How inclusive is innovation policy?

Insights from an international comparison

A working paper

Isaac Stanley, Alex Glennie and Madeleine Gabriel

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Summary

This paper aims to make a practical contribution to emerging conversations across policy, academic and practitioner communities about designing more inclusive innovation policies. It aims to help policymakers who are interested in understanding how innovation policy can:

- **More effectively direct innovation towards social challenges.**
- **Encourage the benefits and the risks of innovation to be shared more equally.**
- **Broaden participation in innovative jobs and sectors, with a focus on particularly excluded groups.**
- **Involve more people in processes of priority-setting and regulation that govern how innovation happens and its impact.**
- **Manage the trade-offs and tensions between promoting economic growth and promoting inclusion.**

Our starting point is an analysis of the overarching innovation policy statements or strategies of ten countries. Specifically, our aim has been to develop a framework to analyse the ways in which innovation policies can be 'inclusive', find out how far and in what ways a sample of ten countries address different dimensions of inclusion in their high level innovation policies, and identify implications for policymakers and areas for further exploration.

Defining inclusive innovation policy

Drawing on our research, we propose that innovation policies may be inclusive if they are concerned with:

- **Who benefits from innovation**: They understand the range of impacts that innovation has on different social groups and attempt to meet the needs of a broad section of society, including communities who might be marginalised or excluded;

- **Who participates in innovation**: They seek to encourage broad participation in terms of who is employed as an innovator or in innovative sectors, so that it is not only the preserve of the most privileged; and

- **Who decides on the priorities and manages the outcomes of innovation**: They actively involve a wide section of society in setting priorities for innovation policy, and seek to regulate and govern innovation in a way that fairly shares its benefits and mitigates its risks.

Based on this, we propose the following working definition for inclusive innovation policies:

Inclusive innovation policies are directed towards ensuring that the benefits and the risks of innovation are more equally shared. These policies will actively consider whose needs are met by innovation and how excluded social groups could be better served, focus on initiatives that promote broad participation in innovation, and take a democratic and participatory approach to priority-setting and the governance of innovation.

To start analysing the extent to which existing innovation policies engage with the three dimensions of inclusion set out above, we have developed a framework to compare the approach of countries with respect to: the overall objectives of policy; the specific goals or missions to which policies are directed; initiatives to increase participation in innovation; and initiatives to involve more people in the governance of innovation policy.

Inclusive innovation policy framework

Dimension	Indicator of an inclusive approach
1. Overall objectives Do the overall aims of innovation policy involve more than economic growth?	1.1. Objectives are not exclusively related to economic growth, but take account of a wider range of socially desirable outcomes, such as sustainability, equality, health and wellbeing.
2. Direction of innovation Whose needs are being met?	2.1. Support for innovation addressing 'societal' challenges and needs. 2.2. Support for innovation addressing the particular needs of excluded groups.
3. Participation in innovation Who participates in innovation?	3.1. Measures to increase the participation of underrepresented and excluded social groups in innovation and innovative sectors of the economy 3.2. Measures to increase the participation of disadvantaged or lagging regions and districts. 3.3. Measures to promote innovation in low-productivity or low-innovation sectors. 3.4 Measures to involve civil society and social economy organisations in innovation.
4. Governance of innovation Who sets priorities, and how are the outcomes of innovation managed?	4.1. Measures to broaden participation in innovation priority-setting. 4.2. Measures to broaden participation in the regulation of innovation. 4.3. Measures to mitigate the risks of innovation. 4.4. Measures to promote fair distribution of the benefits of innovation.

Key findings

Our analysis of the innovation policy statements of ten countries (Brazil, Canada, Chile, France, Germany, Israel, Norway, South Africa, Sweden and the United Kingdom) found that:

- There is a growing emphasis on social impact as a direct goal of innovation policy. All of the countries we reviewed explicitly acknowledge the need for innovation policy to deliver social as well as economic benefits.

- All ten countries aim to direct innovation towards some socially beneficial goals, with the most commonly observed themes being connected to the environment, health and urban sustainability.

- Initiatives to encourage wider participation in innovation are common, but focus on some groups more than others. For example, efforts to promote better gender representation are more common than efforts to promote the inclusion of those on low incomes.

- Inclusive governance is less evident than the other dimensions, but a number of countries at least report having involved a wide range of stakeholders in preparing their innovation policy strategies.

We conclude that governments around the world are starting to think more systematically about the range of impacts that innovation may have on society, but do not yet have a clear idea about how to implement an inclusive innovation policy agenda effectively. Trade-offs between objectives of innovation policy are not adequately addressed within policy statements, and opportunities to create inclusive innovation processes and outcomes are not fully exploited.

Implications for policy and implementation

Building on our findings, we have identified four areas where new ideas, practices and institutions can help governments to develop and improve the effectiveness of inclusive innovation policies:

1. **Improving understanding of how innovation - and innovation policies - impact different groups**

   Innovation policies can be more inclusive by incorporating an analysis of the range of positive and negative impacts that innovation has on different groups, and by creating interventions that will serve the needs of those who are particularly excluded. For this, policymakers will need to invest in gathering better, new, and more timely forms of data on the outcomes of innovation and emerging technologies for different social groups. They will also need to develop methods of assessing the impact that different research and innovation policy interventions may have on these outcomes.

2. **More effectively addressing the trade-offs that may be required in efforts to broaden participation in innovation**

   Innovation policies can be more inclusive by effectively addressing some of the trade-offs involved in encouraging broader participation in innovation. Many governments have an 'excellence-led' approach to funding innovation, which can conflict with initiatives that prioritise helping particularly excluded groups to participate in innovative processes or be employed in innovative sectors. Managing these choices requires tools to help understand both the economic and social costs and benefits of different possible policy interventions, and criteria that will help policymakers make decisions about the interventions that will lead to the most inclusive outcomes.

3. **Opening up priority-setting processes around innovation policy**

   Innovation policymaking can be more inclusive by involving more people in decisions taken about the goals towards which innovation is directed, and the way in which it is governed. Here, there are a range of creative and experimental approaches for involving the public that governments could explore. As a crucial part of this, greater transparency about how governments use the data gathered from public engagement is required.

