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Anticipatory Innovation Governance Model and Regional Innovation Ecosystems Supporting Sustainable Development

Minna Takala[1] and Taina Tukiainen[2]

[1]Regional Council of Häme, Hämeenlinna, Finland
[2]University of Vaasa, Vaasa, Finland

ABSTRACT

Anticipatory innovation governance describes the process of managing and directing innovation efforts anticipating the potential impacts of new emerging phenomena to deal with complex and future challenges in a systemic way. Smart Specialization is a place-based approach characterized by the identification of strategic areas based both on regional strengths and the potential of the economy. Ecosystems form the foundation of EU innovation policies. All these approaches aim for balanced long-term development. This paper also introduces the EU's Mission on Adaptation to Climate Change which focuses on supporting EU regions, cities, and local authorities in their efforts to build resilience against the impacts of climate change. The objective of this paper is to describe the potential implications of the anticipatory innovation governance model to regional innovation ecosystems supporting sustainable development. It shares early experiences and challenges of an ongoing Häme Goes into Ecosystems HGiE –project. The objective of the project is to enhance sustainable innovation ecosystem development.

Keywords: Anticipatory innovation governance, Innovation ecosystem, Regional development, Portfolio management, Sustainability

INTRODUCTION

Anticipatory innovation governance describes the process of managing and directing innovation efforts in the wider context in regional, national, or international innovation ecosystems. In 2022 OECD presented an anticipatory innovation governance model for Finland (OECD 2022a). Since 2014, European Union has recommended that European regions enhance their development activities based on Smart Specialization. Smart Specialization is a place-based approach characterized by the identification of strategic areas based both on regional strengths and the potential of the economy. It aims to enhance the prosperity of European regions by accelerating research, development, and innovation activities as well as supporting Entrepreneurial Discovery Process (EDP) with wide stakeholder involvement (EU Commission 2021).

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The current societal situation cannot be addressed through reactive and conventional governance practices. Societies and regions are facing both challenges and changes that set demand and create opportunities for new sustainable ways of working and collaboration. The anticipatory innovation governance model addresses both authorizing environment and agency mechanisms to support innovation acceleration. It addresses the creation of an enabling environment for innovation and introduces supportive mechanisms to support anticipatory innovation practices with tools, methods, and information resources.

The paper introduces the EU's Mission on Adaptation to Climate Change which focuses on supporting EU regions, cities, and local authorities in their efforts to build resilience against the impacts of climate change. The Mission's activities aim to test and deploy on the ground innovative solutions needed to build resilience (EU Commission 2022).

The paper shares the early activities of Häme Goes into Ecosystems HGiE –project which aims to enhance sustainable innovation ecosystem development among regional stakeholders and support research, development, innovation and Entrepreneurial Discovery Process at Häme Region during 2023-2024. The project aims to support activities linking regional stakeholders to national and international ecosystems. Häme Portfolio management tool, digital and hybrid collaborative workshops, and events are used to support open innovation practices. The goal of this paper is to share early experiences of the study on how anticipatory innovation governance model, regional innovation ecosystems and portfolio management practices can enhance both innovation, and sustainable development as well as adaptation to climate change.

ANTICIPATORY INNOVATION GOVERNANCE

Anticipatory innovation governance is a framework for managing and directing organizational and societal development. It involves anticipating the potential impacts of new emerging phenomena on society and the environment and taking steps to ensure that these impacts are positive and beneficial. This can include setting guidelines for innovation, engaging stakeholders in the innovation process, and monitoring and evaluating the effects of activities. The goal of anticipatory innovation governance is to promote responsible and ethical innovation and to help society to adapt and thrive in the face of rapid and emergent changes (Tõnurist et al. 2020).

OECD has created an emerging framework on how governments can start addressing these challenges by integrating anticipatory capacities into public governance and policy steering. This framework is known as anticipatory innovation governance (AIG). Adequate action starts with the willingness to embrace radical uncertainty and complexity and to put forward the right tools and governance to make sense of new developments as they emerge, adopting a prospective and proactive approach (OECD 2022a).

OECD Assessment Study on Anticipatory Governance in Finland

Finland's ambitious intention is to upgrade public administration to address 21st -century challenges. The Finnish government turned to the European

Commission and the OECD to support the building of a model that would incorporate anticipation into the broader public governance system. Finland wanted to provide a test bed for building and testing a working model for anticipatory innovation governance (OECD 2022a).

