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The complexity of contemporary innovation policy and its governance in Finland

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This article analyses changes in the Finnish innovation policy from the early 2000s to 2016. The contribution is twofold. First, we propose a framework to understand and characterise changes in and different approaches to innovation policy implementation. The framework highlights the evolutive nature of innovation policies and sheds light on often very conflicting trade-offs and tensions within and between various approaches to innovation policy. Second, drawing upon the Finnish case, we elaborate the complexity of contemporary innovation policy implementation and show how the focus has changed since the early 2000s. Based on these findings, we discuss emerging ideas framing the “new innovation policy” and implications to policy-making.

Keywords: innovation policy; rationales; policy change; innovation system

Introduction

During the recent two decades, a growing body of literature in economics, economic geography and innovation studies has enhanced our understanding of the sources of economic growth and innovation. This literature has also fostered the debate on the role and importance of innovation policy. More recently, the role of innovation in solutions to grand societal challenges has been a growing part of this debate. The introduction of the systems of innovation (SI) approach and the surge of interest towards innovation policy, its dissemination into other policy areas, the growing complexity of policy-making and new emerging terminology (e.g. “innovation ecosystem”) raise important analytical questions about the reasoning and actual landscape of innovation policy implementation.

Innovation policy has largely been studied in the light of rationales for public intervention (Edquist 2011; Klein Woolthuis, Lankhuizen, and Gilsing 2005; Laranja, Uyarra, and Flanagan 2008; Mazzucato 2016; Weber and Rohracher 2012) and policy instruments (e.g. Borrás and Edquist 2013; Flanagan, Uyarra, and Laranja 2011; Georghiou et al. 2014). This is due to the shift in the rationales for innovation policy design as a system failure, and more recently, the transformational (system) failure approach has been adopted by policy-makers, especially in many EU countries. According to Borrás (2009), we have witnessed both a “widening” and a “deepening” of innovation policy, and moreover,

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governments have become more proactive in intervening and expanding their areas of involvement in order to accomplish wider socio-economic goals.

Theories and rationales are seldom adapted and translated strictly to policy-making (Laranja, Uyarrá, and Flanagan 2008, 825); instruments are used in a very context-specific way, and policies have a path-dependent nature (Uyarrá and Flanagan 2010). Therefore, much greater effort is needed in investigating the complexity of contemporary innovation policy and its governance by highlighting the evolution and the learning and dynamic nature of innovation policy (cf. Flanagan, Uyarrá, and Laranja 2011, 711). Moreover, earlier studies show that the development of science, technology and innovation (STI) policy is not dependent only on rational adjustment and considerations, but very much on social and institutional processes like imitation and fashion (Lemola 2002).

This article poses the following two research questions: (1) What have been the main developments and changes in the content and focus of Finnish innovation policy implementation from the early 2000s to 2016 and (2) What kind of emergent ideas and directions structure the “new innovation policy”? We use the Finnish innovation policy as an empirical object of policy analysis. The formation of the Finnish STI policy (e.g. Kautonen 2006; Lemola 2002; Sotarauta and Kautonen 2007) and changes in the policy-making practices (e.g. Niinikoski 2011; Niinikoski and Kuhlmann 2015) have already been studied. Yet, few scholars have offered analytical frameworks to understand the complexity of contemporary innovation policy and its governance and discussed these implications to policy-making and implementation. We propose a framework that helps to understand and characterise changes and different approaches to innovation policy implementation. Drawing upon the Finnish case, we discuss the potential development paths and emerging ideas framing the “new innovation policy”.

The article is structured as follows: The following section discusses the theoretical insights in innovation policy, drawing upon the rationales and developments that structure the focus of innovation policy. On that basis, we propose a framework to analyse innovation policy. In the third section, the data, methods and the empirical context of the research and the Finnish innovation policy are introduced. In the fourth section, based on our empirical data, the development paths of the Finnish innovation policy are elaborated by applying the drafted framework and pointing out recent changes, orientations and tensions. The final section presents the main conclusions and discusses their implications for policy and research.

Theoretical insights to evolving innovation policy

Setting the scene for innovation policy

Since the early work of Solow (1956) and Arrow (1962), there has been significant development of theoretical perspectives and debates, from which, rationales for STI policy can be extracted. To clarify the term “rationale”, a distinction can be made between meta-rationales and policy rationales (Laranja, Uyarrá, and Flanagan 2008, 824). Meta-rationales are *high-level philosophies about the proper modes and limits of government action*. Correspondingly, the ideas that are derived from specific concepts and theories and are taken up in the policy process become specific policy rationales.

Due to different perspectives on innovation, rationales and policy-making, numerous ways and approaches have been developed to define and categorise innovation policy. However, Edquist (2011, 1725) defines innovation policy quite straightforwardly as actions by public organisations that influence innovation processes.

The so-called “traditional neoclassical rationale” focused on public intervention to increase the supply of science and technology in order to boost innovation. The neoclassical rationale draws upon the market failure framework, which, as a meta-rationale, has evaded from intervening in so-called “near-market stages”. Thus, policy rationales drawing upon market failure tend to focus on framework conditions and a very limited governmental role.

During the recent two decades, market failure has been complemented by a wider framework. The systems of innovation (SI) approach has focused on systemic imperfections (system failure) and introduced a broader and more profound view on innovation processes and failures that can slow down the innovation system as a whole (Edquist 1997; Klein Woolthuis, Lankhuizen, and Gilsing 2005). The underlying idea is that the competencies for innovation are distributed throughout a network of actors, such as firms, universities, intermediaries etc. and their relationships. Thus, innovations should be understood as a complex interplay between actors, knowledge spillovers, institutions and networks. System failure can be caused by a lack of sufficient elements in the innovation system (e.g. actors, certain types of financing or knowledge) or a non-optimal interaction between these elements (Klein Woolthuis, Lankhuizen, and Gilsing 2005).

The SI approach provided justification for the role that the government can play to facilitate innovation and fix these failures. Moreover, it suggested a move beyond science, research and technology policy and towards a wider understanding of innovation as a social and economic phenomenon. The SI approach saw innovation policy to consist of explicit measures to promote the development, diffusion and efficient use of new products, services and processes in markets or various organisations (Lundvall and Borrás 2005, 37). And beyond, a broader definition sees innovation policy as systemic and broad-based, which implies that most major policy fields and instruments (procurement, regulation, education, tax measures etc.), traditionally intended to achieve other policy goals, should be considered in light of how they contribute to innovation. The emphasis is on the indirect, as well as traditional direct, measures and a wide range of initiatives that are linked to STI and both supply and demand for innovation (Edler and Georghiou 2007; Edquist, Luukkonen, and Sotarauta 2009).

