

Inclusive Innovation Policy

Lessons from EU-US comparison

This policy brief discusses inclusive innovation policies and draws lessons from comparing the Responsible Research and Innovation (RRI) and Broader Impacts Criterion (BIC) frameworks

Inclusive innovation policies aim at providing equal opportunities for different members of society to benefit from and to participate in innovation. The rapidly increasing recognition of inclusion as a science, technology and innovation (STI) policy objective is coupled with the ambiguous nature of the concept itself. Practitioners, policymakers and the research community could benefit from a more in-depth and shared understanding of the inclusion concept.

This policy brief presents findings from comparative analysis of the European Union's and the United States' approaches to promoting inclusion as part of their STI policy frameworks. Challenges and policy implications for Finnish policymakers will also be discussed. Based on comparative analysis of the EU's Responsible Research and Innovation (RRI) and the Broader Impacts Criterion (BIC) of the US, we suggest that the RRI and the BIC are significantly different criteria in terms of their approaches to inclusion. In the EU's RRI approach, inclusion is seen more as a tool to increase the societal impact of STI through inclusive, participatory processes. The BIC approach adopted in the US emphasizes inclusion as an objective in itself. Its focus is on spreading the benefits of STI widely across society, with particular emphasis on marginalized groups (like low income and racial minorities).

Conceptual ambiguity of the inclusion concept can be detrimental to goal-oriented STI policy development and evaluation. Hence, conceptual clarity as well as demonstration of the value and significance of inclusion are important for national STI policy development. The policy brief proposes: 1) drawing lessons from the EU-US comparison to stimulate debate in the Finnish policy context, 2) societal outreach activities as potential criteria for research funding, 3) debate on the pros and cons of inclusion, 4) evaluation framework(s) development for inclusive STI policies, and 5) clarification of the inclusion concept and mapping of related concepts.

This research was conducted in the project *ELVIS – Evolving innovation space, RDI policies and impact evaluation* at the University of Vaasa. The objective of the project is to explore new ways to evaluate the impact of innovation policies and to develop comprehensive approaches and indicators for this purpose. The need for novel evaluation concepts is obvious, due to the fact that the major evolution of policies has not been complemented by novel evaluation approaches. ELVIS produces knowledge, concepts and methods that can be used in the development of Finnish STI policy and in the evaluation of its effectiveness and impact. Some methods of the project include international comparative research and rigorous case studies. The results presented in this policy brief concerning international comparative research will be later published in a book chapter as part of an edited volume, discussing the project's final results concerning evolving innovation space and impact evaluation. The project takes place during the years 2020–2022, and it is funded by Business Finland.

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ELVIS – Evolving innovation space, RDI policies and impact evaluation

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Inclusion as a policy objective has been increasing its significance in STI policy agendas globally

Introduction

Inclusion as a policy objective has been increasing in significance in science, technology and innovation (STI) policy agendas globally, and it is considered a major challenge in science and innovation activities in many countries (Planes-Satorra & Paunov 2017). There is globally growing interest in understanding the links between innovation and inclusion in order to address the challenges in sustainable development and inclusive forms of growth. Therefore, the OECD (2015) has recently raised inclusive innovation policies into discussion as "*policies that aim to remove barriers to the participation of individuals, social groups, firms, sectors and regions underrepresented in innovation activities*" (Planes-Satorra & Paunov 2017, 6). Here, the goal is to provide equal opportunities for different members of society to benefit from and to participate in innovation.

Research on STI policy highlights the rapid increase and dispersion of innovation policy objectives (e.g. Laasonen, Kolehmainen & Sotarauta 2020). This trend also concerns the development of inclusive innovation policies, which have been recently developed in different institutional and socio-economic contexts. Responsible Research and Innovation (RRI) has gained wider importance in Europe in recent years, being part of European Framework Programmes (e.g. Horizon 2020) (Burget et al. 2016) that emphasize wide stakeholder engagement for increased societal impact. In the United States, the National Science Foundation (NSF) requires grant applications to discuss the way the research will have broader societal impacts, for example, through societal outreach activities and enhancing the diversity of the workforce in STI activities and STEM (science, technology, engineering and mathematics) fields. The Broader Impacts Criterion (BIC) has become a standard policy tool for the NSF to show lawmakers and the public that it funds useful research (Bozeman & Youtie 2017; Woodson et al. 2021).