In 2020-2021, the OECD assessed the governance system in Finland. They focused on identifying assets, preconditions, and gaps within the wider public sector policy making and steering system in Finland that may hinder or help implement an anticipatory innovation approach in the Finnish context.

In 2022 OEDC published a report on the development of Finland's anticipatory innovation governance system. This was prepared in cooperation with the Ministry of Finance and the European Commission. The recommendations for Finnish anticipatory governance practices were created based on a review of literature, interviews, and workshops. The initial assessment included an action research phase with four practical case studies focusing on carbon neutrality, continuous learning, child wellbeing, and the roles of political leaders and senior public officials (OECD 2022a, OECD 2022b).

Most of the action points identified during the study are relevant to any organization wanting to establish or improve its approach to anticipatory innovation governance. In our study, we seek to apply the anticipatory governance model and lessons learned from the case studies to the development of a regional innovation ecosystem.

Mechanisms of Anticipatory Innovation Governance Model

Anticipatory Innovation Governance (AIG) model consists of two main elements authorizing environment and agency (Table 1). Authorizing environment is based on the system that provides the context for anticipatory innovation. Organizations seeking to foster anticipatory innovations can build networks and partnerships, encourage public interest and participation, create learning loops, provide evidence, conduct evaluation, clarify legitimacy, and address vested interests and cognitive biases. Stakeholders need to have agency mechanisms including institutional structures, and organizational capacity to support their activities. Agency mechanisms also include the tools, methods, data, and information resources that enable organizations to anticipate and innovate in practice. This requires examining and linking the new ways of working to the traditional management practices, including human resources, budgeting, regulation, decision-making processes, strategic planning, and portfolio and project management. These anticipatory innovation mechanisms should be integrated into dynamic monitoring and evaluation practices, aligned to decision-making cycles (i.e. strategy, planning, budget), and also to the assessment of development activities and their impact.

These AIG model mechanisms can be used as a reference model of analysis for various cross-organizational initiatives, networks, and ecosystems. To describe anticipatory innovation governance, it is key to explore how changes in authorizing environments and stakeholders' agency can create opportunities and habits for experimentation, learning, and innovation. The anticipatory innovation model can expand the scope of identified challenges,

Table 1. Mechanisms of anticipatory innovation governance model (OECD 2022).

MECHANISMS OF AUTHORIZING ENVIRONMENT	MECHANISMS OF AGENCY
Networks and partnerships Working together with leading organizations and individuals with transformative ideas	**Organizational capacity** Organizational structures that give autonomy and resources to explore transformative ideas
Public interest and participation Involving a variety of stakeholders and new perspectives, and facilitating discussions around values	**Institutional structures** Institutions that make room for experimentation and testing
Learning loops Creating feedback loops from experimentation to dynamically inform policy choices	**Alternatives exploration and experimentation** Ability to consider different alternatives that may conflict with current strategic intent
Evidence and evaluation Evaluating future options based on value and accounting for opportunity costs	**Tools and methods** Approaches to create new knowledge about possibilities, creativity of thought, and operationalization of innovations
Legitimacy Creating trust in government, experimentation and exploring futures	**Data and measurement** Reading and interpreting signals in time
Vested interest and cognitive biases Ways to address incumbents' interests and biases in thinking about the future	**Sensemaking** Uncovering underlying assumptions and making sense of trends and data

going beyond the urgent issues to test emerging, alternative, or prototyped concepts and approaches to challenge the prevailing practices and to bring long-term awareness and questions of sustainability to the present, adopting a commitment towards responsible design. Resource allocation should encourage experimentation and cross-organizational work to address complex issues (OECD 2022a).

With partnerships and networks, it is essential to assign ownership, responsibility, and resources in a flexible, but open and transparent manner. It is important to build robust levels of trust between the various stakeholders for collaboration to work effectively. It is also essential to involve more outside and international experts in the work which can help bring a diversity of perspectives and keep the focus on long-term visions (OECD 2022b).