Borrás (2009) aimed to grasp the trends behind this broader view on innovation policy by characterising the developments in the 2000s as a process of (1) widening, referring to the expansion of the realm of action for innovation policy, and (2) deepening, referring to the introduction of new and more sophisticated policy instruments. In a broader context, the recent developments in innovation policy also reflect the replacement of traditional state-centric models of government and public administration by new ideas about the distribution of power, multi-level, multi-actor governance and the New Public Management (Flanagan, Uyarra, and Laranja 2011).

In line with and parallel to the SI approach, there have been other prevailing concepts from (regional) innovation systems (Asheim 1995; Cooke 1992; Cooke, Uranga, and Etxebarria 1997) and clusters (Porter 1998) of innovation, entrepreneurial and business ecosystems (e.g. Isenberg 2010; Moore 1993; Smith 2006; Stam 2015). In addition, more policy-oriented concepts, such as constructed regional advantage (Asheim, Boschma, and Cooke 2011), platform policies (Cooke 2007; Harmaakorpi 2004) and smart specialisation (Foray, David, and Hall 2009, 2011), have had a major impact on implemented innovation policies, especially in the context of the European Union. This literature and the systemic rationales behind them have proposed a more proactive role for a government to intervene and expand their areas of involvement. These policy rationales have brought nuance to the discussion about the operational unit of the

innovation policy, the customisation of policies, level of interventions and the roles for public interventions and policy-makers.

The SI literature has its foundation in both the system-level analysis of institutional arrangements to facilitate innovation and in the economic actors' level, studying the interaction with the surrounding environment. Macro (or top-down) approaches tend to focus on economy, industry or innovation systems remotely as a whole and emphasise the general structures and function of markets (see e.g. Freeman 1987; Lundvall 1992). In contrast, the micro approach has provided a more agent-centred view, especially on the entrepreneurial behaviour of innovative firms that give rise to knowledge creation and diffusion inside firms and within the networks of different actors (Uyarra 2010; Werker and Athreye 2004). Recently, studies on ecosystems (e.g. Smith 2006) have brought the focus even more towards single actors and their self-directing and complex constellations.

The other aspect that the SI approach and related policy concepts suggest is that policies must somehow be "fine-tuned" or customised according to the region or industries in question. In particular, Asheim, Boschma, and Cooke (2011; Asheim and Coenen 2005) have introduced a solid framework that emphasises the importance of the related variety and differentiated knowledge bases of a region in establishing effective innovation policies. They argue that innovation policies and practices vary not only between countries and regions, but also depending on their past paths, resources and policy-making styles. Moreover, policies must be based on the identification of regional and industry-specific knowledge bases and institutions (see e.g. Sotarauta and Kosonen 2013; Tödtling and Trippel 2005).

More recently, there has been growing interest in taking on socioeconomic-technological challenges through innovation policies and transforming whole systems of innovation, production and consumption. The debate on mission – or transition-oriented policy draws upon systemic rationales and, for instance, the literature on transition management (see Geels 2004, 2005; Rotmans, Kemp, and Van Asselt 2001) and reflexive governance (see Voß, Bauknecht, and Kemp 2006). This transformational system failure approach also recognises other types of failures like directionality, demand articulation, policy coordination and reflexivity failures (Weber and Rohracher 2012). Translated into policy rationales, the emphasis is on mission-oriented policies which require the public sector to *not only "de-risk" the private sector, but also to lead the direct creation of new technological opportunities and market landscapes* (Mazzucato 2016, 140). The recent policy debate concerning innovation-led "smart" growth is seen to require *long-run strategic investments and public policies that aim to create and shape markets, rather than just "fixing" markets or "systems"* (Mazzucato 2016, 140).

Constructive synthesis to analyse innovation policy

In conclusion, the studies concerning innovation policy highlight the shift in meta-rationales from market failure to system and transformational system failure. Moreover, studies bring out a plethora of policy rationales, which stem from various concepts and ideas and shape the implementation of innovation policy. Policies derived from different rationales have an evolutive and path-dependent nature and are adopted in *a context of pre-existing policy mixes and institutional frameworks, which have been shaped through successive policy changes* (Uyarra 2010, 132), and they reflect the rationales, theories and concepts only partly. Actual implemented policies contain various ideas, which compete in a complex selection environment (see Slembeck 1997). Moreover, Flanagan, Uyarra, and Laranja (2011, 711) stresses that the innovation policy literature *treats policy makers as translators of theoretical*

rationales into action, denies agency to actors in relation to policy change and remains focused on a superficial analysis of instruments.

Consequently, we need to discuss the different approaches of innovation policy implementation. There are only a few studies that categorise and distinguish different types of innovation policy (see e.g. Edler and Fagerberg 2017, 4–5), disregarding the typologies based on technical policy instruments and rationales and dichotomy of supply – or demand-based innovation policies. Due to this, in the following chapter, we will introduce a framework that captures the changes in innovation policy described earlier and provide a tool to analyse different approaches of actual implemented innovation policy. The framework helps to reveal and to analyse the explicit measures and changes in the innovation policy, such as policy instruments, specific policy programmes, but also more implicit structural and institutional changes (changes in the “rules of the game”) influencing the current innovation policy. Thus, we can expose the traditional and the “new” or referred to here simply as “widened and deepened” realm of innovation policy. As Borrás (2009, 2) reminds, we have to *keep in mind the analytical purpose of using constructed ideal types*.

The literature review leads us to analyse the trends and important approaches to innovation policy, more specifically, the implementation manner with two primary axes. In our framework (Figure 1), the horizontal axis represents the customisation of innovation policy. The general approach to innovation policy implementation focuses on the generic and framework conditions for innovation. Thus, innovation policy is horizontal and the ideal is to avoid too active role in directing of innovation activities and picking