4. **Developing institutional mandates and capacity to deliver inclusive innovation policies**

   Making existing innovation policies more inclusive will require a strong mandate from government, and a clear distribution of responsibilities across different relevant innovation policy delivery bodies - including, but not limited to, national innovation agencies. This will require more effective cross-government collaboration. To promote more inclusive governance of innovation, initiatives and structures should also be developed that aim to systematically address the risks associated with innovation, and promote a fairer sharing of its benefits.

1

Introduction

New evidence is challenging the assumptions that the benefits of innovation will eventually trickle down to everyone.[1] Moreover, innovation itself is still a rarified activity - recent research in the United States, for example, has shown that children with parents in the top 1 per cent of the income distribution are ten times more likely to become inventors than children with below median income parents.[2] This suggests that innovative potential is being lost to the economy and society, while indicating that the direct financial benefits of participating in innovation are mainly confined to narrow social groups.

In this context, policymakers and researchers have begun to consider the roles that innovation might play in an inclusive growth agenda, and how it can be supported in a way that delivers the greatest social benefits. Nevertheless, as yet, there is no comprehensive approach to integrating ideas about inclusion into innovation policy. There are also some tensions between these ideas and mainstream innovation policy thinking. For example, the idea that innovation policy should seek a more equal distribution of the benefits of research and innovation is at odds with an emphasis on concentrating funding in areas of existing 'excellence'.

Our aim with this paper is to make a practical contribution to these emerging conversations within and across policy, academic and practitioner communities about what more 'inclusive' innovation policies could look like and what might be needed to further develop an inclusive innovation policy agenda.

In Section 2 of this paper we draw on the literature to look more closely at definitions and determinants of 'inclusive' innovation policies. We propose a definition of inclusive innovation policy and an initial framework for assessing how 'inclusive' innovation policies are.

We then apply this framework to analyse the high-level innovation policy strategies of ten different countries. Section 3 briefly outlines our methodological approach, while Section 4 describes the main findings of our comparative document review. Our focus is on the overall objectives of policy, the goals to which policy is directed, efforts to broaden participation in innovation processes, and initiatives to include more people in priority-setting and governance processes.

In Section 5, we conclude by outlining the main implications of our analysis for policymakers, and suggest areas for further development of practice.

This is a working paper to set out our initial thinking on these issues. We hope it will spark debate, and welcome ideas for revision and improvement.

2

What does inclusive innovation policy look like?

2.1   How innovation policy thinking has evolved over time

If we define innovation broadly as new ideas that are put into practice and create some kind of value, then innovation policy can be characterised as *"all combined actions that are undertaken by public organizations that influence innovation processes"*.[3]

The term 'innovation policy' came into regular use in the 1990s, but public intervention to promote innovation has a much longer history.[4] Tracking its evolution over time, Johan Schot and Ed Steinmueller describe two 'frames' that have informed innovation policymaking since the 1950s.[5] The 'innovation for growth' framing, emerging after the Second World War, suggested that the state can stimulate innovation and growth by investing in scientific research and development. Since the 1980s, a second framing has emerged - 'national systems of innovation'- which recognises the need for effective connections between different actors in the innovation ecosystem. Meanwhile, differences between places and sectors have been analysed using concepts relating to regional systems of innovation[6] and sectoral systems of innovation.[7]

These frames continue to dominate innovation policy thinking and practice, but they have also been challenged from several directions.

One critique focuses on the possibility that current innovation models destroy more value than they create. Referring in particular to the activities of large digital technology companies, Luc Soete argues that 'conspicuous innovation' – constant small improvements to technologies that involve little change in value but that encourage higher unnecessary consumption - can have harmful impacts on both the environment and society.[8] In a similar vein, Joanna Chataway and colleagues make a link between the trajectory of large-scale, capital-intensive and environmentally irresponsible innovation and an apparent 'uncoupling' of economic growth and social development.[9]

Another critique of dominant innovation models has come from emerging economies such as India and the development studies community. Thinkers such as RA Mashelkar argue that the need to lift huge numbers of people out of poverty creates a compelling case for 'inclusive innovation', described as *"affordable access of quality goods and services creating livelihood opportunities for the excluded population"*.[10] Literature on inclusive innovation in developing countries also emphasises the relevance of innovation processes and the power relationships within them. Christopher Foster and Richard Heeks, for example, argue that innovation becomes more inclusive when solutions are designed not just for, but with, the people they aim to serve; and that ultimately innovation is most inclusive when the context in which it takes place is itself inclusive.[11]

A different line of thinking questions dominant ideas about the role of the public sector. Mariana Mazzucato, for example, argues that governments can (and should) set the direction of innovation and shape markets, rather than limiting themselves to fixing market failures. This focus on 'directionality' has come in tandem with the idea that research and innovation should be directed towards 'challenges' facing society. The Lund Declaration emerging from the Swedish EU Presidency in 2009, for example, stated that Europe's research and innovation policies should focus on 'Grand Challenges',[12] a position later reflected in the EU's Framework Programme for Research & Innovation (R&I), Horizon 2020. The 'challenges' narrative has more recently been accompanied by a revival of interest in 'mission-driven' innovation policy. Advocates argue that in contrast with the technological missions of the past (like putting a man on the moon), modern-day missions should focus on 'wicked' societal problems such as climate change.[13]

As innovation becomes more oriented towards societal goals, this challenges dominant ideas about the types of organisations that innovation policymakers should be concerned with. Rather than focusing mainly on research institutions and firms, civil society becomes relevant too. The social innovation literature emphasises that innovation can also come from citizens and civil society,[14] while advocates of open innovation stress the importance of interaction between governments, researchers, firms and citizens in innovation processes.[15]

The last decade has also seen the emergence of a focus on more inclusive governance of innovation, through the 'responsible research and innovation' (RRI) agenda. This promotes public involvement in innovation governance - for example, through dialogues between researchers and citizens - as a way to ensure that new technologies are developed in a way that is socially responsible and promotes wellbeing.[16]

2.2 The emergence of an 'inclusive innovation policy' agenda

Policymakers are now much more concerned with the direction as well as the pace of innovation. This has led to the development of new innovation policy approaches that consider the social purpose of innovation, the distribution of its benefits and the roles (and power relationships) of those involved in innovation processes.