Challenges for Anticipatory Innovation Governance

Based on the literature study the main challenges for anticipatory innovation governance are overcoming the strategic foresight impact gap by integrating futures and foresight with core strategic processes, innovation, and experimentation. Opening the development of policy alternatives connected to future challenges by systematically involving citizens and other stakeholders in future-oriented policy creation is important for collaboration and commitment. The capacity of stakeholders to reflect and act on future challenges

by increasing access to anticipatory innovation approaches and tools enables participation. Traditional government policy steering mechanisms (strategic, budgetary, and legal) should be geared toward tackling complex problems and explore of alternatives. Anticipatory governance mechanisms not only allow but encourage to address complex and long-term issues to be collectively understood and sustained across the policy and development cycles. Bridging organizational silos and creating new ways of collaboration to look at, address, and solve emerging problems is challenging, yet mandatory for sustainability Selected lessons of case studies for anticipatory innovation govenrnance are presented in Table 2. (OECD 2022b, EU Commission 2022, Stancova, K. C. 2021).

The most frequently mentioned challenges were associated with procedural issues including the budget and legislative processes, how evaluation and strategic planning were conducted and the openness, flexibility, and user-centricity of these processes. There were also organizational challenges: the effect of silos and cultural differences between organizations. Cross-organizational challenges were predominantly tackled through a network approach with working groups. These structures rarely have formal decision-making power. When conflict arises the responsibility to take decisions falls back onto more traditional structures. Challenges with policy implementation consisted of lack of continuity and available policy mechanisms, the influence of foresight on decision making, alternatives exploration, and experimentation and connections between strategies and action. The main issues with policy coordination were fragmentation, lack of coordinated action, and discussion of trade-offs among others. Also resourcing provided challenges with a lack of time and dedicated funding for anticipatory innovation and dominance of outsourcing development work and R&D. Individual challenges consisted of linear decision making, expert bias, fear of making mistakes and risk aversion, lack of open-mindedness, etc. (OECD 2022b).

Suggestions for Change

One of the areas where the Finnish Government has identified a need to improve concerns anticipation and systems approaches to complex problems (Anttila et al., 2018). Systems approaches engage with uncertainty, bridging short-term cycles and long-term ambitions. The anticipatory innovation governance model focuses on improving the governance system to increase agility and capacity to steer the system toward the effective implementation of the strategy. There must be a follow-up function that evaluates if the work is undertaken and completed. Responsibilities for achieving carbon neutrality are divided between a wide set of actors both on the national, regional, and municipality levels, making coordinated action challenging.

Most complex global issues cannot be tackled in a four-year government term nor seven-year EU funding programs. In some areas such as climate change and natural resource management, changes need to be considered decades in advance. Anticipatory innovation governance mechanisms could help bridge this gap by reducing the time to implementation (e.g. through constant iteration and testing), and provide a framework for both long-term development and accelerated implementation.

Table 2. Selected lessons of case studies for anticipatory innovation governance for innovation ecosystem development (OECD 2022).

AUTHORIZING ENVIRONMENT	AGENCY
Networks and partnerships: An ecosystem-level approach that develops the ecosystem and assigns clear roles and responsibilities for actors Connect strategic steering directly to implementation and on the ground, target groups to understand and engage with evolving phenomena Transition management across funding and development cycles and moments of dialogue	**Institutional structures:** Create organizations that allow to operationally work, and coordinate action aligned with the complex issue and the ecosystem
Public interest and participation: Support consensus across actors: in a complex system dependent on a variety of autonomous actors, participation can create legitimacy. Support the ability to engage publicly in value-based discussion and consideration of alternatives	**Organizational capacity:** Create coherence across silos Ensure the capacity to use anticipatory knowledge often hinging on the ability to work together and create common roadmaps and symbiotic action with the ecosystem
Learning loops: Identify clear processes between design and experimentation and strengthen learning from the former Create mechanisms that allow to "carry forward" learnings from the past Universally agreed concepts or definitions help mutual understanding	Alternatives exploration and experimentation: Describe a clear process from strategic visioning to experimentation; the ability to question and challenge the strategy/vision when it does not match with emerging empirical evidence and new signals
Evidence and evaluation: Legitimacy only through evidence and reporting is not sustainable if there is no push to do something with the data. Accountability for the counterfactual and opportunity costs; Address accountability for inaction	**Tools and methods:** Support the ability to integrate new tools and methodologies into established processes through structured piloting Use of anticipatory tools and methods and address capacity barriers in doing so; the ability to bring forth concrete challenges
Legitimacy: Clarify inputs (e.g. financial resources), outputs (evidence), throughputs, and impacts of ecosystem Mechanisms to prioritize urgent issues Use objective facilitation Dedicated efforts to build trust between stakeholders	**Data and measurement:** Connect anticipatory data sources in continuous sense-making and framing of issues Integrate alternative data sources into ecosystem steering functions Transparency and dynamic upgrading of indicator development and monitoring practices.
Vested interests and cognitive biases: Information asymmetries between actors need to be addressed in productive ways Address strong cognitive biases in which limitations of the current models are not understood or internalized; there need to be operational ways to address expert bias and other biases in uncertain contexts	**Sense-making:** Facilitate collective approach in delineating futures, data, and collective intelligence across a variety of actors with different interests Create structures to exchange ideas, develop mutual understanding, and support implementation

