	Public entities give companies subsidies domestically, tutoring and networks to respond to SDGs.	• There are elements in Finnish legislation allows different parts of the society to give the comments in discussions.
	Domestic regulations by the government expect Finnish companies in terms of environmental and social impacts and therefore, they develop solutions which then they are enable to take abroad.	• A principle in tension: in a clear manner, there is no distrust in how the participants can compete with each other.
	Tax solutions also direct how companies develop their solutions.	
Identification, evaluation and addressing of economic, social or	**EU/Nordic:**	**EU/Nordic:**

| environmental trade-offs: A systematic perspective that guide the representative mechanism of operation between actors in the innovation ecosystems for both micro and macro levels of governance | Setting a clear direction and a system of policy coordination

Nordic governments and policymakers often act together and coordinate standpoints on international issues.

Finland:

Approach innovation policy in a systematic and integrated manner, and develop new policy mechanisms to strengthen innovation ecosystems and communities

New interactions and more open modes of innovation, engaging widened communities of knowledge and practice | Adopt the systematic approach to: see how things are interlinked, see where they have to take in the cooperation programmes and more approaches to how we work can be explored, and see the leverage point and understand the dynamics as well as how to intervene in the system

Finland:

"The only way to move forward is to take a systematic approach" (Interviewee 1).

Get people on board and work together in roundtables where different actors discuss |

		A strong capability for horizontal collaboration across policy sectors or policy coordination from the government, ministries and various state agencies involved in innovation policy development
Identification, evaluation and addressing of economic, social or environmental trade-offs: Engage with NGOs and local/regional public bodies in the domain of foreign policy who can organise and facilitate negotiations and lessen potential tensions/conflicts of the innovation ecosystems	Finland: Helsinki EU Office supervises member organisations' interests, promotes their visibility in different unique forms, and provides them information of EU legislation and EU initiatives. Helsinki EU Office analyses impacts of the EU policies on member organisations, communicate that in Finland, and then assess whether to conduct policy advocacy or measurement.	Finland: Everyone is heard and the government works very closely with the NGOs. Consultation with different groups of people when a new legislation is launched or initiative developed

| | Have close collaboration with the UN bodies in cooperation programmes and enhance the presence of UN in the country

NGOs can express their views very openly and their statements are included in Finland's reports to the UN. | |

Table 6: Findings of empirical work on sustainable development diplomacy policies

Interventions	Insights of sustainable development diplomacy policies	Key success factors and learnings
Advancement of sustainable development: Set up an overarching framework, forms of governance and innovative approaches to meet SDGs	**EU/Nordic:** Implement, review and monitor at high levels Development financial institutions work closely in partnerships with other institutions, similar types of organisations in co-financing, and recipient countries	**EU/Nordic:** Motives and sustainable development objectives are aligned and shared by all of organisations in partnerships, much guided by the SDGs. Strong alignment and clarity of objectives and what financial institutions are doing: • Principle of development financial institutions: • Do the best practices with the highest international standards • Harmonisation

		- Very clear guidelines from the World Bank - Values such as transparency, gender equality, poverty reduction and so on, are all shared by all the partners
Advancement of sustainable development: Convene ventures and incorporate expertise to identify causes, effects and their relations and find solutions to global challenges	**EU/Nordic:** Encourage private sector to become a solutions provider concerning SDGs and communicate sustainability issues in value chains transparently (Cross border) risk capital to open opportunities for stakeholders, especially businesses Programmes, for instance transition to circular economy, are open to everyone as part of the value chain **Finland:**	**Finland:** We need to accept that we cannot get the results today even though the situation is urgent. We still need to make it in a controlled way so it is not collapsing and not go so fast. Strong governments to ensure sustainable innovations will become mainstream

	Businesses are collaborating between countries regarding sustainable development and sustainable innovation.	Governments and policies have strong responsibility to share their risks of trying new things, doing diplomacy inside and outside the countries.
Advancement of sustainable development: Give guidance on policy actions and establish the mechanisms and social practices of cooperation and coordination among stakeholders	**EU/Nordic:** Implement European Green Deal: calls for large-scale changes in public and private investments and technologies and technological pathways to identify one or more technology scenarios to reach climate neutrality by 2050 By signatories and suitably revising climate strategies through nationally determined contributions and long-term low-emission development strategies: be active and have a leading role in mobilising countries around ambitious outcomes	**EU/Nordic:** Deploy comprehensive and deep transformations, long-term plans and policies A mixture of direct regulation and public infrastructure provision Incentives for private businesses and consumers Model of partnership in the SDG context that show the readiness of Nordic co-operation on sustainable development, political will and