As inclusion as an STI policy objective is increasing its significance globally, it is necessary to scrutinize the concept's use and symbolic role in broader STI policy language promoting closer interaction between STI activities and society. In this policy brief, we present findings from analysis aiming to explore how inclusion as an STI policy objective is both defined and operationalized in the extant evaluation frameworks of BIC in the US and RRI in the EU. Based on the findings of this comparative analysis, we draw lessons for the Finnish STI policy context, and discuss the challenges and possibilities of inclusion as an STI policy objective.

Materials and methods

The analysis is based on a review of STI policy literature. In addition, the principles of international comparative policy analysis were utilized, paying particular attention to the contextual differences in both policy formulation and implementation (Kern & Howlett 2009). Research on the BIC and the RRI as well as the key policy documents and publications related to the frameworks were analysed. Examples of the key documents for the BIC include: *National Science Foundation's Merit Review Criteria: Review and Revisions* (2011); *Perspectives on Broader Impacts* (2014); and *Proposal & Award Policies & Procedures Guide PAPPG* (2021). For the RRI, they include: *Options for Strengthening Responsible Research and Innovation* (2013); *Rome Declaration on Responsible Research and Innovation in Europe* (2014); and *Responsible Research and Innovation: Europe's Ability to Respond to Societal Challenges* (2014).

The operationalization of inclusion as a policy objective has met various challenges, dealing, for example, with problems to define, design and implement inclusive policies

Results

Inclusion has emerged as a pivotal concept in contemporary science and innovation policy debate as a way to promote the societal impact of research and innovation. However, the notion of inclusion has not been subject to rigorous academic research in the context of STI policies. Its usage in practitioner, policy and research language is ambiguous and scattered. This can be at least partially explained by the two-sided meaning of the term. In the definition of the Oxford Dictionary of English (2021), inclusion is defined either as a) the action or state of including or of being included within a group or structure, or a person or thing that is included within a whole, or b) the practice or policy of providing equal access to opportunities and resources for people who might otherwise be excluded or marginalized. Such complexity and vagueness of the concepts leave room for a variety of interpretations throughout the policy work, from its design to implementation.

The two aspects of the definition – inclusion in the innovation process/system in general vs. inclusion of the marginalized – are clearly present in science and innovation policies, practices and research. Accordingly, the operationalization of this complex and increasingly horizontal policy objective has met various challenges, including, for example, problems in appropriately defining, designing and implementing inclusive policies (Thapa et al. 2019; Planes-Satorra & Paunov 2017). In the STI policy literature, inclusion has been approached in numerous ways and contexts, both implicitly and explicitly, such as financial aid to support research, innovation or entrepreneurship for marginalized people and groups, enhanced awareness of innovative opportunities through training, information and communication programs, and supporting lagging regions and areas to implement STI objectives (see OECD Inclusive Innovation Policy Toolkit).

In terms of inclusion of underrepresented actors in innovation processes, policymaking has become more prominent over the past years, reflecting the more general shift towards transformative innovation policy (Davis & Laas 2014). This has been coupled with more attention to the way in which innovation policies impact vulnerable actors and marginalized communities (Woodson et al. 2021). New innovations tend to primarily benefit advantaged societal groups, and therefore innovation policy instruments should consider how underrepresented groups are included in the diffusion of new innovations. Marginalization may occur due to unequal power relationships between social groups. Marginalized communities are those excluded from mainstream social, economic, educational and/or cultural life. These communities include, but are not limited to, groups excluded due to race, gender identity, sexual orientation, age, physical ability, language and/or immigration status (Baah, Teitelman & Riegel 2019).

