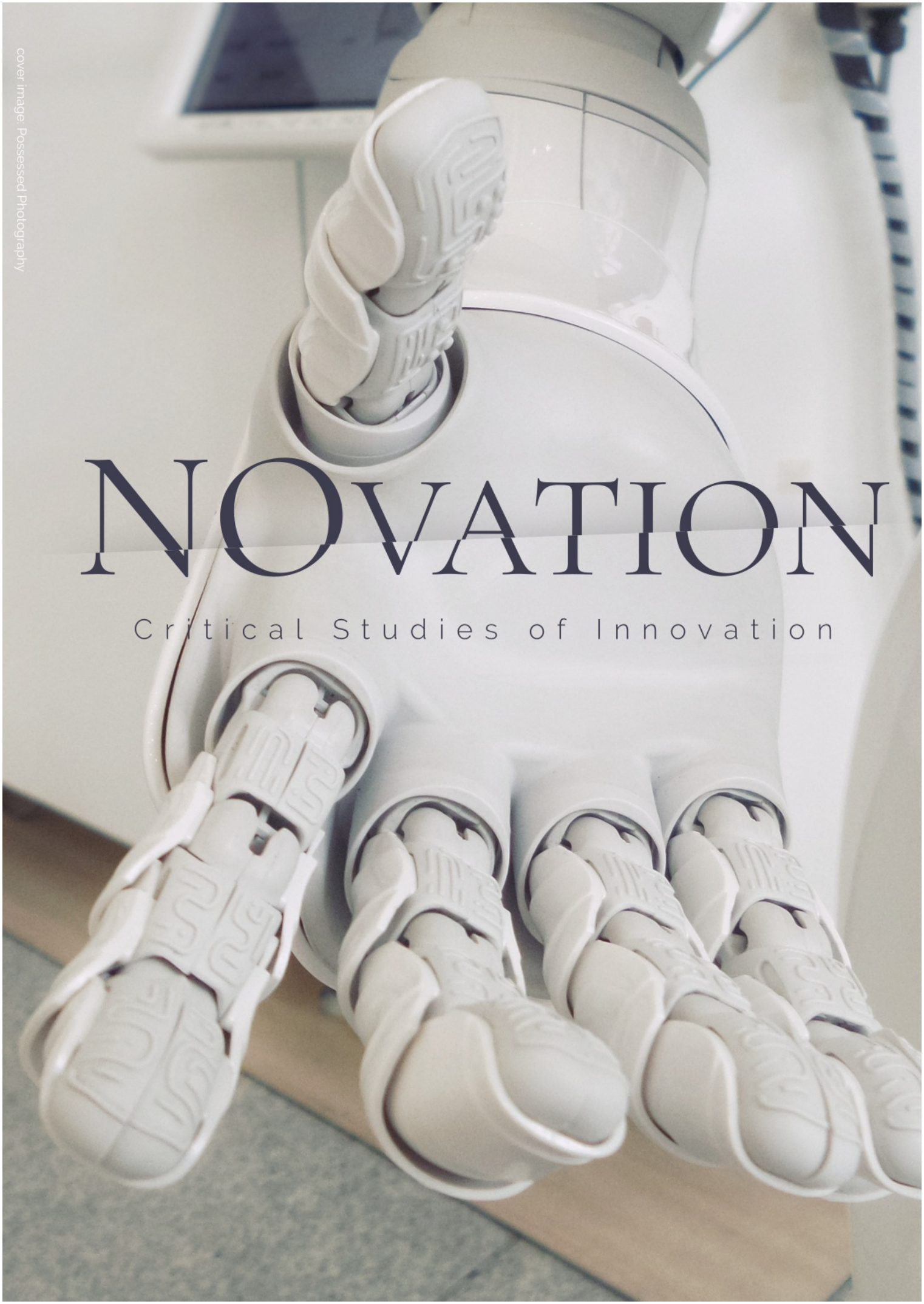

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Perspectives on innovation governance:

challenges and dilemmas

Guest Editors

Monica Edwards-Schachter, University of Burgos

Hector Gonzalo Ordoñez-Matamoros, University of Twente

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The international journal *NOvation: Critical Studies of Innovation* was launched to contribute to the rethinking and debunking of innovation narratives in STS (Science, Technology and Society) and STI (Science, Technology, and Innovation). There is a need to critically examine studies of innovation and obtain a clearer portrait of innovation than the depiction this field has been accustomed to. The journal questions the current narratives of innovation and offers a forum for discussion of some different interpretations of innovation, not only its virtues, but also its implications. In this sense, NO refers to non-innovative behaviors, which are as important to our societies as innovation is. Failures, imitation and negative effects of innovation, to take just some examples of non-innovation or *NOvation*, are scarcely consi-dered and rarely form part of theories of innovation.

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novation@ufpr.br

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Editorial Presentation

Perspectives on innovation governance: challenges and dilemmas

Monica Edwards-Schachter[1]
and Hector Gonzalo Ordoñez-Matamoros[2]

[1] University of Burgos, Spain.

[2] Universidad Externado de Colombia, Bogotá, Colombia; University of Twente, The Netherlands.

Innovation governance has risen to prominence as a central theme in nurturing and framing contemporary debates surrounding innovation policies. This Special Issue features contributions that critically examine the "complexities of governance and the governance of complexity" (Jessop, 2020), aiming for a deeper understanding of innovation governance processes. The selected papers build on some discussions from the inaugural international *NOvation* Online Forum (held from 15 to 17 September 2021) around innovation policies and governance practices. The issue focuses on a critical approach to dilemmas and challenges associated with innovation governance in the context of sustainability transformations and its intricate relationships with ethical, social, economic, and environmental concerns.

Despite the abundant literature on the concept of governance, the term governance of innovation or innovation governance becomes diffuse and used in many different ways and perspectives. Some authors refer to innovation policy governance (Kuhlman, 2000; Fagerberg & Hutschenreiter, 2020), and "innovation" usually appears as part of the governance of STI and as a less visible guest into the governance of science and technology, and the governance of change of socio-technical systems (Borrás & Edler, 2014, 2020).

Innovation governance can be understood as a response to the multiplied innovation forms embedded in an intensified social complexity (Edwards-Schachter, 2021). In the praxis arena, governance of innovation refers to a plethora of governing styles and practices involving actors from private, public, and third sectors in a context of multiple and intertwined changes between different modes of state intervention and societal autonomy

(Lindner *et al.*, 2016; Borrás & Edler, 2020). Overall, it can be seen under the lenses of specific forms of collective reflexivity embracing innovation processes and practices strongly interlinked with "the ability of a society to develop and implement collective choices" (Pierre & Peters, 2001). In that sense, the notion encompasses changes in governing either in a new government process, policy, or regulatory framework, or the development of policy instruments that creates the conditions for collective action (Rhodes, 1996; McGuinnis, 2011). More specifically, innovation governance represents a system to align goals, allocate resources, and assign decision-making authority for innovation, which entails the generation of structures, models, and practices marked by complex interdependence at multiple sectors and levels, i.e., local, national, or international (Stocker, 1998; Jessop, 1998, 2020).

Over the past few decades, the concept has gained significant traction, particularly in the corporate sector, as organizations seek to enhance their innovation governance practices. This shift reflects a broader trend toward proactive and anticipatory policymaking designed to effectively address complex challenges and uncertainties (Stoker, 1998; Diercks *et al.*, 2019; Tõnurist & Hanson, 2020). Prominent examples include the emergence of Claims to Responsible Innovation (RI) and Transformative Innovation Policy (TIP), both of which are regarded as essential tools for addressing societal issues and driving systemic change toward sustainability (Diercks *et al.*, 2019; Ludwig & Macnaghten, 2020). Additionally, there is a growing emphasis on enhancing civil society participation through a surge in Public Engagement (PE) initiatives. These endeavors are connected to the proliferation of governance labs and methods aimed at fostering optimistic discussions on participatory citizenship within public policy and innovation processes (e.g., the role of governance labs and Public Sector Innovation Laboratories, PSIL).