Schot and Steinmueller, for example, propose the concept of 'transformative innovation policy', as a new, third framing. They argue that innovation objectives need to be more closely aligned with social and environmental objectives, and that governments should involve people in decisions about the future direction of innovation before investments are made, rather than simply managing negative impacts of innovation after they occur.

Some other researchers and policymakers have started to use the term 'inclusive innovation policy'. However, there is not yet consensus on what this means. Some definitions, for example, emphasise the need for innovation policy to consider whose needs are being met by innovation, with an emphasis on making innovations accessible to low-income and marginalised groups:

"Inclusive innovation is the means by which new goods and services are developed for and by marginal groups (the poor, women, the disabled, ethnic minorities, etc.)... New government policies.. must encourage formal innovation systems to focus on the poor; help low-income actors to adapt, diffuse and use innovations; and work to address structural roadblocks."[17]

Others focus more on spreading participation in innovation to underrepresented people and places. The OECD, for example, describes as 'inclusive' innovation policies that support 'disadvantaged individuals to engage in innovation activities':

Inclusive innovation policies *"aim to remove barriers to the participation of individuals, social groups, firms, sectors and regions that are underrepresented in innovation activities in order to ensure that all segments of society have the capacities and opportunities to successfully participate in and benefit from innovation"*.[18]

Some bring these two dimensions together. In a paper on 'distribution-sensitive innovation policies', Amos Zehavi and Dan Breznitz note that policies can focus on production of innovation (who takes part) as well as consumption (who innovation is for).[19]

Meanwhile, a paper written to inform the Canadian government's inclusive innovation policies argues that: *"Inclusive innovation requires that opportunities for participation in innovation be broadly available and that the benefits of innovation be broadly shared…Policies that would facilitate both innovation and inclusiveness have a strong case for implementation."*[20]

Advocates of inclusive innovation policy tend to agree that innovation policies can and should promote growth while also promoting a broader distribution of its benefits. They also recognise that tensions may arise between these objectives. The Canadian thinkpiece referenced above, for example, argues that *"policies that might promote innovation at the expense of inclusiveness would require that the trade-off be managed or mitigated."* While some definitions focus on spreading the benefits of innovation to poor, marginalised or disadvantaged groups, others talk about 'broad' or 'wide' sharing. Within these definitions the benefits of innovation include products, services and solutions, but also the fruits of economic growth (for example, increased wages) and other outcomes, such as better health.

2.3 A working definition of inclusive innovation policy

For the purposes of this working paper, we propose the following definition of inclusive innovation policy:

Inclusive innovation policies are directed towards ensuring that the benefits and the risks of innovation are more equally shared. These policies will actively consider whose needs are met by innovation and how excluded social groups could be better served, focus on initiatives that promote broad participation in innovation, and take a democratic and participatory approach to priority-setting and the governance of innovation.

This definition builds on, but goes further than, some of the other ways in which 'inclusive innovation policies' are characterised. We incorporate a focus on equitable outcomes, rather than simply stating that benefits should be 'widely' spread. Theoretically, innovation policies that spread benefits 'widely' could still increase inequalities (if, for example, only the richest 50 per cent of people benefited).

We also incorporate a call for more inclusive governance of innovation, which has been less commonly emphasised in other definitions of inclusive innovation policy. This recognises that power to influence priorities and decision-making is fundamental in ensuring that innovation benefits a wider section of society.

We invite discussion and feedback on this definition as we develop this area of work.

2.4 A framework for inclusive innovation policies

In preparing this paper, our aim was to find out to what extent, and in what ways, innovation policies are currently engaging with these three dimensions of inclusion - direction, participation and governance - and to compare across a spectrum of countries to look for interesting differences of approach.

Drawing on our insights from the literature, we constructed a framework to enable analysis of the different ways in which innovation policies may be inclusive. Looking at both the overall objectives of policy, as well as the three dimensions of policy considered above, we identified a number of indicators to look for:

Table 1: Inclusive innovation policy framework[21]

Dimension	Indicator of an inclusive approach
1. **Overall objectives** Do the overall aims of innovation policy involve more than economic growth?	1.1. Objectives are not exclusively related to economic growth, but take account of a wider range of socially desirable outcomes, such as sustainability, equality, health and wellbeing.
2. **Direction of innovation** Whose needs are being met?	2.1. Support for innovation addressing 'societal' challenges and needs. 2.2. Support for innovation addressing the particular needs of excluded groups.
3. **Participation in innovation** Who participates in innovation?	3.1. Measures to increase the participation of underrepresented and excluded social groups in innovation and innovative sectors of the economy 3.2. Measures to increase the participation of disadvantaged or lagging regions and districts. 3.3. Measures to promote innovation in low-productivity or low-innovation sectors. 3.4 Measures to involve civil society and social economy organisations in innovation.
4. **Governance of innovation** Who sets priorities, and how are the outcomes of innovation managed?	4.1. Measures to broaden participation in innovation priority-setting. 4.2. Measures to broaden participation in the regulation of innovation. 4.3. Measures to mitigate the risks of innovation. 4.4. Measures to promote fair distribution of the benefits of innovation.

3

Our methodological approach

Our research objective for this paper was to better understand the ways in which existing innovation policies are 'inclusive'. To do this, we selected the innovation policy statements of ten countries to review and compare across the indicators set out in the framework: Brazil, Canada, Chile, France, Germany, Israel, Norway, South Africa, Sweden and the United Kingdom.