	Nordic cooperation has initiated joint programmes and pooled resources from different sectors into larger establishments. **Finland:**	interests in joint actions for SDGs among stakeholders Consensus to be reached on the priorities for owners of cooperation programmes Projects, especially under co-financing from businesses, have to be relevant Be overarching enough to make it from the Nordic when developing instruments, incorporating Nordic added values while discussions of promotion of the national interests and consensus for Nordic interests move stakeholders forward.
Advancement of sustainable development: Ensured policy	**EU/Nordic:**	**EU/Nordic:**

coherence, flexibility, redundancy and robustness offered by effective sustainable development diplomacy can generate a wider range of options for actors to select	Policy coherence: • Perform international conventions and multilateral national partnership agreements, leadership in multilateral forums, bilateral forums and discussions in in trade agreements, investment, technology and other domains • Regulatory leadership and international collaboration for sharing problem solving and exchanging lessons internationally in how to achieve SDGs while implementing SGD transformation • Add new tools to promote coherent strategies for financing and implementing the SDGs: for instance make necessary policy changes and phase out of harmful subsidies Flexibility:	Realise the importance of cohesion Direct funding sustainable research and innovation

	• Make sure implementation takes place to reach ambitious targets while the actors on the ground receive enough support • Consultation at subnational levels with regional stakeholders **Finland:** Policy coherence: • SDGs are strategically present in all of the goals and policy programmes of ministries and sub-national institutions • Finnish Government and Parliament have engaged in regular dialogues on the implementation of the 2030 Agenda • The National Audit Office has integrated SDGs into its audit programmes	

	• All line Ministries are included in the Sustainable Development Coordination Network, which enhances policy coherence across sectors • A sustainability assessment has been integrated into annual cycle of policy planning, budgeting and reporting of the Government	
Advancement of sustainable development: Consistently develop diplomatic processes to address the linkages across issue areas, scales and actors	**EU/Nordic:** Spillover responsibility: developing indicators for monitoring spillovers Improve the EU information concerning the spillovers generated by the EU's policies around the world, i.e. global footprint and handprint Nordic Innovation has had potential initiatives in support of the objectives of sustainable growth.	**EU/Nordic:** Authorities, businesses, and organisations in Nordic work together and challenge each other Leverage the potential of Nordic co-operation Focus on those areas where their co-operation yields the greatest values

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	Nordic initiatives aimed to make the Nordic region a global innovation hub and enhance their cooperation in international markets and global market opportunities (export modules and utilised tools doing research and research work with businesses) Spread awareness around the challenges to attract various partners and stakeholders in matchmaking events, conferences, workshops, and programmes of accelerated types Nordic Innovation also has the financial space that encompasses proposals of innovation challenge competitions and innovation prizes. **Finland:** Substantial R&D effort in interactive processes of innovation and diffusion to deal with structural weaknesses, weak incentives and downstream competences	

	Continue improvement of framework conditions for innovation and business activity to improve linkages between the research sector, innovation intermediaries and technology transfer agents/institutions, industry and government	
Advancement of sustainable development: Advocacy by experts to mainstream innovation for SDGs roadmaps	**EU/Nordic:** Continue consistent advocacy for policies and strategies to achieve SDGs Promote integrated approaches: Integrate SDGs into bilateral discussions, trade agreements and other forms of collaboration under recognition of mutually beneficial transformative change towards the SDGs within the region, and other parts of the world to cope with international spillovers Regulatory standards in support of SDGs considered in cooperation with other countries	

	EU leadership on the SDGs continues to be crucial in their works supporting the UN activities and initiatives Negotiate ambitious frameworks **Finland:** Helsinki EU Office is aiding and support for Finnish stakeholders in terms of government relations, via its strategic support and active policies influence in Brussels. Embassies and diplomats are main networks and the widest networks for advocacy. Business Finland has the global network. Innovation counsellors, for example in China, Japan, Korea, United States, where they have special dialogues and bilateral projects	

Balance of private sector needs and market dynamics with the public good: Utilise private-public partnerships and flexible, decentralized, voluntary market-oriented approaches, in addition to multi-sectoral and multi-stakeholder partnerships, to problem solving of social and environmental problems	**EU/Nordic:** Implement partnerships through projects, cooperation and collaboration Public funding for the development of ecosystems in research, development and growth New operating models set up for testing, piloting and scaling innovations **Finland:** Embed a human right- based approach in policies Establish strategic centres for science, technology, and innovation (public-private partnership model) that narrow the gap of inputs and outputs, accelerate innovation processes and revitalise the Finnish industry clusters for new competencies and radical innovations	**EU/Nordic:** International networks particularly play a crucial role. **Finland:** Global collaboration should be enhanced rather than talks about high tech single innovations, which is often the case about innovations for SGDs. Ownership of the partnerships should be found on all on sides involved: mechanisms could be developed and more funding required.