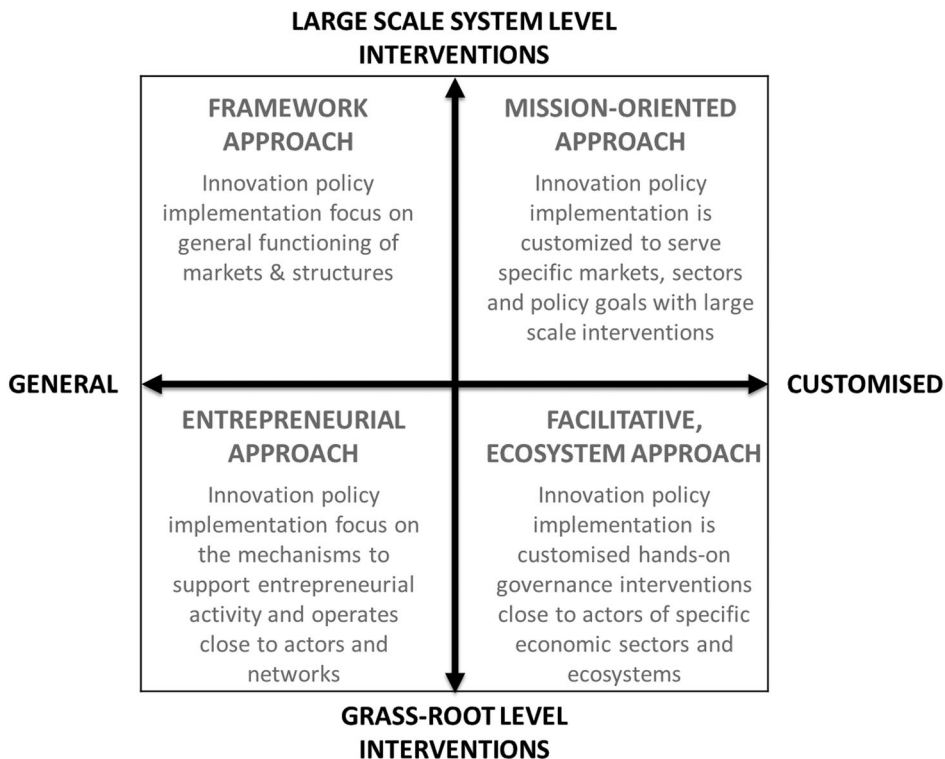


Figure 1. Framework for analysis of innovation policy.

winners among industries, technologies or innovations which may lead to ineffective use of resources, negative path-dependent development and unhealthy divergence of domestic and global markets. On the other hand, customised innovation policy is tailored to meet the needs of specific branches of economy and regions and to tackle specific development-related problems. The role of innovation policy is rather active in directing development and facilitate innovation in these specific branches of economy.

Correspondingly, the vertical axis represents the level of innovation policy interventions. This means that on the other end, innovation policy operates with large scale system level interventions. Innovation policy has a distant role – watching over the functioning of markets (e.g. tax, support system, regulation, IPR), structures and structural composition of the economy and the innovation system. In contrast, the other extreme of implemented innovation policy is operating very close to actors and networks and is also organised bottom up to grasp the emerging opportunities. This perspective also quite often reflects a decentralised, implementation of innovation policy, where national policies are shaped, formulated and implemented through cooperation between national, regional and local policy actors as well as representatives from firms, universities and other research centres.

In summary, the two axes together form four different simplified approaches to innovation policy implementation, which also reflect the prevailing and partly overlapping policy debate. Firstly, in its purest and most extreme form, general policy that operates with markets and structures represents non-interventionist ideology and emphasises the market-based paradigm (see Lundvall and Borrás 2005, 610). The underlying idea in this framework approach is to look after the conditions for economic renewal and innovation.

Secondly, the combination of general innovation policy that operates close to actors and networks stresses the need to understand the Schumpeterian perspective and the micro foundation of innovation studies. We call this the entrepreneurial approach. In this view, the innovation system and policy should be seen in more detail from the actors' point of view. Thus, innovation policy focuses on the grass-root level interventions and mechanisms to support entrepreneurial activity, considered as a process in which individuals and communities create opportunities for innovation, i.e. especially stressing variety creation and knowledge exploitation (see Schumpeter 1934, 1942).

Thirdly, customised innovation policy implementation, which focuses on structures and markets, is here referred to as the mission-oriented approach. It draws upon how Krugman and Obstfeld (1991) have defined industrial policy as *an attempt by a government to encourage resources to move into particular sectors that the government views as important to future economic growth* and to actively direct innovation activities. The underlying debate concerning the implications of how customised and mission-oriented innovation policy has enhanced many significant innovations and societal transformation processes (see e.g. Mazzucato 2016). Thus, recent developments in this approach especially reflect the ideas to tackle transformational system failures.

Fourthly, customised innovation policy that operates close to actors and networks shifts the focus from strategic-level agenda setting to hands-on governance and is here regarded as the facilitative, ecosystem approach. Although innovation ecosystem is a debated policy concept (see e.g. Papaioannou, Wield, and Chataway 2009) the elements of ecosystem-based innovation policy has received remarkable scholarly interest. According to Rinkinen (2016, 62), ecosystem innovation policy *perceives the need for constant evolutionary and emergent change that begins from the grass roots level and also recognises the possibilities of influencing on this change through intentional policymaking*. This calls for an active and

delicate role of the public sector and more sophisticated innovation policy instruments and bottom up agendas to stimulate both the supply and demand of innovations. Facilitation, service and platform provision have major role in implementation, as one of the main objectives is to support the engagement of various actors and collaboration among the key stakeholders of the ecosystems.

Research data, methods and context

The empirical analysis in this article is based on qualitative research methods. The empirical data consist of personal in-depth interviews and document material. The interview data were gathered through 13 semi-structured interviews with Finnish actors responsible for the preparation of national innovation strategy and implementation of national innovation policy. They represent organisations and bodies that have major influence on the formulation of Finnish innovation policy: The Research and Innovation Council of Finland, the Ministry of Employment and the Economy, Finnish universities, the Finnish Funding Agency for Technology and Innovation (Tekes), the Finnish Innovation Fund and regional councils. The discussion with the interviewees included a broad discussion of the most important changes in innovation policy, the nature of contemporary innovation activities and their implications to the rationales, priorities and implementation of innovation policy. The interviews were conducted in Finnish between April and May 2015 and were recorded and transcribed. The primary document material includes 20 main Finnish national innovation policy documents (such as strategies and policy guidelines) and innovation policy evaluations from the 2000's.

The interview and document material were gathered together, condensed and then sorted into descriptive potential themes and commonalities according to the core interests of the research. We looked for the links, emerging patterns and connections in the data relating to developments in innovation policy. After this data-driven analysis, we reflected on the emergent patterns in terms of our conceptual framework to scrutinise the innovation policy debate. This technique proved to be similar to the analytical process of abductive reasoning. Based on the empirical analysis, we also draw conclusions on the value of the created framework.

The Finnish innovation policy, as an empirical object of policy analysis, is a case in point of what comes of the innovation policy hype. Finland was the first country to introduce the national innovation system concept as a basis for national policy in 1990 (see Lemola 2002; Miettinen 2002; Miettinen 2013). Finland has successfully pursued knowledge-based strategy with a strong focus on R&D&I and the innovation system (e.g. Sabel and Saxenian 2008), and it has been ranked among the top countries in terms of innovativeness (Dutta, Lanvin, and Wunsch-Vincent 2015; Hollanders et al. 2014). Finland has been a showpiece for the construction of knowledge economy and in the frontline in its effort to adopt the latest policy concepts (e.g. systemic and broad-based innovation policy). Despite the excellent performance in the rankings and being regarded as successful innovation policies, the Finnish innovation system has not been able to efficiently promote new paths of economic development, albeit the major efforts in R&D and the innovation policy (see also Sabel and Saxenian 2008; Veugelers et al. 2009). The long-lasting economic crisis and slower (and even negative) economic growth compared to many other European countries led the Finnish government to question the impacts of the adopted innovation policy especially during the Prime Minister Sipilä's Government (2015–2019). As a result, the Finnish innovation policy is in a state of confusion and many public organisations in the Finnish innovation system are going through difficult and painful reforms.