Table 2: Documents reviewed

Country	Document title	Year	Responsible ministry or department	Page length
Brazil	National Science, Technology and Innovation Strategy (Portuguese)	2016	Ministry of Science, Technology, Innovations and Communications	136
Canada	Budget 2017: Innovation and Skills Plan	2017	Ministry of Finance	278
Chile	Plan Nacional de Innovacion 2014-2018 (Spanish)	2015	Ministry of Economy, Development and Tourism	16
	Productivity for Inclusive growth: 2014-2018 roadmap	2014	Ministry of Economy, Development and Tourism	54
France	National Strategy for Research 2015 (French)	2015	Ministry of Education, Higher Education, and Research	48
	Nouvelle France Industrielle (French)	2016	Ministry of the Economy and Finance	112
Germany	The New High Tech Strategy	2014	Federal Government	58
Israel	Innovation in Israel 2017	2017	Israel Innovation Authority	42
	Endless possibilities to promote innovation	2017	Israel Innovation Authority	39
Norway	Research for Innovation and Sustainability Strategy 2015-2020	2015	Research Council of Norway	40
	Research for Sustainable Societal and Industrial Development: The Research Council of Norway's Strategy for Sustainability, 2017–2020	2017	Ministry of Economy, Development and Tourism	36
South Africa	Strategy Plan for the Fiscal Years 2015-2020	2015	Department of Science and Technology	68
Sweden	Swedish Innovation Strategy	2012	Government Offices of Sweden	62
	Join us in co-creation	2017	Government Offices of Sweden	16
United Kingdom	Industrial Strategy	2017	Department for Business, Energy and Industrial Strategy	256

We compared these documents to identify the presence or absence of measures, initiatives or institutions corresponding to each indicator in the framework. An indicator was scored as present when the document specifically mentioned the existence of a relevant measure or initiative, rather than a statement simply indicating that the issue was considered to be important.

Further details of our methodological choices and limitations can be found in an Annex at the end of this paper.

4

In what ways are national innovation policies inclusive?

In this section we set out the key findings from our analysis of the innovation policy statements of ten countries. We start with observations on their overall objectives. We then explore each of the three dimensions in our framework: direction, participation and governance.

4.1 The overall objectives of innovation policy

Social goals are present within the overall objectives of innovation policy strategies

To a varying degree, every strategy we looked at included social objectives as well as economic ones. For example, Canada's *Innovation and Skills Plan* in its 2017 Budget focuses on *"good jobs, healthy living, strong communities, and better opportunities for future generations"*.[22] Norway's *Research for Innovation and Sustainability Strategy* asserts that *"societal challenges must be given an increasingly greater role in setting the research agenda, precisely because research and innovation are becoming a more critical part of solving the challenges facing trade, industry and society at large"*.[23] Brazil's *National Science, Technology and Innovation Strategy* has a goal of *"creating and distributing wealth compatible with the aspirations of its population"*.[24]

Most of the strategies we looked at incorporated a concern for generating growth that is shared more evenly across society. Some explicitly use the language of inclusive growth. One of Chile's key recent innovation policy documents is titled *Productivity for Inclusive Growth*.[25] 'Inclusive social development' is one of the primary aims of the South Africa's Department Department of Science and Technology.[26] Canada's strategy states that the country's future success *"depends on building an economy that is as inclusive as it is innovative. The Government's long-term plan to grow the economy will only succeed when everyone benefits from the opportunities that result."*[27]

In other cases, the idea of inclusive growth is embedded in the concept of promoting sustainability. Germany's *New High-Tech Strategy* describes efforts to develop *"a model for sustainable development that generates innovation from a position of responsibility for the present generation and future generations"* and suggests that *"scientific breakthroughs and innovative solutions create opportunities to harmoniously combine dynamic economic growth and social cohesion and... efforts to protect natural resources"*.[28] The French *National Strategy for Research* describes an effective innovation process as being one that will *"in the long-term benefit all members of society in a sustainable development perspective"*.[29]

There were some interesting rhetorical differences in emphasis between different strategies we looked at though. Some focused particularly on the intrinsic importance of social objectives for innovation. For example, the South African Department of Science and Technology's *Strategy Plan for the Fiscal Years 2015-2020* aims to use knowledge and innovation to promote 'inclusive social development', specifically mentioning their role in addressing poverty, unemployment and inequality.[30] Chile's *Plan Nacional de Innovacion*

2014-2018 describes innovation as a *"fundamental pillar of ensuring inclusive growth"*.[31] Germany's strategy commits to promoting innovation and emerging technologies *"not just for their own sake but for their ability to provide clearly recognizable social benefits"*.[32]

Others frame the role of innovation as being more to deliver competitive advantage and prosperity, with social benefit being a positive simultaneous outcome. For example, the goal of the French 2015 *National Strategy for Research* is to *"ensure [France's] place among the leading research powers and mobilize that dynamism towards scientific, technological, environmental and societal challenges of the 21st century"*.[33] And the UK's recent *Industrial Strategy* sets out to tackle four global 'grand challenges' - relating to AI and data, the ageing society, clean growth and the future of mobility - in order to improve living standards and the country's productivity.[34]

4.2 The direction of innovation policy

The environment and health are the most common 'social' themes for challenges

All of the strategies we looked at contain objectives relating to the environment and natural resources, while nine strategies describe health-related challenges and goals. Eight strategies contain initiatives linked to urban sustainability and housing. Work is a less common focus, appearing in the strategies of only four countries (Norway, UK, Germany and France). Seven countries include initiatives directed towards broadly defined 'social' objectives, coalescing around the concepts of 'society' and the 'social' and typically addressing a miscellaneous set of themes. For example, the Brazilian strategy features a set of initiatives directed towards 'social technologies', and the French strategy includes a challenge on 'innovative, integrative and adaptive societies'.

Table 3: Social challenge areas, by country

Country	Environment and natural resources	Health	Urban sustainability/ housing	Work	Broadly defined social' objectives
Brazil	●	●	●		●
Canada	●	●	●		
Chile	●				●
France	●	●	●	●	●
Germany	●	●	●	●	
Israel	●	●			
Norway	●	●	●	●	●
South Africa	●	●	●		
Sweden	●	●	●		●
United Kingdom	●	●	●	●	●

Within some challenge areas - notably those relating to urban sustainability and housing - there is attention to the particular needs of the poor, but this is not consistent across all themes

Within the two most common themes - the environment and natural resources, and health - specific attention to the needs of the economically excluded (i.e. those on low incomes) is relatively rare. The Canadian strategy is the only one to mention addressing the particular environment-related challenges of a specific social group (see Box 1). Only four out of the nine countries which feature health-related challenges mention issues particularly affecting economically marginalised citizens. For example, the South African strategy refers to supporting *"food security, health and wellness based on indigenous knowledge systems in three marginalised communities"*.[35]