Identification, evaluation and addressing of economic, social or environmental trade-offs: Utilise roadmaps of innovation for SDGs to engage multiple stakeholders that acknowledge international and supranational policy guidance and assistance, and innovation strategies by donor countries and agencies globally	**EU/Nordic:** Engage with academia and civil society more generally in designing pathways for SDGs Collaborative programmes with developing and innovation-following countries globally to help build the institutional frameworks for innovation Framework for sustainable development finance that includes more and better targeted development assistance Nordic Development Fund (NDF) finances the developing countries directly, supporting their national adaption plans or national contribution plans under the Paris Agreement. Nordic Development Fund finances research and innovation projects, in lower-income countries and	**EU/Nordic:** Diplomacy and its alignment ensure that the financial institutes are not either stepping each other toes or competing but rather bring additionality through harmonization of tools. High level diplomacy discussing sustainable development and its objectives has made it easier for such financial institutes as NDF to execute and operation efficiently to reach targets of sustainable development. **Finland:** Enhance NGOs participation in innovation processes: the

	countries in fragile situations, which are interesting and innovative from climate change perspectives. NDF finances projects and facilitate capacity building i.e. building local and national institutions and supporting research and education, training, knowledge, and awareness at all levels. A need for institutional R&D financing such as policy innovation, regulation innovation and strengthened local institutions, national institutions in developing countries **Finland:** The Government's roadmap for research, development and innovation paves the way for Finland towards sustainable development through high-level knowledge, research and innovation.	mechanism to include them to be further developed

	The role of NGOs is acknowledged, have come up with solutions that solve the challenges and put user needs into the centre of development.	

It is worth highlighting that far from traditional governance, Finland is approaching its policy making and addressing global challenges with decentralised implementation without missing the strategic overview over the whole society and synergy of collaboration and cooperation between government bodies and agencies. Noticeably, there are two typical areas of interventions that Finland is very much focused on: digitalisation and creation of enabling environments for innovations:

Digitalisation

Digital innovation is geared to support responding and reaching SDGs, particularly improving efficiency and benefit sustainability in production (The Prime Minister's Office, 2020). In a way, digitalisation helps engaging diverse perspectives and viewpoints by people in shaping of digital policies that support innovation reaching SDGs. Regarding supporting the partner countries in these digitalisation processes, the UN is becoming more active through its Digital for Development Agenda and currently there are several so-called European initiatives being developed in partnership between the Commission, member states and various partner countries in the global South. Having the bilateral works with partner countries, and some of these works are focused the ICT sector and ICT policies, it is a very important to enhance this type of multi-stakeholder model in this sphere, and engage NGOs in the processes that relate to shaping of future digital policies and legislation. (Interview 5)

At the moment in Finland, digital development agenda is quite significant that balance of trade-off of sustainable development dimensions. The global pandemic has really accelerated the collaboration and dialogues in this area, and questions such as digital human rights and privacy issues are much more critical at the moment to resolve and to enhance the frameworks that globally ensure that these rights are fulfilled in the future. Whether the UN can really act as a platform to globally enhance this type of development, the UN guiding principles on business and human rights play important roles and their tools can ensure good conducts and best practices in the digital age. And as a matter of fact, the overall digital agenda is very political as there are different approaches and interests here: what types of digitalisation we want to see in the future, and how to collaborate with developing countries on enhancing digitalisation. Hence, there are different

values and shared values of the Nordic countries, Europe, and UN in how to drive digitalisation forward. By all means, Finland is a strong support of partnerships that are mutually beneficial and supportive of reaching the SDGs. (Interviewee 5)

Globally, digitalisation is divided very much as around half of the world population is currently online. There is a significant gap recognised that affects the opportunities to deliver digital services to these people who are still very much offline. In the pandemic where many countries are in lockdown and people cannot for instance access schools or healthcare services, the way normally would be able to be very critical to understand that the network needs to be expanded and digital skills are to be focused and digital capabilities enhanced so that people are really able to use these digital services once they become accessible. At the same time, there is a question of how governments build their digitalisation plans and create enabling policies and regulations that really give values on digital inclusion, ensuring that everyone has access and skills. (Interviewee 5)

Finland is very active on international arena to advocate for inclusive innovation and inclusive human rights-based digital development. It is essential for Finland to ensure that digitalisation does not leave anyone behind and take into consideration the rights and participation of all groups, particularly women and girls as essential priorities in their foreign policies. Overall a focus is paid on human rights-based approach to move forward in a more digital age: inclusion, gender equality and non-discrimination- all are very much representative of all the works Finland do in innovation with regard to development and foreign policy. The major issue at the moment is how to foster digitalisation in the manner that these issues are considered by the UN and at the EU level to advance normative guidance in how the digital sphere is regulated and developed further. (Interviewee 5)