National policies in Finland are formulated through a co-evolutionary process between various stakeholders on national and regional/local levels (Sotarauta and Kautonen 2007). Additionally, the transnational context and interstate systems have had important role in Finnish innovation policy (Niinikoski 2011; Niinikoski and Kuhlmann 2015), and Finland has largely adopted its policy doctrines and instruments from OECD and countries like Sweden and Japan (Lemola 2002). However, currently it seems that there is no dominant policy models to adopt and learn from, and in contrast to OECD peer economies (Denmark, Germany), Finland has implemented contractionary policy in funding R&D and innovation (see OECD 2017).

The trends in statistical data show that investments in R&D and the innovation system have grown steadily during the last decade, but we also saw a rapid change of direction after 2008 and especially so in recent years (see Figures 2 and 3). Finland was hit hard by the global economic crisis in 2009, and industrial restructuring entailed a steep decline in business R&D expenditure. At the same time, the widely shared consensus on the role and importance of science, technology and innovation weakened during the recession. This led to cuts in public spending on R&D, and the Finnish innovation agency's (Tekes)¹ budget has been cut especially hard. This, combined with cuts at the Technical Research Centre of Finland VTT and other government research institutes, have raised the question of contemporary innovation policy and the missing strategy behind these cuts.

In recent years several studies have recognised the crisis of Finnish innovation policy and highlights the need for a new direction for innovation policy (e.g. Lemola 2020). The same concerns, relating to the confusion in innovation policy, have been raised in the national innovation policy evaluation committed by OECD (2017) and by the innovation policy officials in Finland (see Koski et al. 2019; Ormala 2019). Thus, the case of Finland is particularly useful for examining the ongoing search of new directions for innovation policy-making.

Analysis of trends and aspects of Finnish innovation policy

Framework approach to provide conditions for economic renewal

The empirical data strongly suggests that the pervasive idea in Finnish innovation policy has been to guarantee a good and attractive environment for businesses and for innovation to flourish – increasingly in the global perspective. The discussion has emphasised macro-economic issues such as the functioning of markets, industries, structures, taxation, regulation and that the government budget is in balance. Even though the Finnish STI policy has discarded the purist view of the public sector's role of only fixing market failures, still the idea or ideology of framework policy complemented by the system failure approach has lingered in policy documents and rhetoric as a meta-rationale. According to the interviews and policy documents, there has clearly been an understanding that innovation policy should be neutral spatially for most as well.

In the early 2000s in particular, the common belief in the excellence of Finnish education, research and the innovation system, a highly educated and talented workforce and solid basic structures of society were very strong and key to competing in a globalising economy. The traditional realm of the Finnish innovation policy has been the science and technology push policy, reflected in the steady increase of public spending on science, technology and innovation. The idea has been to strengthen the national innovation system and the capabilities and competencies in global competition. The Government Science and Technology Council's review (2000) and definition of policy (2003) stressed

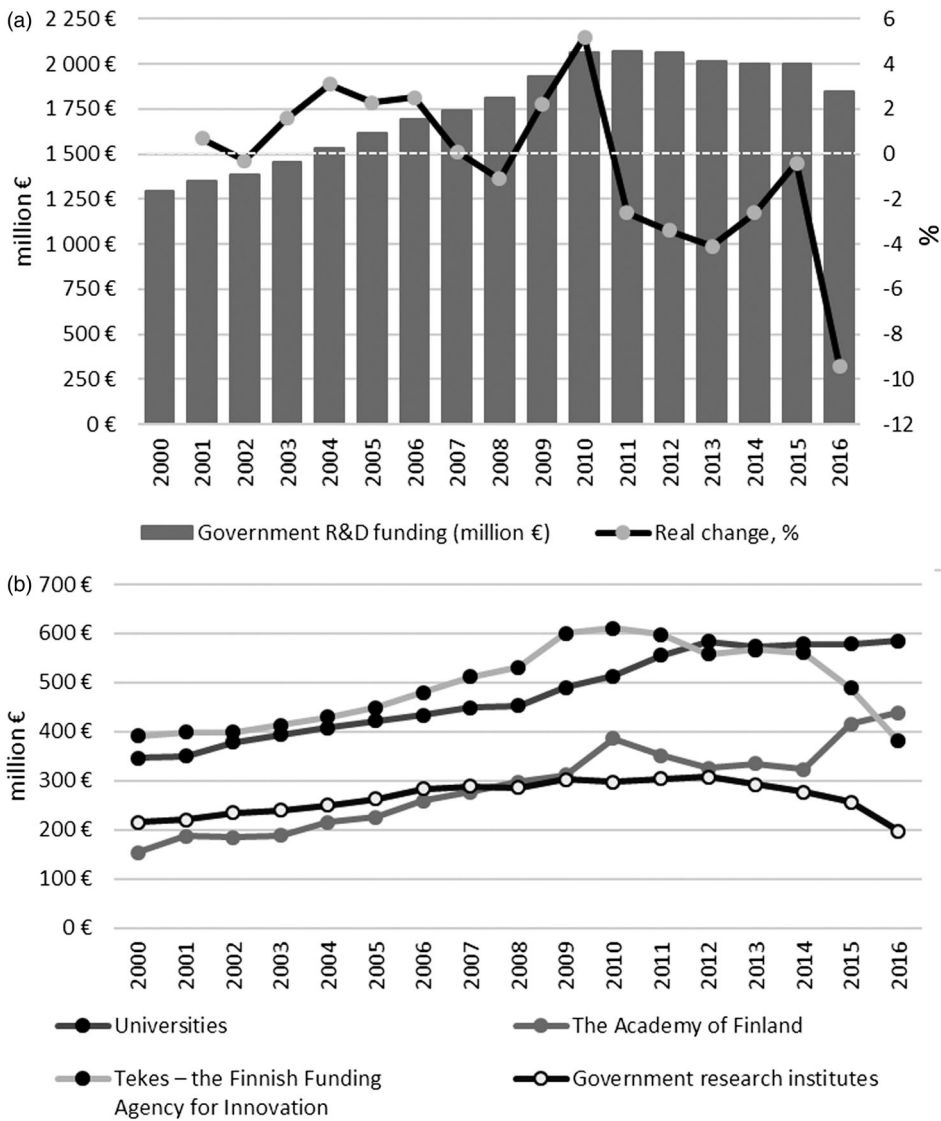


Figure 2. (a) The development of government R&D funding in Finland from 2000 to 2016 (overall funding).