However, in some of the other themes we see more consideration of the needs of the economically excluded. For example, five of the eight countries whose innovation policies include a focus on urban sustainability and housing identify the particular needs of economically marginalised individuals or groups within this theme. Norway's initiative on sustainable cities, regions and transport systems draws attention the *"substantial and often increasing social contrasts"* that characterise cities, and includes a call for knowledge to *"develop adequate housing and basic services; promote sustainable, safe and accessible transport for all"* and *"encourage participation and inclusion"*.[36]

Within challenges addressing loosely defined 'social' objectives, this emphasis is even more frequent. For example, the Brazilian *"social sciences and technologies"*[37] initiative is framed as a contribution towards *"the eradication of extreme poverty and the reduction of social inequalities"*, and includes calls to develop solutions in the fields of *"education, health, transportation, energy, housing and security"* for those who lack access to services and live in *"precarious conditions in Brazilian cities"*.[38]

BOX 1: Canada's initiatives for First Nations and Inuit communities[39]

As part of its commitment to respond to climate change and promote resilience, Canada's 2017 Budget contains initiatives designed to identify the needs of a historically economically-excluded group within Canadian society - First Nations and Inuit communities - and to involve them in efforts to encourage innovation that will address their needs.

It proposes to provide C$18 million over the five years from 2017-2018 to conduct monitoring activities, risk assessments, education and public awareness campaigns to implement a climate change and health adaptation programme targeted at First Nations and Inuit communities. This is the only initiative that singles out a particular group for attention; the rest of the commitments relating to health and climate adaptation are framed broadly as being for the benefit of all Canadians.

The Budget also commits nearly C$85 million to a programme that will draw on indigenous knowledge to support the development of climate change adaptation measures. This is intended to increase the resilience of First Nations and Inuit communities, and may also create opportunities for the participation of these groups in innovation that will help to address specific challenges they will face as a result of climate change.

There are also signs of variation between countries as well as themes. Some countries address the needs of the economically marginalised in a relatively high proportion of the themes they address. The needs of the economically disadvantaged feature in all three of the directional themes covered by Canada, and three out of four of the areas for which both Brazil and South Africa have challenges. In others, such as Sweden, the proportional attention to economically marginalised citizens is considerably lower.

4.3 Participation in innovation

Initiatives promoting the participation of women are common; people on low incomes or with disabilities are less frequently targeted

Eight out of the ten countries we looked at (the UK, Norway, Sweden, Germany, Canada, South Africa, Israel, and Brazil) mention efforts to promote the participation of one or more underrepresented social groups in innovation.

Among these initiatives, the group most commonly targeted is women, followed by ethnic minorities and immigrants and people with low incomes. Although a focus on these groups is common to most countries, some patterns emerge. Norway, Germany and Israel all aim to boost women's participation, but none of these countries feature participation initiatives targeted at low-income groups. Conversely, Brazil includes no initiatives for women or ethnic minorities, but focuses instead on boosting participation among people who are economically marginalised.

Table 4: Targets of social group participation initiatives, by country

Country	Women	Ethnic minorities/ immigrants	Low-income/ economically marginalised	People with disabilities
Brazil			●	
Canada	●	●	●	●
Chile				
France				
Germany	●	●		
Israel	●	●		
Norway	●			
South Africa	●	●	●	●
Sweden	●	●	●	
United Kingdom	●	●	●	●

Sectoral policies frequently address less innovative traditional industries and SMEs, but only rarely address less innovative service sectors

Commitments to promote innovation within traditionally low-productivity sectors are present within eight of the country strategies we looked at. However, there is variation in terms of the type of low-productivity sector receiving attention.

Most common, featured in some form in the strategies of all eight of these countries, are initiatives to encourage innovation and technology transfer within traditional (mainly manufacturing) industries. For example, Israel's Advanced Manufacturing Division offers incentive programmes to encourage productivity-boosting technology development among low- and medium-technology sector industrial enterprises, and manufacturing-focused industrial enterprises with low investment in R&D.

Six countries include measures to encourage innovation and technology adoption among traditionally low-tech or less innovation-focused SMEs and micro entrepreneurs. Chile, for example, features a Business Development Centres programme to increase productivity in SMEs, and another programme to strengthen the capabilities of small neighbourhood businesses.

Less common (featured in only three countries) are initiatives explicitly directed towards firms in less innovative service sectors. A notable example is the UK strategy, which features the commitment to work with service sectors with *"lower than average productivity levels"*, including hospitality, retail and tourism, in order to raise productivity and the earning power of employees.[40]

Table 5: Targets of sectoral participation initiatives, by country

Country	Traditional industries (i.e. manufacturing)	SMEs and micro entrepreneurs	Other low-productivity sectors (e.g. hospitality, retail)
Brazil	●	●	
Canada			
Chile	●	●	●
France	●		
Germany			
Israel	●		
Norway	●	●	●
South Africa	●	●	
Sweden	●	●	
United Kingdom	●	●	●

Initiatives to increase participation in innovation tend to either seek to increase 'equality of opportunities' or 'equality of outcomes', with different implications for inclusion

We found two main types of policy initiatives to increase participation in innovation across the strategies we looked at. One set can be characterised as 'equality of opportunity' measures, focusing on promoting fair access to roles in innovative sectors or occupations. In Israel, for example, an incentive programme for high tech startups owned by ethnic minority entrepreneurs aims to improve the chances of minorities to participate in high productivity sectors of the economy. There are also examples of more 'upstream' measures, such as an initiative in the Canadian strategy designed to make home internet access more affordable for low-income families. These measures primarily aim to provide more equal opportunities to innovate and compete, rather than to guarantee that the benefits of innovation are more equally shared. Other participation initiatives we identified looked more at how to increase 'equality of outcomes', by aiming to increase the innovative capabilities of excluded or lagging sectors (and therefore improving outcomes for the people employed within them).

These two types of measures have different implications for the economy and society. While increasing ethnic diversity among technology entrepreneurs may improve access to existing innovation opportunities, a mass programme to boost innovation within an entire low-productivity sector may increase the incomes and conditions of a substantial segment of society.