There are some concrete benefits that can be recognized and concluded from the scientific literature considering inclusion. First, some studies have recognized that a diversity of actors and viewpoints is beneficial for innovation and creativity (e.g. Nathan 2015; Nielsen, Bloch & Schiebinger 2018). Secondly, with enhanced inclusion, the results of research and innovation are more likely to be accepted in society and to correspond with the needs of the end users (e.g. von Hippel 2009; Hewlett, Marshall & Sherbin 2013). This is well recognized in the RRI framework. In addition, inclusion in STI and research processes may improve societal involvement and equity for underrepresented groups (e.g. Foster & Heeks 2015; Planes-Satorra & Paunov 2017). With better inclusion, the full potential of society can be utilized for the benefit of STI; underrepresented groups include brilliant innovators and researchers, but sometimes they may need extra support to get on board the processes. Moreover, there is still

The RRI and the BIC set different criteria for policy

work to do in research and science to achieve equality inside professions and organizations (e.g. Hofstra et al. 2020), and inclusive approaches may help to counter this issue.

The findings of comparative research present different approaches to conceptualize and operationalize inclusion as an STI policy objective: in many ways, the RRI and the BIC set different criteria for policy. In the context of the RRI and the BIC, as well as within the broader STI policy literature, the dual meaning of inclusion is present. It refers to those who might otherwise be excluded or marginalized, and to the inclusion of various actors and stakeholder groups in innovation and diffusion processes in general.

In the RRI framework, inclusion refers primarily to involving various stakeholders (e.g. users, citizens, third and private sectors) through engagement in the research and innovation (R&I) processes, starting from the beginning (i.e. pre-project agenda setting and framing of the research problems). This ensures the inclusion of a diverse pool of viewpoints and expertise in the co-creation and decision-making processes. This, in turn, ensures that the results of R&I respond to the needs of society, and they can be widely accepted and adopted by the public. It also helps to avoid unintended negative consequences to disadvantaged members of society and to society as a whole. This is reflected in the widely recognized definition of the RRI by René von Schomberg (2012): "*Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society).*" Furthermore, the RRI emphasizes the transparency of research and its linkages to the principles of sustainable development (Shelley-Egan et al. 2020). A relevant question concerns how the inclusion of a wide range of social partners influences the focus, quality and scope of the resulting R&I projects. There is obviously a need for further research on this point.

In BIC, inclusion is approached primarily as the participation of women, underrepresented minorities, persons with disabilities, and youth in research and education activities, disseminating research results to wider audiences, and emphasizing collaboration and networking activity with external actors; that is, greater focus is on the question of who will benefit from the direct and indirect results of research, development and innovation (National Science Foundation 2021). The BIC aims primarily at benefitting STEM fields by means of concrete outcomes of the research and utilizing the whole potential of the US population by bringing marginalized groups into STEM as students or staff. For example, the BIC model requires researchers to show that their research makes a social contribution in terms of educational outreach or a broad dissemination of results (including to non-academic audiences). Outreach activities for education are thus a clear focus area of the BIC, and the model requires researchers to participate in K–12 (primary and secondary) education activities to encourage schoolchildren and underrepresented groups to get excited about science and to ensure a pipeline of excellent future scientists. A relevant question here is to what extent the choice of R&I project topics in itself limits the scope of potential benefactors.

As an example of evaluating inclusivity, an "Inclusion-Immediacy Criterion" (IIC) was designed in the US for assessing the social impact of research (Woodson et al. 2021), in order to complement the currently available BIC model by better determining how the impacts of research are distributed across social groups. In the IIC, there are three

categories of inclusion to better understand the impact of research for different user categories, that is, types of people or groups that benefit from the research: universal, advantaged/status quo, and inclusive. Universal inclusion means that innovation is targeted at everyone, independent of their status, and that everyone benefits from its results. Innovations in the second category primarily target advantaged groups, who can afford products based on them. These innovations may eventually also benefit marginalized groups, but only after being redesigned, or after advantaged groups have fully benefited from the innovation. The third category of inclusive innovations are those that are designed to help marginalized communities directly. Thus, research initiatives with inclusive impacts may include, for example, the participation of women in scientific fields where they are underrepresented, or developing new pedagogical methods for children with special needs.

The IIC and the EIIC as examples of inclusion considerations in impact evaluation

Kunttu et al. (2021) modified the IIC model to consider the inclusion of different groups on a more general level. In the Extended IIC (EIIC) model, the middle category (Advantaged/Status quo) is represented by a "Stakeholder" category, in which the impacts of the research are analysed from the viewpoint of all project stakeholders, that is, the actors for whom the project was originally designed. In the third category, the focus is extended from the marginalized groups to all individuals, including users and consumers. This helps the researchers and developers to consider the variety of the target groups in an international context. Also, the needs of marginal groups should be considered in different phases of the innovation development process. New innovations should benefit both advanced and marginalized consumers.