Source: Official Statistics of Finland (OSF), Government R&D funding in the state budget 2017. (b) The development of government R&D funding in Finland from 2000 to 2016 (by funding organisations on the right). Source: Official Statistics of Finland (OSF), Government R&D funding in the state budget 2017.

the national structures for diverse and effective financial markets, IPR and diffusion and exploitation of knowledge and know-how.

Fundamental institutional changes have implicitly influenced Finnish innovation policy and widened, as well as deepened, its realm. Innovation policy remained quite unchanged until 2006–2008, when major reforms took place. This period was interpreted by the interviewees as a turning point of Finnish innovation policy. Policy-makers and key actors had recognised the limits of the traditional supply-based strategy, which led to a

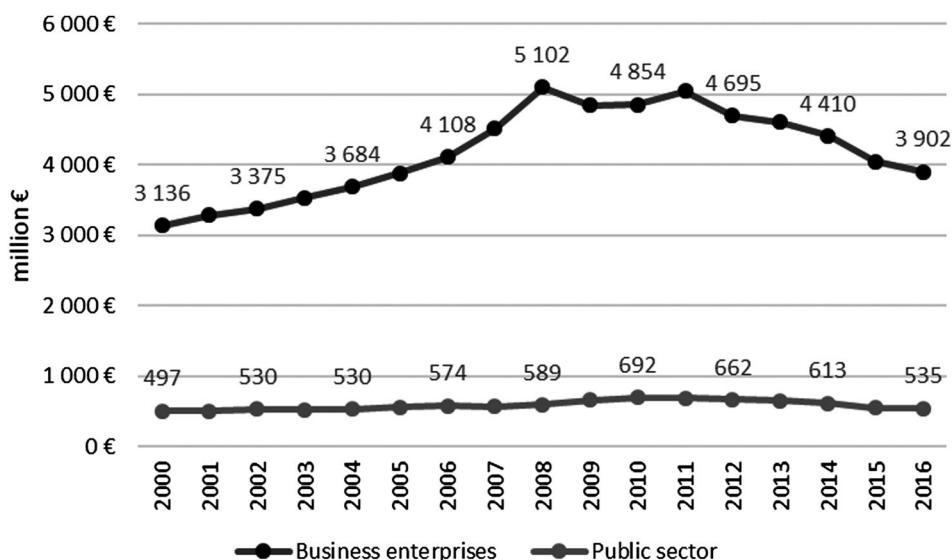


Figure 3. The development of total R&D expenditures of the private and public sector in Finland from 2000 to 2016.

Source: Official Statistics of Finland (OSF), Research and development 2017.

more ambitious, broad-based approach to innovation policy. The formation of a new Ministry of Employment and the Economy and the proposal for Finland's national innovation strategy in 2008 introduced a more demand – and customer-oriented innovation policy. The idea of a demand-based innovation policy and its tools has also evolved in accordance with EU level of policy-making (Niinikoski 2011, 202–210). This allowed Finland's contemporary innovation policy to draw more explicitly from two innovation modes; the aim being to sharpen policies for STI, while at the same time, broadening the innovation policy by emphasising the demand side instruments (Ministry of Employment and the Economy 2008), such as public procurement for innovation.

Due to changes in rationales towards the SI approach and globalising innovation activities, there has been a growing interest to see innovation policy as a cross-sectoral policy, integrating various aspects of sectorally organised policies and instruments to support innovation. However, the change in policy rationales towards broad-based innovation policy led the policy documents and policy-makers to pay more attention to the enhancement of diversification, adoption of new knowledge and combinations of different knowledge. The internationalisation of the innovation system actors has been one of the main aims of innovation policy in order to improve diffusion and adoption of new knowledge. All these objectives have been reflected especially in the strategies of national science and innovation institutions and their funding criterias. More recently, especially triggered by the economic crisis in 2008 and stagnated growth in the early 2010s, the responsiveness of the innovation system to shocks or the ability to recover from shocks has received a lot of attention in Finland. Thus, the latest definition of policies by the Government Research and Innovation Council's policy document (2014) raises the resilience of the economic structures and actors as one of the main challenges and objectives for innovation policy.

The widening realm of innovation policy has led to structural reforms. The interviewees stressed that comprehensive innovation policy, system-level coordination, the

efficiency of innovation system structures, cutting down system overlapping and impact-oriented rhetoric have been more dominant the closer we come to present-day reality of Finnish innovation policy. The establishment and re-positioning of the Research and Innovation Council in 2009 and a more active role of the Prime Minister's Office have been a few endeavours towards coordinated broad-based innovation policy, although many challenges in implementation towards the goal still remains (Pelkonen and Lehenkari 2014). The changes in steering and funding of higher education institutions (HEI's),² reform and incorporation of public research organisations, the recent cut down and repositioning of funding of the Finnish Funding Agency for Innovation (Tekes) have reflected the impact-oriented but also more market-based rhetoric.

In contrast to the traditional realm of framework policy, the recent changes in innovation policy have led the government to consciously and systematically enable innovation with regulation, taxation and structural reforms. The Government Research and Innovation Council's definition of policy (2014), for instance, stresses the opening of public data resources as an important source for (user-driven) innovation. A few examples of the explicit changes in innovation policy instruments are the emphasis towards loan-based instruments, e.g. in Tekes, funding and the innovation voucher launched in 2016. R&D tax incentives were also experimented in 2013–2014. However, the tax incentive scheme was terminated as take-up was low. Interestingly the Finnish government moved the emphasis to enhance any economic activity in the country and not just innovation-driven businesses by launching one of the lowest corporate taxes in Europe in 2014 (Kuusi et al. 2016).

The entrepreneurial approach for variety creation and knowledge exploitation

The interviewees stressed that the actor – and network-centric view has strengthened in Finnish innovation policy implementation during the 2000s, which means that more emphasis is put on entrepreneurship and the capabilities to exploit knowledge capital. The interviewees note that large companies have had a crucial and dominating role in the traditional realm of Finnish STI policy, e.g. in distribution of innovation funding. National policy has walked alongside big companies, such as Nokia, exercising the science and technology push mode of innovation policy, and provided finance to R&D.