Regional measures feature in some form in all country strategies, but the degree of emphasis on 'place-based' policies varies considerably

Initiatives to promote the participation of lagging regions in innovation also feature in some form across all the strategies we looked at. However, there is significant variation in the emphasis that place-based approaches receive. Two countries mention broad initiatives such as 'regional incentive measures' (Norway) or regional 'future industry ambassadors' (France), with a rhetorical emphasis on acting 'throughout the country'.

In other strategies (Brazil, Canada, Chile, Germany, Israel, South Africa, Sweden and the UK), there is a more explicit emphasis on investing in deprived regions and reducing inter-regional inequality. For example, the German strategy highlights an 'Entrepreneurial Regions' campaign that is designed to promote support in the development of clusters and centres of innovation excellence in the eastern German *Länder*, as well as targeted measures to support structurally weak areas in the western *Länder*. It has also established a number of task forces to improve regional economic structures.[41] And the UK's strategy identifies 'Place' as one of its five key pillars of action, with a range of concrete initiatives to develop *"prosperous communities throughout the UK."*[42]

BOX 2: The UK's approach to 'place'

'Place' is a central theme of the UK's Industrial Strategy. Alongside the objectives set out for the country as a whole, the Strategy commits to developing Local Industrial Strategies that build on local strengths and can deliver economic opportunities. It also makes a series of financial commitments, including creating a £1.7 billion Transforming Cities fund that will invest in intra-city transport.

While the strategy's regional and local focus is framed primarily as being about increasing productivity and economic prosperity, attention is also paid to the social drivers of growth. The strategy outlines a number of education and skills initiatives designed to develop knowledge and capabilities in underperforming areas. For example, £42 million is allocated to pilot a

Teacher Development Premium that aims to provide high quality professional development for teachers in areas of the country that face the greatest challenges in driving pupil outcomes.

The strategy describes investments in both underperforming regions and in areas that are already highly competitive and productive, such as the Cambridge-Milton Keynes-Oxford corridor: commitments include an 'ambitious' programme of infrastructure, housing, business investment and development. However, it does not comment on whether and in what ways there might be tensions or trade-offs between taking an 'excellence-based' or a 'place-based' approach to funding, and how decisions might be made about which should be the priority.

Civil society and social economy organisations feature in some form in most of the strategies

The strategies of seven of the ten countries we looked at describe measures designed to promote innovation among civil society or social economy organisations, or involve them in innovative economic activities. Some countries have fairly general - if prominent - commitments in this area. For example, Norway's *Research for Sustainable Societal and Industrial Development* strategy observes that it will *"facilitate good cooperation between the public sector, civil society, industry and research environments to develop new, resource-efficient solutions for society"* but with few details of how this will work in practice.[43]

However, others are clearer in their statements of intent. Sweden's *Innovation Strategy* often refers to the need for civil society actors to be involved in solving societal problems in new ways, emphasising that *"these processes often take place in the borderland between industry, the public sector and civil society"* and that *"it is of great importance to better understand and develop the conditions for social innovation and social entrepreneurship"*.[44] Israel has a similar focus, and the programmes of the Societal Challenges Division of the Israel Innovation Authority (Israel's main innovation policymaking and implementation body) are designed for both companies and non-profit organisations interested in developing technologies, products and services to address social and environmental challenges.[45]

More specific initiatives to prompt wider collaborations and involvement in innovation can be found in Germany (its *New High-Tech Strategy* refers to the recent creation of a central information platform to encourage citizen science projects[46]) and in the UK (which has established an Inclusive Economy Partnership to *"address some of the biggest challenges that face our society, encouraging collaborations between business and civil society, enhancing the UK's reputation as a global hub for social investment"*).[47]

4.4 The governance of innovation policy

Initiatives to broaden involvement in priority-setting are common, but split between one-off consultations and more systematic processes

With respect to the governance of innovation policy, we found the most widespread practice is involving citizens in discussions about strategic priorities for policymaking. Eight out of the ten countries we looked at mention this explicitly.

However, there is variation in terms of the depth of this commitment. In Canada, Norway, Sweden and the UK, inclusion has taken the form of a consultation process or activities to feed into the strategy itself, with no mention of ongoing opportunities to shape innovation priorities. In Canada, for example, *"to ensure that the Innovation and Skills Plan would meet the real needs of Canadian workers and businesses, the Government undertook broad consultations, and heard from more than 100,000 Canadians, including industry leaders, academics, Indigenous leaders and other orders of government"*.[48]

In Brazil, Chile, France and Germany (see Box 3 below), we found evidence of more ongoing and in some cases systematic efforts to engage citizens and others in shaping the direction of innovation policy.

Box 3: Citizen engagement on science and technology in Germany

The German government has frequently taken direction from the public on important policy issues, such as its development of the 'Energiewende' initiative to pivot away from nuclear power and develop more renewable sources of energy in response to public activism.[49] This focus on citizen engagement is also evident in its *New High-Tech Strategy*.

Embedding innovation in society is an explicit goal of the strategy, which asserts that the Government will *"enhance the options and opportunities for interested citizens to help shape innovation-policy processes...including formats for citizens' dialogues and public participation in research"*.[50] For example, one creative approach proposed in the strategy is the creation of a 'Haus der Zukunft': a 'house of the future' and special exhibition venue that will allow

policymakers, scientists, businesses and the public to explore, test and debate the value and the purpose of new ideas and technologies. The 'Futurium'[51] is due to open in spring 2019.

The German government sees citizen engagement on science and technology as essential rather than desirable, and states that this consultation should inform all stages of the innovation chain and agenda-setting processes, rather than being one-off. However, the framing of its efforts around citizen engagement relate more to the provision of good information in order to generate widespread public acceptance of new technologies.[52] The *New High-Tech Strategy* has less to say about the potential negative outcomes of innovation, and how the Government might respond to critical feedback from these engagement processes.

In contrast to agenda-setting, initiatives to increase public engagement in shaping the regulation of innovation are relatively rare. The French strategy contains a research strand to support the development of an 'effective and equitable' multi-level governance model for 'new energy systems', while the German strategy refers to the Federal Government's

intention to create a 'strategic foresight process' which *"assesses and calls attention to future societal and technological developments"* and *"directly involves the country's citizens"*.[53] These ideas are not developed in much detail though.