Table 1. Levels of Inclusion (Woodson 2021; Kunttu et al. 2021).

Inclusion levels in IIC (Woodson et al. 2021)		Inclusion levels in EIIC (Kunttu et al. 2021)	
 Universal	Universal (General societal impact) <ul style="list-style-type: none"> • Research targets everyone, regardless of status • The research is important to everyone and everyone benefits from the research 	 Universal	Universal (General societal impact) <ul style="list-style-type: none"> • Research targets everyone • The research is important to everyone and everyone benefits from the research • Sustainability considerations
 Advantaged/ Status quo	Advantaged/Status quo <ul style="list-style-type: none"> • Research primarily target advantaged groups and/or maintain the status quo • These innovations could eventually diffuse to marginalized communities, but only after they have been redesigned or after powerful groups have fully benefited from the innovation 		Impact to project stakeholders <ul style="list-style-type: none"> • Research impacts on the direct and indirect stakeholders of the project (funder, research institute, research communities, companies, ecosystems,...) • Business impacts
 Inclusive	Inclusive (to marginal groups) <ul style="list-style-type: none"> • Innovations that are designed to help marginalized communities directly 		Impact to consumers, users, and individuals <ul style="list-style-type: none"> • Impacts to individual people • User/consumer perspective • May include also specific impacts to the marginal groups

Challenges for innovation policy

Inclusion in itself and its multiple manifestations as an STI policy objective pose several challenges for innovation policy development. To generate debate and reflection, we raise the following into the discussion:

- **Challenge 1 – Conceptual ambiguity of the inclusion concept can be harmful for goal-oriented STI policy development and evaluation.** As discussed in this policy brief, in the broad STI policy context referring widely to science, technology and innovation processes and outcomes, discussions regarding who should be included in what, and in what role, are dispersed and highly contextual. It is important to shed light on this conceptual ambiguity as the co-existence of multiple definitions existing in both academic literature and policy and consultancy

circles has varied effects on the understanding of these terms and their further uptake in both the private and public sectors. The identified complexity of policy concepts and the related ambiguity are decreasing the legitimacy of STI policies.

- **Challenge 2 – Under the broad umbrella of STI policy, inclusivity as a policy objective is increasingly intertwined with other sector policy objectives aimed at increasing inclusivity.** This increases the need for horizontal policy coordination and necessitates clarifying goals and impact evaluation measures in relation to other inclusive policies (e.g. in the social policy domain). Considering the rapidly developing policy sphere, clarifying the scope of inclusive policies in the context of the broader STI framework is needed to retain focus on STI policy objectives.
- **Challenge 3 – The societal impact debate, emphasizing inclusive processes, may weaken curiosity-driven research and its role as a key source of innovation.** Especially in the EU context, STI policies are strongly emphasizing the processual view on inclusion, in which inclusion is seen as an important means to increase the societal impact of STI. At the same time, a lack of emphasis on curiosity-driven research has been recently pointed out in various countries, including decreasing funding for basic research and (over)emphasis on strategy-driven research at the expense of academic freedom. Even though collaborative research and inclusion of various perspectives are needed to increase research impact, inclusive processes should not decrease the possibilities for scientific discovery.

Proposals for action

Based on the identified lessons and challenges that innovation policies are facing, the following proposals for action are identified:

- **Proposed action 1 – Drawing lessons from the EU-US comparative analysis is a good way to stimulate debate in the Finnish policy context.** Overall, the extensive work of the OECD and the existing frameworks (RRI and BIC) may offer valuable opportunities for transnational policy learning. As an EU member, Finland operates within the RRI framework; in addition, BIC offers some good practices (e.g. diversity in STEM and other research fields, science infrastructure, extensive societal outreach activities), which are worth further consideration in the Finnish STI policy context. Finland could benchmark the best practices regarding inclusion in innovation policies and consider these lessons in the Finnish context, where inclusion as an STI policy objective is not yet sufficiently recognized. This is reflected in a lack of highly competent people in science and technology areas. Also, the underrepresentation of genders and minorities in certain areas (e.g. STEM) is remarkable.
- **Proposed action 2 – Societal outreach activities could be considered as criteria for research funding.** Following from the previous action, funding applicants (research institutions, companies, public sector actors) could be required to widen outreach activities to the education system as part of project results dissemination. Such outreach can include either direct or indirect activities. There could, for example, be specific funding calls for