The reason to consider the entrepreneurial approach in the Finnish innovation policy is above all due to a lack of diversity in the economy and poor performance in commercialisation and utilisation of knowledge and inventions. This has led to the widening and deepening of the realm of innovation policy, and hence, to consider the effective mechanisms for variety creation and utilisation of knowledge and business opportunities. Moreover, this tendency reflects the idea of increasing the quality of entrepreneurship, which refers to the emphasis on growth and innovation-oriented (start-up) entrepreneurship. The interviews and policy documents clearly point out that grass-root level approach to innovation policy implementation is needed to achieve these goals. Consequently, cities and regional development agencies have been given more power and responsibility to foster innovation and innovation-oriented entrepreneurship. This change in the focus is particularly visible after the financial crisis. The ideal for innovation policy is to make sure that the innovation infrastructure (incl. services) and institutions, networks and capabilities support entrepreneurial activity and to remove barriers and disincentives.

One of the most visible examples of this deepening and explicit changes in the innovation policy has been the tendency of innovation policy to support diffusion and exploitation of knowledge with high-quality innovation services. Most of the main innovation

policy documents during 2000s fairly state that the availability and effectiveness of these services and funding instruments must be guaranteed. The idea draws upon the establishment of technology centres and business incubators in the 90's and the 2000s. Due to this institutional change and the national funding through the Centre of Expertise programmes in 1999–2006 and 2008–2013, a wide network of innovation services and service providers spread all over Finland providing also more nuanced services and funding for innovative firms and start-ups.

The present-day development seems to indicate that the public innovation service network is narrowing, internationalising, concentrating into knowledge hubs and focusing on growth and innovation-oriented (start-up) entrepreneurship. One explicit example is in 2013 launched flagship initiative Team Finland, which integrates all state-funded internationalisation services under various ministries and brings the services of Business Finland (former Tekes, Finpro), Finnvera³ and a nationwide network of partnership organisations together into comprehensive growth support programmes for firms under the coordination of the Prime Minister's Office. Also, one prevailing idea found in innovation policy documents is to strengthen the venture capital markets to support start-up and growth companies. One example of increasing public sector activism is the Vigo Accelerator Programme launched in 2009 to *address perceived gaps in the Finnish national system of entrepreneurship notably, those existing in the high-growth venturing ecosystem* by the Ministry of Employment and the Economy (Autio et al. 2013). Tekes has also directed funding towards early-stage growth of start-ups and launched in 2008 a programme for young innovative company funding. Thus there is a clear trend to support the creation of new innovative firms and enhance coordination among the different constituent parts of the entrepreneurship support system (see also Autio, Rannikko, Handelberg and Kiuru 2014). Nonetheless, the turmoil especially in public venturing activities has left many structural challenges for innovative growth firms (see Sorvisto and Sotarauta 2016).

The widened and deepened realm of the innovation policy, reflecting the entrepreneurial approach, is also visible in higher education and research. Innovation policy has emphasised the active role of cities, universities and students to enhance entrepreneurial activity in the country. HEIs have been pushed to focus more on university-industry collaboration and on mechanisms, processes and services to promote and enhance the commercialisation of research, to support vibrant start-up communities and to increase the mobility of students and researchers into business life (see also Lahtinen et al. 2016, 99–121). HEIs have created common service units and pooled their services, laboratories and equipment together; some of the universities even acted as investors in university-based innovations. In addition, market-oriented steering and business life representation in HEIs' and public (innovation system) organisations' boards and projects' steering groups have grown (see also Niinikoski et al. 2012).

Lastly, the changes in soft institutions have implicitly influenced innovation policy. Many interviewees stressed that openness and changes in the organisational culture and political climate in supporting entrepreneurship can have a good impact on innovativeness. For instance, the latest Government Research and Innovation Council's definition of policies (2014) recognises soft elements such as promotion and development of entrepreneurial and experimentation culture and curiosity towards commercial activity.

Mission-oriented approach to direct systemic changes

For a long time, the Finnish STI policy has directed resources to sectors that are most important for the Finnish economy like the forest industry, the metal and machinery

industry, ICT and the shipbuilding industry. Innovation policy has been customised by establishing different research, development and innovation programmes in specific sectors. However, more recently, the single industries and technologies have faded from the innovation policy documents and programmes having been replaced by broader branches of economy and megatrends. Health and wellbeing, bio-economy (and circular economy), digitalisation and their key enabling technologies are the spearheads of the widened realm of innovation policy. The interviewees stressed that these choices have been justified by the path-dependent nature of accumulating knowledge and know-how, Finland's natural strengths and competitive and comparative advantage in specific sectors, in which Finnish research and firms could be on the leading edge.

Consequently, one of the fundamental changes has been the growing interest and goal towards the systemic, broad-based policy approach, which tackles societal challenges rather than only economic growth objectives. The need for customisation and direction to tackle specific systemic problems is clearly noted in the innovation policy documents and recognised by the interviewees. These ideas of systemic and transformation-oriented policy also draw upon the urgency for new path-creation and a renewal of old industries and clusters. The Government Research and Innovation Council's latest strategy (2014) clearly states that *the public sector will take on a new role as an active promoter and exploiter of innovations*.

There have been some major institutional changes that implicitly reflect the widened realm of innovation policy implementation and the mission-oriented policies. A broader set of actors are implementing innovation policy and sector policies are integrated into policy-making than in the 90's and early 2000s. Especially during 2010s ministries have pushed together ambitious strategies and reforms e.g. in digitalisation and health-care and development of bio based economy. A wide range of actors (ministries, national innovation and business authorities, HEI's and research institutes and stakeholders in regional and local level) have participated in the preparation of these strategies. The ambitious goal is to create growth environment for businesses and facilitate innovation within identified sectors, but also to coordinate and integrate national innovation policy agendas, harness a wide range the instruments and measures (incl. e.g. Tekes innovation programmes and regulation) for systemic change. For instance, the Ministry of Transport and Communication is pursuing holistic mission-oriented policy for digitalisation of services and executing remarkable reform in transportation. The reform aims to transform the whole system of mobility and to make Finland's mobility – a service pioneer in the world, which will facilitate innovation, especially in the transportation sector.

The Finnish broad-based innovation policy has been criticised to have no concrete tools and operational procedures (Veugelers et al. 2009). The interviewees also note that after the launch of the national strategy in 2008, innovation policy has been empty rhetoric much more often, raised a number of "fashion" phenomena and lost its clear focus. Some of the interviewees see that strong customisation of innovation policy has led to path-dependent development to support old industries, incapability to actively search for new growth sectors, short-term policy and a fragmented, fixed and biased structure of the innovation system, which is hard to restore. One such example of a specific instrument was the Strategic Centres of Excellence (SHOK) programme, which served existing industries too much and lacked an interdisciplinary perspective (Lähteenmäki-Smith et al. 2013).

Explicit change towards broad-based and mission-oriented innovation policy has also been the National Innovative Cities (INKA) programme, an instrument launched by Tekes in 2014 to promote innovative public procurement and to create attractive innovation clusters and demand-based and user-driven innovations in specific nationally important

themes. Thus, the mission-oriented approach has also increased the role of cities in the Finnish innovation policy arena.