There is evidence of policy initiatives to address the risks of innovation or promote a fair distribution of its rewards, but these remain fairly nascent

Four of the countries we looked at mentioned initiatives to mitigate the potential risks of innovation, and four (although not all the same ones) described efforts to spread its benefits more evenly.

Table 6: Initiatives to mitigate risks and spread benefits of innovation, by country

Country	Measures to mitigate risks of innovation	Measures to spread benefits of innovation more evenly
Brazil	●	
Canada	●	●
Chile		
France	●	●
Germany	●	
Israel		
Norway		●
South Africa		●
Sweden		
United Kingdom	●	●

We observed a difference between initiatives intended to mitigate the risks and costs relating to particular areas of innovation, and more cross-cutting initiatives designed to tackle risks in a broader sense. For example, the French strategy describes a research programme that aims to identify the risks of agricultural innovations, while the Brazilian strategy identifies a need to strengthen regulatory systems and increase public and worker safety in relation to the nuclear industry.

More broadly framed initiatives include the UK's plans to set up a Centre for Data Ethics, an advisory body with a mission to *"ensure that our regulatory regime fully supports...the ethical and innovative use of data and AI"*.[54] In Germany, a focus on 'Work in a digital world' is intended to support the development of measures and frameworks for 'good digital work' so that *"people – and not technology – can continue to be the central focus in workplaces"*.[55]

In terms of initiatives to share the benefits of innovation, three countries (the UK, France and Norway) include 'intermediate' solutions to the problem of unequal distribution. For example, the UK government recently commissioned a review of the future of work as part of its intention to be *"among the first countries to identify the best way to ensure everyone benefits from this technological revolution"*.[56] The only strategy containing substantive (if far from comprehensive) initiatives in this area is that of South Africa. However, most of the initiatives we identified are research programmes or commissions which aim to identify mechanisms of sharing the benefits of innovation, rather than the mechanisms themselves.

5

Making innovation policies more inclusive

In this paper, we propose the following definition of inclusive innovation policies:

Inclusive innovation policies are directed towards ensuring that the benefits and the risks of innovation are more equally shared. These policies will actively consider whose needs are met by innovation and how excluded social groups could be better served, focus on initiatives that promote broad participation in innovation, and take a democratic and participatory approach to priority-setting and the governance of innovation.

Our comparative analysis of the innovation strategies of ten countries indicates that there is clear support for the idea that innovation policy should be directed towards achieving a range of social and environmental goals. It also shows that policymakers are thinking about the three main dimensions of inclusive innovation we have included in our definition – direction, participation and governance – in different ways and to varying degrees. However, strategies and initiatives to ensure that the benefits of innovation are equally shared and that the risks are mitigated remain relatively nascent at this point.

This section outlines a number of key policy implications we have drawn from our research, and makes suggestions for how to practically take this agenda forwards.

1. Improving understanding of how innovation - and innovation policies - impact different groups

A number of the innovation policy strategies that we looked at consider the needs of specific groups in society that are excluded or underrepresented in relation to some thematic social areas. We found this to be more prevalent in initiatives directed towards housing and urban sustainability or to more broadly defined 'social' objectives, but less so in initiatives directed towards the environment and natural resources or health.

Innovation policies can be more inclusive by incorporating an analysis of the range of positive and negative impacts that innovation has on different social groups across all social challenge areas, and by creating interventions that will serve the needs of those who are particularly marginalised. For this, policymakers will need to invest in gathering better, new, and more timely forms of data on the outcomes of innovation and emerging technologies for different social groups. They will also need to develop methods of assessing the impact that different research and innovation policy interventions may have on these outcomes.

Ideas to explore

- **Gathering data on inclusive innovation**. There is limited available data to help policymakers understand who benefits from innovation, and key measurement tools - like the European Innovation Scoreboard and the Global Innovation Index - do not currently include measures of inclusion. Some projects are trying to fill these gaps. For example, the European Commission has recently funded the EURITO initiative[57] to develop timely, trusted and relevant indicators for innovation policy using big data and data analytics, and inclusive innovation is one area that the project focuses on. Innovate UK, the UK's innovation agency, has launched a project to measure black and minority ethnic (BAME) participation in business innovation. Further investment in exploratory projects like these could be an effective first step in developing better ways to measure inclusive innovation.

- **Measuring progress towards meeting inclusive innovation goals**. Further investment in metrics is needed to support and incentivise the development of inclusive innovation policies, as well as to hold governments to account for their commitments. Inspiration could be taken from initiatives such as the Migrant Integration Policy Index,[58] a tool with more than 150 policy indicators to measure and compare approaches to integrating migrants in all EU Member States, Australia, Canada, Iceland, Japan, South Korea, New Zealand, Norway, Switzerland, Turkey and the USA. Here, governments could work individually or collaboratively to develop a shared set of 'inclusive innovation indicators' against which to assess progress.

2. More effectively addressing the trade-offs that may be required in efforts to broaden participation in innovation

In all the strategies we looked at, we found examples of initiatives which aim to increase participation in the innovative economy i.e. increasing the number and diversity of those employed in innovation and innovative sectors. We also noted a difference between 'equality of opportunity' initiatives (which aim to increase the opportunity of particular groups to participate) and 'equality of outcomes' initiatives (which generally aim to increase innovation within low-productivity and low-pay sectors). Both types of initiative may have a beneficial impact, but it is important for policymakers to be clear on the potential implications of each approach; changing the composition of the 'included' group is not the same as attempting to substantially expand that group.

Our findings also highlight a need for policymakers to develop better ways of addressing possible tensions between 'place-based' policies that seek to close gaps between regions, and 'excellence-based' funding opportunities that risk entrenching them by generating much faster growth rates in a few selected places. The policy statements we reviewed give no indication about which approach they believe should be prioritised, and how these and other potential trade-offs should be managed.

Ideas to explore

- **Using analytical tools to support decisions about investments in innovation**. Policymakers would benefit from support in more effectively analysing the potential impacts of policies on inclusion and weighing up the costs and benefits of different approaches (for example, investing in regions with existing R&D strengths versus investing to boost innovation in lagging regions). Here, governments could explore the value of applying social cost-benefit analysis models to innovation policy and investments in new technologies (as opposed to tools that just focus on likely economic impacts) in a more rigorous way.