The Secretary General Roadmap on digital development or digital cooperation was launched in June 2020 and it relies on global multi-stakeholder collaboration to try inclusive digital cooperation for the coming years. Finland has been really active in this level in certain tasks, particularly related to the governance of artificial intelligence, digital public goods and digital inclusion. Noticeably, UN is one important arena to enhance this global collaboration on digital collaboration, apart from the EU arena. (Interviewee 5)

Creation of enabling environments for innovation

In addition, the work of the government should be on creating and enabling environments, platforms and processes that enable legislation and regulations. Moreover, policy makers should focus on building good structures and ensure that human rights and these types of important aspects are recognised, secured, and promoted through innovations whereas companies partner with research organisations and NGOs to develop solutions. (Interviewee 5)

Finland is keen on the creation of enabling environments for innovation. These environments can locate somewhere in the developing world that support the creation of solutions to national needs and bring actors from around the world together onto innovation platforms to create solutions to the challenge, and also, they can reach funding for the solutions developed. All in all, multi-stakeholder partnerships and platforms for innovation that respond to SDGs are very important to enhance future collaborations and they can also enhance creation of mutual benefits and mutual interests in the area that the challenge of the national and commercial interests can be tackled. (Interviewee 5)

In the ecosystem, as their operations are built on the basis of international cooperation, co-creation, and interaction, SHOKs also help test and pilot creative research environments and ecosystems, creating and searching room for businesses and research units to closely cooperate and carry out joint research. (Halme et al., 2014)

6. CONCLUSION

6.1 Contribution to the theoretical works

Theoretically this thesis aims to highlight the role and effective approaches in diplomacy that enhance implementation and future developments of sustainable innovation. A few diplomatic approaches and interventions by EU/Nordic and Finland were outlined into two main domains: innovation diplomacy and sustainable development diplomacy, which appear to be useful in

addressing the complexity of sustainable innovations and making them a comprehensive spectrum of policies to achieve SDGs.

Findings from literature review led to development of the framework and empirical work to disclose more insights from the current policies and practices by the forerunners in achieving SGDs, namely the EU, Nordic and Finland. These findings contribute to answering the research question of "How diplomacy policies can foster sustainable innovation":

Sustainable innovation

Findings of diplomacy policies in EU/Nordic and Finland strengthen the overarching sustainability model which captures the interconnectedness of environment, society and economy (Gray, 1992). They also reinforce the principles by Hautamäki that the expertise required for sustainable innovation lies outside organisations, taking place within informal networks, where companies personnel, users, subcontractors, customers, and voluntary experts collaborate with one another (Antti, 2010, p. 27).

Findings of this thesis contribute to the theory of social-ecological systems: system properties, how these properties change and the meaning of these changing properties for actors to operate within systems (Feola, 2015, pp. 376–390), in addition to the opportunities and constraints afforded by the parameters of social-ecological systems (Gunderson & Holling, 2002).

Findings from EU/Nordic regions confirm the importance of proximity as one element of in innovation diplomacy that shapes foreign relations, coordination and direct investments in regions, countries and cities (Leijten J. , 2016).

Updates of the bilateral and multilateral agreements, alliances, platforms and collaboration in EU/Nordic and Finland supplement the theory around the actual shape of innovation diplomacy, international dimensions of innovation and validate the changes in innovation trends in the development of innovation in various dimensions (Leijten, 2017, p. 2): Increasing complexity,

increasing collaboration and openness, growth of knowledge society, agglomeration and globalisation.

Insights on collaboration of research and innovation; public engagement and influence of NGOs, UN organisations and other public entities in policy decision making; and the focus on all sustainable development dimensions and integration of SDGs by the EU/Nordic and Finland into their policy making and diplomacy activities: all validate the theory of helix models of innovation, and respectively reinforce the development of these models: the triple helix models which embraces interactions between science, industry and government, the quadruple helix which acknowledges the wider public or civil society, and the quintuple helix that takes in nature and environment as independent sources of knowledge. (Leijten, 2019, p. 6)

Diplomacy for sustainable innovation

Innovation diplomacy

Findings of diplomacy policies in EU/Nordic and Finland complement the theoretical concepts of international relations and innovation policy, particularly the use of diplomatic tools of the state to achieve its national innovation interest in the global geopolitical arena (Leijten, 2019, p. 17) to facilitate innovation and improve the relations between countries (Leijten, 2017, p. 2).

Sustainable development diplomacy

Findings on the systematic approaches in EU/Nordic and Finland policies complement the theory of system thinking in improving mechanism of operation between actors in the innovation ecosystems for both micro and macro levels of governance in terms of coordination and synergy, power of information and communication technology, managerial and organisational systems efficiency, and the international agreements, rules, and regulations. Findings also complement the examples of technological, governance, political, and openness development of capabilities across countries. (Elias & Charalampos, 2011; Hekkert, et al., 2007; Leijten, 2017).