The recognition of concepts, such as social innovation and service innovation and their special needs and support instruments, points towards broad-based and customised innovation policy in Finland. Interviewees also stressed that in general, a much broader set of instruments is exploited to promote innovation. The mission-oriented approach largely highlights the role of national visioning, foresight information, regulatory planning and target-setting, financial and tax-based approaches, which have become a more visible part of the widened realm of the mission-oriented approach to Finnish innovation policy. Innovation policy also pushes regions and HEIs to specialise and strengthen their profiles and guided regions to improve regional resilience.

Innovation policy as a facilitative, bottom-up development of functioning ecosystems

A decentralised actor – and network-centric approach evolved in Finnish STI policies for many decades (see also Sotarauta and Kautonen 2007), and this tendency in innovation policy has also been strongly influenced by EU regional policy (see Niinikoski 2011, 157–163). The empirical data suggest that there has been a shared understanding that Finnish innovation policy should promote networking and be facilitative and system-oriented. This approach has called for customised, regional/local context-based policy, which recognises the specific conditions for innovation.

There has been a long series of explicit policy programmes since the 90's that have tried to combine and operationalise bottom-up and top-down views of innovation policy.⁴ The traditional realm of innovation policy already had characteristics from proactive customised and actor – and network-centred policies. These policy programmes have encouraged regions to experiment, find their strengths and develop their unique knowledge-base and capabilities in collaboration between public sector organisations, HEIs and industry. The programmes have clearly been customised to serve specific clusters, promote interaction of various actors and focused on the specific bottlenecks in question (see Sotarauta and Kosonen 2013). The programmes have also been tools of mutual learning, mediators of (broad-based) innovation policy language and helped create common understanding and discussion. Nonetheless, the interviewees noted that these innovation policy programmes reflect the ambiguous and complex setting between national and local ambitions, where nationally defined framework, themes, steering and funding do not serve and communicate with bottom-up initiatives. The clear tendency has been to integrate the resources of various actors and to carry out common innovation policy, but this integration is still searching for working practices and tools.

The shift to new ecosystem policy rationales is reflected in Finland's national innovation strategy (2008). The strategy suggested that instead of national innovation systems, attention is focused on innovation ecosystems and innovation centres, which are embedded locally and regionally, but at the same time, are globally networked and capable of renewal. By using the "ecosystem" concept, shaking off the excessive regional and sectoral dimension from the Finnish innovation policy was attempted. According to the interviewees, this new ecosystem approach emphasises facilitative policy instruments and interventions such as the promotion and combination of co-creation models and platforms to organise interaction between various stakeholders, public-private partnerships and joint strategy processes (incl. foresight, visioning, cumulative knowledge production and analysing, sense-making and collective learning), exploitation of public procurement for

innovation, launch of various experimentations and organisation of innovation competitions (cf. Rinkinen 2016).

A couple of explicit examples of the change in innovation policy instruments towards this facilitative, ecosystem approach is the previously mentioned Innovative Cities (INKA) programme and the 6Cities strategy (6Aika) in particular. Launched as a common cities' bottom-up initiative, the 6Cities strategy aims to develop smart city-related products and services and tackle common urban challenges by launching cooperative projects, platforms and co-creation models, which enable the cities to experiment in common themes like smart mobility and cleantech. Influenced by the EU innovation and regional policy, the smart specialisation concept has also pushed Finnish regions to create a unified innovation strategy and allocate funding and investments on the fields with the most future innovation potential (Rinkinen 2015).

Consequently, the development of functioning ecosystems has emerged as the guiding principle in the widened and deepened realm of innovation policy. The interviewees highlighted that the ideas structuring this facilitative, ecosystem approach have various premises. Firstly, ecosystems are referred to as a holistic development approach, as there is a growing need to develop internationally attractive innovation ecosystems, actively engage new actors in innovation activities and policy and to open, expand and revitalise networks of actors in regions or knowledge hubs.

Secondly, the ecosystems approach is seen to emphasise open innovation platforms (see e.g. Anttiroiko 2016; also Chesbrough 2003; Tukiainen, Leminen, and Westerlund 2015) and the mission-oriented view – to solve societal challenges locally by developing innovation platforms for experimentation (e.g. Hämäläinen 2015). Due to this, innovation policy stresses the previously underexploited role of cities as innovation policy actors and laboratories, open platforms and physical environments for ecosystem development. Critical mass and agglomeration economies should be better exploited, since cities make major future investments in infrastructure, products and services and are actively involved in the development of ecosystems (e.g. sustainable and effective public transportation, energy production, waste recycling etc.).

The third view, reflecting the facilitative, ecosystem approach, draws upon the growing policy debate on the identification of emerging business ecosystems or supporting market-led ecosystems (see Rinkinen and Harmaakorpi 2017). Interviewees stressed the self-directing nature of these ecosystems and the supporting role of the public sector. This means that the public sector stands in the background, initiating various development processes and “feeding” the ecosystem with supply and demand-based instruments. Yet, understanding innovation policy as facilitating dynamic business ecosystems makes implementing even more fuzzy and complex.

Future paths for Finnish innovation policy

Empirical findings show that the Finnish innovation policy is in a state of confusion. The confusion is due to a mix of major structural economic issues and their impact, such as the long-lasting economic crisis, but also difficulties in increasingly systemic and complex operationalisation of innovation policy-making, clear misunderstandings of the contribution of the innovation policy, a lack of faith in its prospects and failures in communication between academics and policy-makers when reasoning through these issues. Innovation policy is at a risk of becoming a victim of its own concepts. Consequently, there is a lot of pressure put on the ongoing search of new directions for innovation policy-making and experimenting with the “new innovation policy”.

Earlier studies have shown that Finland's development strategy in STI policy has been based on catching up with the high international level and adopting the good practices and models from other successful countries (e.g. Lemola 2002). Now Finland is in a situation where there does not seem to be a single dominant innovation policy model. Rather, in practice, there are many approaches to innovation policy implementation and new emerging ideas, which are still taking their shape as policy-rationales, functioning practices and instruments. The new Finnish innovation policy seems to be built more on exploration and experimenting.

The summary of the different approaches to contemporary innovation policy and its governance show various reasoning, basic tenets and main aims to influence innovation activities (Table 1). The table below summarises the different approaches to innovation policy and points out emerging ideas framing the "new innovation policy" implementation in Finland.

The framework approach to innovation policy implementation seems to be characterised by the shift towards a more holistic direction, where the public sector takes a role as an enabler of innovation. This framework approach especially underlines the role of the central government (active role of the Prime Minister's Office and ministries) as an enabler. Edquist (2016, 2019) raises similar notions from Sweden, concerning emerging endeavours towards system-level coordination of innovation policy. The recent innovation policy debate in Finland also reflects the growing interest in academic and policy fields towards resilience of national and regional economies (see also Boschma 2015; Simmie 2014).