outreach projects. Due to the evolving innovation space, education curricula reform is needed to improve skills in science, innovation and business in the international context. Science and innovation education should improve competences by facilitating interaction between schools, companies and research institutes. This would improve inclusion and awareness in different areas of science and technology, and foster an innovation mindset among young people. Even if this kind of reform is more related to education policy, it has a clear impact on STI policy, since the skills and innovation mindset of future generations are developed within the education system. Therefore, it is essential that STI policy and education policy have close interaction between each other.

- **Proposed action 3 – STI policy renewal needs to debate the pros and cons of inclusion.** This also relates to balancing between different value-based policy objectives: a) effective innovation stimulation by means of policy, or b) maximal inclusion, even at the cost of less impactful innovation policy. Reflecting the broader ongoing discussions related to mission-based innovation policies, inclusion could also be considered as a STI policy mission. However, contextualization of inclusion within the national STI policy framework is needed. This means exploring and defining the value and role of inclusion in the given context of STI policy. Relevant forums need to be identified for further discussion.
- **Proposed action 4 – Development of evaluation framework(s) to support informed decisions and transparency.** In terms of measuring the impact of inclusive policies, more understanding is still needed regarding the actual evaluation of effectiveness and various types of impacts. Among multiple approaches from the BIC context are, for example, indicators for measuring the presence of students from underrepresented groups in STEM courses and majors and measuring demographics data for STEM faculty and hiring patterns by rank, gender, ethnicity, tenure and salary in universities (Campbell, Thomas & Stoll 2009; Clewell & Fortenberry 2009). In the RRI framework, indicators include, for example, the amount of citizen science projects, percentage of women as PIs in projects, share of research projects with educational deliverables, and the involvement of the public in RRI policy development and policies (European Commission 2015; see also Stilgoe 2019). In addition to extant indicators, there is a need to better capture the qualitative impacts of inclusive processes, as inclusion as a policy objective and inclusion as a means of societal impact imply different evaluation focuses. Furthermore, the frameworks should differentiate between project-level and policy-level evaluation and definitions of the concept of inclusion. Without this, it is not possible to define clear goals that are necessary for evaluation.
- **Proposed action 5 – Development and clarification of inclusion concept and mapping of related concepts.** As presented in this policy brief, the usage of inclusion concept in practitioner, policy and research language is ambiguous and scattered. Thus, clarifying policy concepts and objectives is needed in relation to overlapping STI concepts and sector policy objectives. For example, the concepts of open and citizen science, co-creation and design thinking have various interlinkages concerning toolkits and shared objectives that could be utilized in further policy development.

Considering inclusion within the broader STI policy framework is important in the forthcoming value-based considerations reframing the scope of Finnish STI policies in a mission-oriented direction

Next steps

At the moment, new innovations tend to primarily benefit advantaged groups. These innovations may eventually also benefit marginalized groups, but only after being redesigned, or after advantaged groups have fully benefited from the innovation (Woodson et al. 2021). In the Finnish context, equality between different groups is in an international comparison generally considered to be good, despite some areas needing improvement, such as a gender wage gap (OECD 2021). However, considering inclusion within the broader STI policy framework is important in the forthcoming value-based considerations reframing the scope of Finnish STI policies in a mission-oriented direction. Inclusive societal development has gained prominence as a cross-sectoral policy objective due to increasing inequalities witnessed at different scales and contexts of societal development (George et al. 2019; OECD 2015). STI policymakers clearly need to be aware of this development. In addition to asking what it is that STI policies can do to increase inclusive societal development, it is equally important to recognize the boundaries of this already broad policy umbrella in order to keep a focus on STI policy goals. Innovations are increasingly developed in an international context, yet inclusion needs to be considered also in the national context, where local marginalized groups can be better considered in innovation policies and processes.

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