6.2 Practical implications

Sustainable innovation

The listed diplomatic approaches contribute to addressing the macro challenges in governance of innovation and emerging technologies regarding sustainable development: balance private sector needs and market dynamics with the public good; and identify, evaluate and address economic, social or environmental trade-offs. Once again, findings of innovation policies indicate diplomatic efforts by the EU and members in global public good for prosperity around the globe and for solving pressing societal problems.

Diplomacy for sustainable innovation

Innovation diplomacy

Diplomatic activities of EU/Nordic and Finland at the supranational, regional, national and society levels have pushed innovation forward in the national and international interests. As in other countries, these activities may have a strong positive effect on the national brand name and enhance the geo-economic, geo-political and geo-technological position of a country agenda (Carayannis & Papadopoulos, 2011).

Findings also bring to view the coordination of actors at the intersection of international relations and innovation and how they can collaborate with less tensions or conflicts through new models of multi-sectoral governance, partnerships as well as increasing involvement of international organisations such as UN bodies, NGOs and public entities with their roles of facilitating and negotiating. Particularly in the Nordic region, findings unfold one model of networked technology and data hubs and clusters, which is leading to a stronger concentration of powers and a deeper penetration of these powers into economic, social, and political aspects of life concerning sustainable development, and concurrently, extending the international field of negotiated collaboration on SDGs through consensus of nation members and the balance of the national

interests with the common objectives of the region, apart from their shared responsibility in addressing spillovers.

Regarding Finland's innovation diplomacy actions that can help build innovation ecosystem functions in the relevant dimensions of sustainable development, findings showcase dynamics of diplomatic practices in facilitating innovation systems functions, ranging from the work of the Ministry of Employment and Economic Affairs, Ministry for Foreign Affairs to Nordic Innovation and Helsinki EU Office in supporting industries develop global innovation networks and value chains, supporting international collaborative research and education, developing strategy for inclusion/exclusion, developing position and strategy for common or global challenges, developing vision and strategy for national strengths and strategies to improve access to foreign markets.

The findings of Finland showcase a successful model of innovation diplomacy, taking the whole-of-government-approach and whole-of-society-approach that aim at the alignment within the government and within society and as a result, effective coordinated and linked policies and actions are formed. In this model, the role of scientists in providing data and evidence to identify challenges, and advising on needed policy actions is recognised in line with the important roles of other stakeholders joining for innovative solutions to global issues.

The practice of foresight analysis in the interviewed organisations highlight foresight as one valuable tool of innovation diplomacy in addressing international social, environmental and economic affairs. Explicitly the current policies and practices of diplomacy for sustainable innovation in EU/Nordic and Finland are embracing the changes in the domain of science diplomacy, the growing importance of national economic interests, in stakeholder configurations and in the set of policy instruments and relevant working methods. The risks of implementing sustainable innovations are accepted and supported by these organisations through risk capitals, in the form of co-financing and public/private funding.

The thesis also contributes to understanding and reviewing the practice of Multilateralism Mode 2.0 in EU/Nordic and Finland policies, which embodies the rise of transnational policy networks

and states, and now allows other actors to involve and influence policy-making regarding current global problems in an open, networked and less state-centric mode. The concept of multi-sectoral partnership is more completed through findings of practices in the case, in which the logic of argument and persuasion is highlighted as the rule making for implementation and joint problem solving. On the other hand, findings bring a positive notion of diplomatic approaches in addressing the issues of power, representation and voice remaining critical in the analysis of new modes of networked governance.

As such, EU/Nordic and Finland have capably demonstrated that innovation can accelerate achievements of SDGs across national borders, assisting member/neighbour states and developing countries through innovation cooperation, respecting respective countries' development experiences, national plans and UN/EU principles and guidance regarding sustainable innovations.

Sustainable development diplomacy

Sustainable development diplomacy approach provides a guiding framework for stakeholders to discuss and arrive at mutually agreeable solutions, manage those trade-offs regarding sustainable development dimensions of sustainable innovation and cope up with uncertainty and changing conditions on the basis of values, mutual gains and interests and a needs-based approach.

In practice, the multilateral approaches and views are mainstreamed and considered of most importance in the sustainable development diplomacy approach in the case regions and country. Furthermore, it is encouraged that policy coherence balance with the characteristics of flexibility, redundancy and robustness. Policies are more likely to be implemented when mutual benefits of all parties are considered and integrated, and a sense of ownership is stimulated through engagement of diverse stakeholders, incorporating the common agendas and all three dimensions of sustainable development. The commitment by governments, business and civil society in a larger collaborative endeavour is acknowledged and diplomatic approaches can remain effective in implementation of engagement around innovation on different levels of international relations in parallel with national/regional negotiations by global governance bodies.