The entrepreneurial approach is shifting the focus of innovation policy more and more towards vibrant grass root-level forces of renewing the economy, namely, the scene of innovation-oriented start-ups and growth companies, reflected as increasing the quality of entrepreneurship (cf. Stam 2015). Consequently, the context for entrepreneurial innovation and soft elements, such as the "innovative culture and climate", seems to receive more attention as well (cf. Autio et al. 2014). As a consequence, this approach emphasises the role of HEIs and public agencies providing innovation services and funding to stimulate entrepreneurship and knowledge exploitation.

The most important developments framing the "new innovation policy" implementation from the mission-oriented perspective have been the shift from industrial innovation policy towards national vision-led transition policy to enhance systemic changes in the society (see also Mazzucato 2016). Concurrently, it is closely connected to the specialisation process in which different actors and institutions should also find their role in relation to global challenges. This approach put a lot of pressure on the governance and vertical coordination of these "national projects" and experimentation (see also Kuhlmann, Shapira, and Smits 2010; Mazzucato 2016, 153).

The facilitative, ecosystem approach is the most unclear and uncertain one, but also seems to receive the most attention in the "new innovation policy" implementation (see e.g. Hämäläinen 2015; Rinkinen 2016). We distinguished three emergent directions that stem from this approach. The basic idea beneath them still draws upon the premises already clearly proposed by Bathelt, Malmberg, and Maskell (2004), which refers to the understanding of the importance of "local buzz" and "global pipelines" and supporting interactive learning and knowledge creation across various organisations. But the emergent ecosystem approach also emphasises the role of decentralisation, directionality, experimentation, open innovation paradigm (Chesbrough 2003), facilitation and collaboration platforms (Cooke 2007) and sophisticated use of supply and demand-based policy instruments (Rinkinen 2016). Successful operationalisation of this approach demands new capabilities, especially from cities as platforms and regional (local) development agencies as facilitators of collaboration between ecosystem actors.

Table 1. Summary of the approaches to innovation policy implementation.

Approaches to innovation policy	Framework approach	Entrepreneurial approach	Mission-oriented approach	Facilitative, ecosystem approach
Main aim	Conditions for economic renewal	Creation of variety and knowledge exploitation	Systemic change	Ecosystem development
Characteristics	General functioning of markets and structures	Grass-root level mechanisms to support innovative and entrepreneurial activity	Customisation of innovation policy to serve specific markets, sectors and policy goals with large scale interventions	Customised interventions close to actors of specific economic sectors and ecosystems
Emergent directions that structure the ‘new innovation policy’ implementation	<ul style="list-style-type: none"> • The public sector as an enabler of innovation • System efficiency and system-level coordination • System adaptation (resilience) 	<ul style="list-style-type: none"> • (Local) support, services and culture for innovation and entrepreneurship • Activation to innovate 	<ul style="list-style-type: none"> • Visioning and directing resources to tackle societal challenges • Continuous identification and evaluation of key economic sectors and enabling technologies 	<ul style="list-style-type: none"> • Innovation ecosystem development • Platform-based development of ecosystems • (Emerging) business development of ecosystems
Actors emphasised by the ‘new innovation policy’ implementation	Central government as enabler and Prime Minister’s Office as coordinator; Transnational organisations provide general frameworks (e.g. EU competition policy and subsidies)	Central and local government as enablers; HEIs, business incubators and public agencies provide innovation services/funding and activate communities; Vital role of start-ups as drivers of economic renewal	Vertical and horizontal coordination between central government, national R&D funding agencies and institutions and cities; Transnational organisations provide supporting policy agendas and resources (e.g. EU)	Central government supports public private partnerships; Cities as platforms; Regional (/local) development agencies facilitate collaboration; Businesses as ecosystem leaders

Conclusion

In this paper, we have analysed the developments and changes in the content and focus of Finnish innovation policy implementation in the 2000s. The contribution is twofold. Firstly, our synthesis of the previous literature together with our empirical data complement earlier studies and theoretical approaches to innovation policy, which mainly concerned rationales and instruments. We proposed a framework that helps understand the different aspects of innovation policy. Secondly, the Finnish case pointed out practical implications of how the landscape of innovation policy implementation has changed from the early 2000s and suggested some emergent ideas and directions that structure the “new innovation policy”.

Our findings support the earlier notion of the “widening” and “deepening” nature of innovation policies. Moreover, based on our empirical findings concerning Finland, we argue that there is a third aspect that comes along as a consequence of widening and deepening. The ubiquitous nature of the systemic and broad-based innovation policy has led to a situation where it is hard to recognise what the innovation policy actually contains (as it is “a bit of everything”), who is responsible for it, and how its impact can be measured. Nowadays innovation policy is even more complex, fuzzy and difficult to put boundaries on. Innovation policy should be understood as a complex, evolutive activity that serves various goals, spans across various policies, which includes trade-offs, tensions, experimentation, learning and argument about means and ends. Innovation policy provides conditions for economic renewal, enhances variety creation and knowledge exploitation, direct systemic changes and facilitates bottom-up development of functioning ecosystems. The fuzzy and complex innovation policy demands for strong agency and new roles and capabilities from innovation policy actors to capture the emerging ideas of new innovation policy and create effective ways to operationalise different approaches to innovation policy.

In summary, this study suggests that analysing innovation policy only in the light of policy rationales and instruments is not enough to grasp its current actual realm. Contemporary innovation policy has various goals and is characterised by trade-offs, tensions and experimentation as a new way to make policy in a complex world. This multi-level and – dimensional set of policy approaches seems to be the new way to tackle complex challenges. There is a lot to learn from new experimenting governance models and instruments, which specify new innovation policy and integrate top-down and bottom-up initiatives and resources of various actors. We need more empirical work that shows what we have learned from systemic innovation policy-making, research that structures this “new innovation policy” and what is expected from implementation of contemporary innovation policy.

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Notes

1. In the beginning of 2018, Tekes and Finpro were merged into Business Finland, and the coordination function will be re-organized. Finpro helps Finnish SMEs go international, encourages foreign direct investment in Finland and promotes travel to Finland.
2. The new University law and the Universities of Applied Science law put in practice in 2010.
3. Finnvera is a specialised financing company owned by the State of Finland and is the official Export Credit Agency (ECA) of Finland.
4. These include the Centre of Expertise Programmes (1994–1998, 1998–2006, 2007–2013) and the Innovative cities programme INKA (2014–2016). Also, regional policy instruments have had a focus on innovation policy: EU regional development funds programmes, Regional Centres Programme (2001–2009); Cohesion and Competitiveness Programme (2010–2013); Regional Innovations and Experimentations Programme (2016-).

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