3. Opening up priority-setting processes around innovation policy

Support for involving the public and others in innovation policy agenda-setting features in many of the strategies we reviewed. However, in most cases this appeared to be a one-off consultation to inform the development of the strategy, with little transparency about how feedback may have shaped or changed the thinking of policymakers. In addition, we found relatively little evidence of attempts to include more people in decisions about regulating innovation and new technologies.

There is scope to explore ways of encouraging more systematic forms of public involvement in decision-making and governance relating to innovation policy. A greater focus on inclusive governance is fundamental in addressing the trade-offs and tensions that will necessarily arise in discussions around inclusive innovation policies. While better data on inclusion can help inform decision-making, the question of 'who should benefit' is ultimately political - it cannot be resolved only through analysis, but also requires conversation and consensus-building.

Ideas to explore

- **Experimenting with creative approaches to engaging the public in decision-making processes about innovation policy**. Public engagement in policymaking relies on a set of tried and tested methods, such as focus groups, citizens' juries, and public dialogues. While effective for some purposes, these methods also have limitations - they tend to engage small numbers of people, provide little opportunity for wider community input, and require a significant commitment of time and resource. Governments should experiment with new approaches to public engagement, focusing on digital tools, creative methods (such as games, theatre and storytelling), and bottom-up approaches (since community-led engagement can surface issues that do not appear in exercises led by institutions). Ideas to explore include funding and mentoring programmes for community-led public engagement in order to help governments develop a better understanding of how the public can be more involved in the development of science and innovation policies.

- **Increasing transparency about how consultation and engagement is used to shape innovation policies**. Policymakers should report back on how they use the information gathered from consultation and engagement activities, describing how it has changed thinking and practices, or explaining why certain ideas are not practical or feasible. The What We Heard[59] website (produced by the Canadian government following a widespread consultation on the future of their international assistance policies) is one example of how this can be done in an innovative and accessible way. An idea to explore here could be the development of a public engagement scorecard - with governments being required to state how stakeholders and citizens contributed to the evidence collected for the policymaking process leading to major investments in research and innovation, and then being scored against a common framework.[60]

4. Developing institutional mandates and capacity to deliver inclusive innovation policies

Government innovation agencies are often (although not always) the primary delivery bodies for government innovation strategies. Yet their missions and programmes are generally connected to supporting entrepreneurship and economic growth. Few of the strategies we looked at considered whether existing policy structures and practices are capable of implementing more inclusive innovation policies, and how they would measure the progress and impact of these policies.

We also observed that while an awareness of the need to identify and share the risks of innovation is present in many of the strategies, there are few examples of well-developed institutions or initiatives to systematically address these risks, and promote a fairer sharing of the benefits of innovation. Creating these structures and processes will be important for policymakers seeking to develop inclusive innovation policies.

Ideas to explore

- **Developing cross-government policies to support inclusive innovation**. Given its cross-cutting nature, inclusive innovation could benefit from an approach similar to the 'policy coherence for sustainable development' framework, which aims to minimise contradictions between and better coordinate policies across different government departments that impact on developing countries.[61] While this review has focused on statements of innovation policy, delivering wider benefits from innovation implies a clear need for coordination across policy areas - including education and skills, transport and infrastructure, housing and regional development, among others - to jointly define and work towards the implementation of inclusive innovation policies. It will also require assessment of which bodies - at both the national and regional level - are best placed to support the delivery of inclusive innovation policies.

Annex:
Methodological issues and clarifications

Sampling strategy

A first challenge in identifying a sample was that innovation policy statements are often distributed among different documents, and the responsibility for innovation policy can be held by multiple agencies or policymakers. We chose countries that had a single document (or set of clearly connected documents) which could be characterised as a clear statement of innovation policy (either as a single focus or as part of a broader policy strategy, such as an industrial strategy). The statements of policy were sourced from the Innovation Policy Platform,[62] and we conducted supplementary web research to ensure that they were the most recent and relevant documents.

Given the relatively small sample size, we decided to limit the review to high- and middle-income countries. We aimed to achieve reasonable geographic diversity, and our final sample included 'regional innovation leaders' from five of the seven regions identified in the *Global Innovation Index*.[63] While language limited some of our choices, where possible, documents were reviewed in their original language (France, Chile and Brazil).

We also focused on countries that had published innovation strategies in 2012 or later and where documents were still relevant for the current political administration. For this reason we did not include the strategies of, for example, the United States (where the Trump administration has not published a clear statement of its innovation policy) or India (where there is no recent strategy to replace the 2012-2017 Five Year Plan document).

Document analysis approach

In order to assess the different dimensions of inclusion, we analysed documents to identify the presence or absence of measures, initiatives or institutions corresponding to each indicator. Rather than relying on the presence or frequency of key terms, the texts were closely read and their meanings were analysed. An indicator was scored as present when the document made mention of a relevant measure or initiative, rather than simply a statement implying importance. For example, indicator 4.1 ('Measures to broaden participation in innovation priority-setting'), was scored as present if a document mentioned a measure, initiative or institution to promote wider participation. However, if a strategy contained only a statement of the importance of wide participation, without mention of any substantive initiative, the indicator was scored as absent.

Most indicators could be considered discretely, with analysis requiring a relatively straightforward process of reading the documents to determine the presence or absence of initiatives relevant to each one. Some indicators, however, were more intertwined, and required attention to additional layers of detail. For example, capturing relevant information for indicators 2.1 ('Support for innovation addressing 'societal' challenges') and 2.2 ('Support for innovation addressing the particular needs of excluded groups'), required first identifying relevant directional initiatives within a strategy, and then identifying which of these directed attention towards the need of various excluded groups.

Limitations of our approach

Using strategy documents as a source of data on innovation policies enabled us to draw out valuable cross-country comparative insights, but our approach has a number of limitations. We compared the rhetoric of different governments and the substance of their commitments with regard to initiatives promoting inclusivity, but were not able to accurately gauge the depth of their commitment to these initiatives. This would require a more detailed analysis of budgetary data. We were also not able to assess whether governments have followed through on the commitments made in their high-level strategies, or the impact of these initiatives. Both of these would be valuable areas for future research.

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58 Victoria Embankment
London EC4Y 0DS

+44 (0)20 7438 2500

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