Regarding roadmaps for SDGs, policy making and practices by the Ministries of Finland vividly exhibit the influence of regional and cooperation bodies, NGOs, research institutes and the variety of civil society on the country-level strategies and roadmaps via encouraging the government to standardise policies, providing technical assistance to build capacity, assist funding and investments, and facilitating spillovers and peer learning among the communities of policy practitioners nationally and internationally through various methods and approaches.

In the global arena, insights show that the impacts of finance are increasing and continue to be supported by the governments. Finance in form of ODA or public funding for research and innovation partnership are coming from developed countries, and EU/Nordic and Finland as donors. In these countries, public spending for innovation has increased and their finance projects have been operating in forms of co-finance and partnerships, with the support and expertise offered by UN agencies in creating innovation roadmaps, diagnosing and strengthening foundations of innovation systems and capabilities.

6.3 Limitation of the study

The thesis visited a number of reports and interviewed a number of important policy advisors in Finland. Yet a comprehensive framework is more ensured if the reports and interviews can be covered at a higher number. Also, there is not very much previous research on diplomacy for sustainable innovation and hence, the thesis is more of exploration. Because sustainable development is a critical issue globally and innovation can address the global challenges, continuous research on the topic and recommendations are encouraged in the future.

6.4 Suggestions for further research

The evidence from reports review and interviews conducted by the author of this thesis did not cover all the details and supplement all interventions suggested in the framework. Hence, further research is called for in order to collect more data and updates of data to develop the framework further, covering a comprehensive and systematic collection of insights regarding policy strategies and practices, as well as learnings and success factors for better policy implementation in Finland

under guidelines and principles of the UN, the policy guidelines and support from the EU and the coordination and collaboration within Nordic.

Moreover, the synergies and contradictories of interventions can be realised in both domains of innovation diplomacy and sustainable development diplomacy. Deeper analysis and research into these intersections can potentially enhance the synergy for efficient implementation of policies to advance sustainable innovations, thus being recommended.

Last but not least, the role of UN bodies in facilitating the process of negotiating and implementing of SDGs among multi-stakeholders and strengthening foundations of innovation systems and capabilities is very much recognised and emphasised from the literature and empirical work. Still, as these agencies can assist a certain number of countries per year under current financial, administrative and operational models and instruments, there might be inadequate incentives and assistance to deliver on the commitment of "leaving no one behind" by 2030. Hence, future research can examine effective mechanisms or financial frameworks, carefully considering inclusion of these models and making relevant recommendations.