Ecosystem building could benefit from an inventory of all stakeholders and their contributions to RDI activities. This inventory could be used to review and develop the interactions between different elements of the system and identify points for strengthening collaboration or initiating it where it does not yet exist. It could also be used help actors to navigate the complex RDI system in Finland and the EU. A collaborative platform could facilitate ad hoc collaborations, exchange information, and provide support for prototypes and tests of new initiatives. A dedicated process for stakeholders to get to know each other, their respective expertise, and their priorities. Dedicated efforts to build trust between stakeholders enhance collaboration and commitment.

Coordination activities need to be separately resourced to support ecosystem management so that continuous and collective intelligence can be addressed. The collaboration between stakeholders mainly takes place in 'traditional' contexts such as committee meetings leaving limited room for discussion.

An objective facilitator for dialogues that enjoys trust from all sides can support the development of trust. Assigning responsibility and ownership of the phenomenon, making anticipatory processes between structures explicit, and addressing institutional blind spots through expansion of collective roadmapping with additional actors. Commitment to long-term, dynamic, and future-oriented activities enables the agile steering system to build up and support anticipatory innovation governance and lead the way in demonstrating how it can be implemented in practice.

THE EU MISSION ON ADAPTATION TO CLIMATE CHANGE

Adaptation is a global challenge faced by all with local, regional, national, and international dimensions. A long-term global response is needed to protect people, economies, and ecosystems. The Mission on Adaptation to Climate Change can help test and deploy solutions that might be replicable in other regions while advancing our common knowledge on adaptation. The Mission supports EU regions, cities, and municipalities in their efforts to build resilience against the impacts of climate change. It aims to help at least 150 regions and communities in accelerating their transformation towards climate resilience by 2030 and to support regions and local authorities to better understand, prepare for and manage climate risks, as well as to develop innovative solutions to build resilience.

The Mission helps regions develop their pathways to be better prepared and cope with the changing climate, and test and deploy on the ground the needed solutions to build resilience. Adapting to climate change means taking action to prepare for and adjust to both the current effects of climate change and the anticipated impacts of the future. The Mission supports innovation that can help rebuild areas impacted by extreme weather events better or reduce the impacts of such events in the first place, for example by building living environments that can stand a storm or a heatwave. With adaptation to climate change, we can restore floodplains, do vertical farming, or prototype insurance approaches.

The Mission on Adaptation to Climate Change contributes to putting the EU's adaptation strategy into practice to test and deploy on the ground the solutions needed to enhance resilience. Research, development, and innovation have a key role to play. To tap into their full potential, we must accelerate the transfer of the solutions developed by research and innovation projects to society at large. Therefore, the Mission will support testing, demonstrating, and deploying concrete solutions at a large scale. Regional and local authorities are at the forefront in Europe's transition to becoming a more resilient continent. European Members States, researchers, businesses, organizations, and citizens all have an essential role to play in supporting the regional and local pathways toward resilience (EC 2023).

EXPERIENCES FROM HÄME REGION

Since 2014, European Union has recommended that European regions conduct development activities based on Smart Specialization Strategies (S3). These strategies aim to enhance the prosperity of European regions by creating enabling conditions, accelerating research, development, and innovation activities as well as supporting active stakeholder involvement for enhancing new entrepreneurial activities. Smart specialization approach embraces open innovation ecosystems supported by collaboration (Asheim et al. 2019, EU 2021, Tukiainen et al 2020).