Appendix 1: Main innovation policy actors in Finland
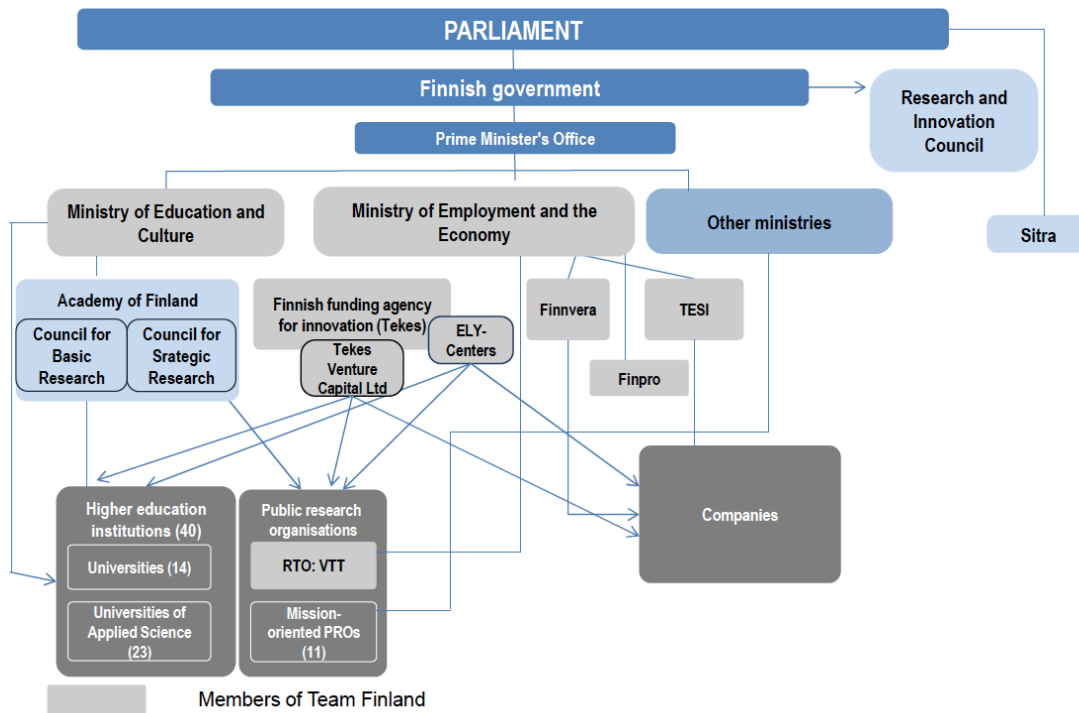
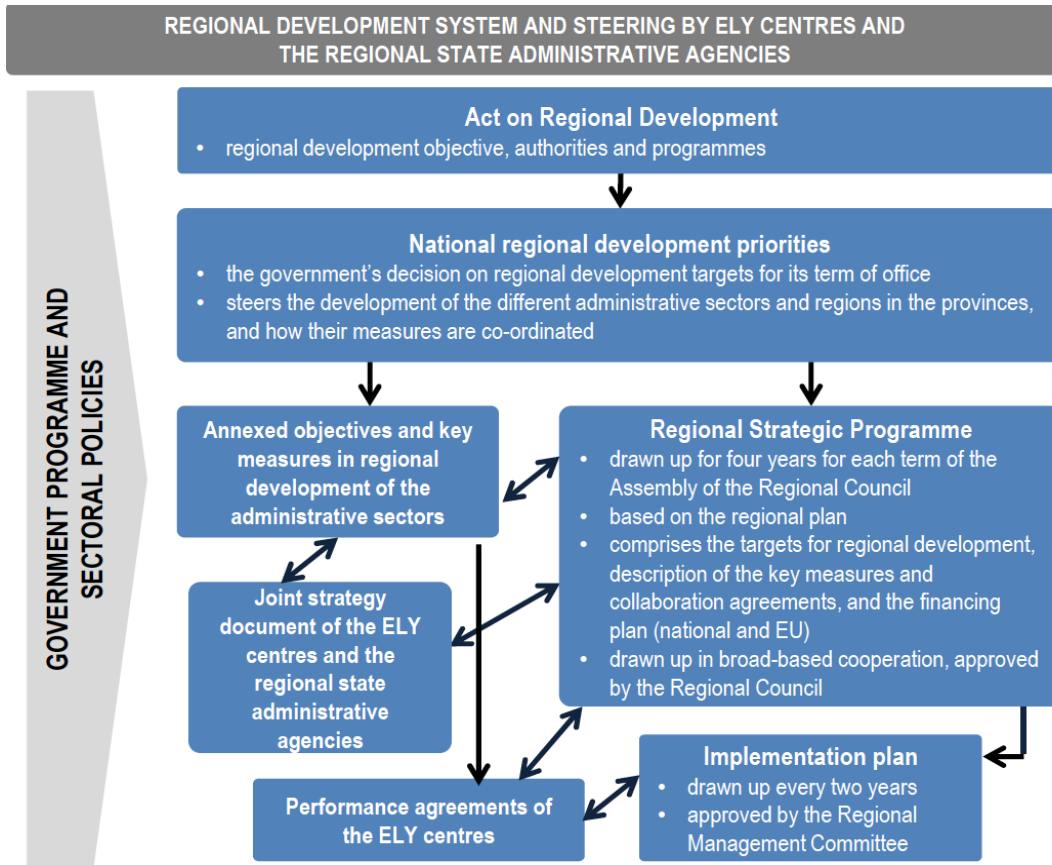Source: Finnish Ministry of Economic Affairs and Employment

Appendix 2: Current regional development frameworks in Finland

REGIONAL DEVELOPMENT SYSTEM AND STEERING BY ELY CENTRES AND THE REGIONAL STATE ADMINISTRATIVE AGENCIES

GOVERNMENT PROGRAMME AND SECTORAL POLICIES

Act on Regional Development
- regional development objective, authorities and programmes

National regional development priorities
- the government's decision on regional development targets for its term of office
- steers the development of the different administrative sectors and regions in the provinces, and how their measures are co-ordinated

Annexed objectives and key measures in regional development of the administrative sectors

Joint strategy document of the ELY centres and the regional state administrative agencies

Regional Strategic Programme
- drawn up for four years for each term of the Assembly of the Regional Council
- based on the regional plan
- comprises the targets for regional development, description of the key measures and collaboration agreements, and the financing plan (national and EU)
- drawn up in broad-based cooperation, approved by the Regional Council

Performance agreements of the ELY centres

Implementation plan
- drawn up every two years
- approved by the Regional Management Committee

Source: Finnish Ministry of Economic Affairs and Employment

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Appendix 3: Interview questions of empirical work

Innovation diplomacy

Perspective/ Importance of innovation diplomacy for sustainable innovation

- To what extent has the expansion of innovation diplomacy policies made them more socially and environmentally oriented?
- How is your organisation facilitating and negotiating international collaboration for sustainable innovation?
- What policies of innovation diplomacy have been taken to advance sustainable innovation? What are the key success factors?
- What are your views of the future practices/strategies of innovation diplomacy policies?

Finland's current activities (Policy approaches, Advocacy)

- How Finland could leverage their similar values and policies with the Nordic while maintaining their position in maximizing potential of innovation diplomacy for sustainable innovation?
- What next steps can Finland advocate for policies and strategies regarding diplomacy for sustainable innovation?
- What Finland can learn from other Nordic countries and strengthen the necessary capabilities to harness innovation for the SDGs, generating regional or collective goods and addressing collective challenges?

International, Nordic and regional cooperation (Cooperation)

- What innovation diplomacy policies have been taken by EU/Nordic/Finnish governments to identify, evaluate and address economic, social or environmental trade-offs among stakeholders internally and externally?
- What innovation diplomacy policies have been taken by EU/Nordic/Finnish governments to balance the private sector needs and market dynamics with the global public good of sustainable development?

- How have the policies been progressed to accelerate research & innovation partnerships (along with robust attaché and other sectoral programmes) for sustainable development? What could be the future development of these partnership programmes?

- What are the evolving diplomatic processes to address the linkages across issue areas, scales and actors in fostering collaboration for sustainable innovation?

- What do you think about the roles of global governance bodies such as UN and NGOs in facilitating international relations around sustainable innovation on different levels?

Engagement of different stakeholders (Tools, Engagement, Finance)

- How do you evaluate the utilization of foresight and role of scientists in policy making of innovation diplomacy for sustainable development?

- What could be the actions to ensure policy coherence in balance with flexibility, redundancy and robustness for multilateral engagement of actors?

- What has been the engagement practice of governments and community of policy practitioners in Europe, Nordic and Finland with academia and civil society in designing roadmaps of innovation for SDGs? What are the best approaches, methodologies and instruments?

- What could be the outcomes of the networks or the kinds of innovations that the inclusive networks promote and their sustainable development impacts?

- What could be the actions or strategies to solve the issues of power, representation and voice, as well as enhance the accountability structures and monitoring mechanism among the actors in the multi-sectoral networked governance?

- How do you evaluate the sufficiency and effectiveness of national and international investments and mechanisms in Finland/Nordic/EU to ensure the facilitation and transfer of technology and innovation for sustainable innovation?

Opportunities and challenges

- What are the main opportunities and challenges at the policy levels in maximizing the contribution of innovation diplomacy to achieve SDGs?

- What has been the biggest challenge for Finland in taking the global public good scenario which calls for international collaboration on all functions of the innovation system towards SDGs? How to overcome?

Sustainable development diplomacy

Perspective/Importance of sustainable development diplomacy for sustainable innovation
- How is your organisation facilitating and negotiating international collaboration for sustainable innovation?
- What can policies of sustainable development diplomacy do (strategy/practices) to advance sustainable innovation? What are the key success factors?
- What is your view of the future practices/strategies of sustainable development diplomacy policies?

Finland's current activities (Policy approaches, Advocacy)
- How Finland could leverage their similar values and policies with the Nordic while maintaining their position in maximizing potential of sustainable development diplomacy for sustainable innovation?
- What next steps can Finland advocate for policies and strategies regarding diplomacy for sustainable development?

International, Nordic and regional cooperation (Cooperation)
- What sustainable development diplomacy policies have been taken by EU/Nordic/Finnish governments to identify, evaluate and address economic, social or environmental trade-offs among stakeholders internally and externally?
- What sustainable development diplomacy policies have been taken by EU/Nordic/Finnish governments to balance the private sector needs and market dynamics with the global public good of sustainable development?
- How have the policies been progressed to accelerate research & innovation partnerships (along with robust attaché and other sectoral programmes) for sustainable development? What could be the future development of these programmes?

- What international cooperation strategies of innovation by and among EU/Nordic countries that Finland can best harness to serve both national and global/regional sustainable interests?

- What are the evolving diplomatic processes to address the linkages across issue areas, scales and actors in fostering collaboration for sustainable innovation?

- What do you think about the roles of global governance bodies such as UN and NGOs in facilitating international relations around sustainable innovation and the delivery of global public goods? How governments in EU/Nordic/Finland are working with them in this regard?

Engagement of different stakeholders (Tools, Engagement, Finance)

- What could be the actions to ensure policy coherence in balance with flexibility, redundancy and robustness for multilateral engagement of actors?

- What has been the engagement practice of governments and community of policy practitioners in Finland/Nordic/Europe and with academia and civil society in designing roadmaps of innovation for SDGs? What are the best approaches, methodologies and instruments?

- What could be the outcomes of the networks or the kinds of innovations that the inclusive networks promote and their sustainable development impacts?

- What could be the actions or strategies to solve the issues of power, representation and voice, as well as enhance the accountability structures and monitoring mechanism among the actors in the multi-sectoral networked governance?

- How do you evaluate the sufficiency and effectiveness of national and international investments and mechanisms in Finland/Nordic/EU to ensure the facilitation and transfer of technology and innovation for sustainable innovation?

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