SmartHäme 2025 – smart specialization strategy for the Häme Region was approved by Regional Council in November 2021. Strategy implementation is supported via several development projects. Häme Goes into Ecosystem - project started in January 2023 and it aims to enhance the implementation of the regional development program Sustainable Growth in Häme 2022-2025, strengthen both research, development, and innovation (RDI) and Entrepreneurial Discovery Process (EDP) - activities across Häme Region. The aim is also to increase RDI and innovation ecosystem collaboration among stakeholders (corporate, entrepreneur, university, government, and 3rd sector) and funding together with regional, national, and international stakeholders, as well as to accelerate support for new innovative products and services, strengthen capabilities and creation of new jobs and entrepreneurial regional development practices. Activities consist of experimenting with new open/hybrid ways of working with innovation camps, Fast Expert Teams sessions, demos, and pilots, coaching for RDI /EDP funding, benchmarking, and reports on innovation ecosystem development.

The project is conducted in four work packages. The first work package focuses on the creation of a systemic operational model for regional innovation ecosystem. This paper focuses on the first work package. The second work package provides support and facilitation of ecosystem activities. The third work package develops anticipatory steering practices for RDI supported by indicators and measurement. The fourth work package includes project management and communication.

Climate adaptation is one of the cross-cutting themes of the regional development programs. The roadmap for Circular Economy for Häme was approved in early 2022 and climate targets were stated in more detail by the Management Board of Häme Region in November 2022. Based on the

preliminary survey Häme Region was invited to sign the Mission on Adaptation to Climate Change in January 2023. Häme Region climate issues are addressed in all regional strategic plans, there is a permanent steering group and proactive actions have been taken with several ongoing activities and development projects (e.g. Häme Climate Watch – a regional web-based assessment tool, Häspi, Climate Satefy). The Häme Portfolio tool has been created for follow-up and assessment of development activities. Regional Council employees are working actively together with regional stakeholders to encourage actions enhancing sustainability across Häme Region.

The Häme Portfolio can be used to support Anticipatory Innovation Governance (AGI) model implementation. It provides information on companies, public and private RDI organizations, and associations thus supporting networking and partnerships. The tool is open to all interested people, and it can enhance legitimacy and trust. The tool provides opportunities for learning and sense-making. It can be used for evaluation and assessment, and it provides long-term data for indicators. Reporting and monitoring practices are very flexible. It is possible to link development projects to strategies to follow up on implementation. Projects can be also linked to each other, and the aim is to encourage collaboration and learning also from the past. The Häme Portfolio provides a knowledge repository around long-term development activities and anticipatory issues, and it could be combined with structured transition processes including opportunities for trust-building to enable stakeholders to build on the successes and learn from the challenges of the past. The Häme Portfolio creates access to fragmented regional development knowledge, and it can help to tackle "institutional amnesia". It provides an opportunity to share information to new stakeholders who could other vice develop activities with little reference to the initiatives or achievements of prior practitioners. The Häme Portfolio aims to promote systematic ways of working, encouraging sharing and collaboration to tackle complex development issues and it offers practices for coordination and coherence (Takala et al. 2022).

CONCLUSION

Wicked problems are characteristically open-ended, inter-connected, and without clear, pre-determined pathways to solutions (Rittel and Webber, 1973). Not all developments can be predicted or reduced to manageable practices within a single domain; they must be continuously explored in real time and in an iterative manner with relevant stakeholders. Organizations both public and private across the world need to start taking even more concrete action on sustainability. Adequate action starts with the willingness and commitment to embrace radical uncertainty and complexity and to take use of the right tools and governance models to make sense of new developments as they emerge. The best way to determine the most effective responses to a problem is to test them out in practice by innovating intentionally and learning from the feedback gathered from this active process. The commitment to experimentation is at the core of the anticipatory innovation governance model. Based on the OECD study this commitment is shared by the Finnish government (OECD 2022a).

For Finland to develop and act on anticipatory strategies for carbon neutrality, the pilot case study on carbon neutrality highlighted the need to prioritize creating responsibility and urgency to act, collaboration and coherence, capacity development, and integration of green fiscal practices into the mainstream.

In the study, we will use the anticipatory innovation governance model as a tool to design, describe, manage, and assess the regional innovation ecosystem. The application of the model allows us to apply lessons learned and recommendations from practical case studies. Anticipatory innovation governance is an ongoing practice requiring continuous investment and reflection rather than isolated efforts.

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