However, some critical voices have raised concerns about the political and ideological dimensions of the governance discourse, questioning to what extent prevailing neoliberalism and pro-innovation biases shape public narratives and governance perspectives (e.g., Godin *et al.*, 2021). More than a decade ago, Newman (2005) highlighted how Western and European governments contributed to the gradual dismantling of the traditional social contract between the state and citizens, paving the way for collaborative governance that emphasizes citizen responsibility. More recently, Kuhlmann & Ordonez-Matamoros (2017) and Ordonez *et al.* (2021) have drawn attention to biases and governance imbalances in emerging economies, highlighting numerous barriers linked to the non-neutrality of transformative policy innovation and the politicization of policy decisions.

In summary, innovation governance encompasses a wide spectrum of perspectives on innovation, mostly focused on innovation systems and interrelationships and the conditions that facilitate thriving innovation. It involves the establishment of decision-making processes and structures that support the management of innovation activities, encompassing the definition of clear roles, responsibilities, and guidelines for innovation, as well as ongoing monitoring and evaluation of innovation performance.

The following papers provide different aspects of governance that are not generally taken into account in the literature, paying attention to the barriers and conundrums that arise in innovation processes and practices.

In the first paper, Centeno & Pinzón-Camargo (2022) bring to the fore the dilemmas and limitations of innovation governance in the Latin American context that emerge from the acritical uptake of theoretical perspectives deeply rooted in scholar traditions in the global North. By examining three in-depth case studies the authors critically assess the underlying assumptions of the dancing metaphor as a heuristic to study the interplay between innovation practice (I), policy (P), and theory (T) in Colombia (Kuhlmann *et al.*, 2010; Kuhlmann & Ordóñez-Matamoros, 2017). They identify gaps in the metaphor and provide insights into who controls the "music" of innovation, the relationships between different actors, the potential exclusion of grassroots innovation movements, and the influence of established industrial actors.

The lessons drawn from the cases highlight the significance of time in the innovation policy dance. Long-term processes show shifts between second-order learning and first-order learning, altering the dynamics of debate and the prevailing policy objectives. In some instances, like Cases 1 and 2, newcomers initially engage in second-order learning but eventually transition to a first-order learning process as they become more familiar with the dance. The persistence of certain policy goals and music over extended periods can indicate stability or institutionalization, but it can also reflect conflicting path-dependent situations that hinder deeper learning. Additionally, the cases underscore the multi-level nature of the policy dance, revealing alignment and misalignment patterns across different levels within the realms of policy, theory, and innovation practice. Tensions within the policy domain often arise, impacting the coordination of policy goals and competencies across levels due to misalignment between national policy objectives and local innovation practices. The interactions among innovation policy, theory, and innovation practice across various governance levels highlight the role of politics in shaping these interplays and learning processes. Otherwise, actors associated with P, T, and I are not confined to their

respective realms and they can shift roles or belong to multiple realms simultaneously. For instance, in Case 2, policy actors and theory actors took on the role of practice by implementing STI projects funded by royalties. Conversely, in Case 3, policy was carried out by actors with strong academic backgrounds, blurring the lines between academia and policy. These cases reveal the complexity and intertwining of roles when actors are called upon or invited to participate in the dance. This dynamic nature of actors in the innovation dance means that they can readily switch from theory to practice to policy, or even assume different roles simultaneously. Overall, the paper provides new insights into grasping the specific dynamics of innovation governance in emerging economies, shedding light on some crosscutting opportunities and gaps for the innovation policy dancing metaphor across different innovation I-P-T situations.

Aligned with this critical perspective, the second paper (Pinzón-Camargo *et al.*, 2023) analyses the appropriation and implementation of the transformative innovation policy (TIP) approach in Colombia. Such policy framework is acquiring prominent popularity within scholar and policy circles in the Global South, with an active diffusion and impulse given by global partnerships such as the Transformative Innovation Policy Consortium (TIPC) composed of innovation policy agencies from Colombia, Finland, Mexico, Norway, South Africa and Sweden, and coordinated by the Science Research Policy Unit (SPRU) at the University of Sussex in the United Kingdom and its sister project Deep Transitions coordinated by SPRU and the Centre for Global Challenges of University of Utrecht.

TIP refers to a comprehensive approach aimed at driving significant and long-term changes in sociotechnical systems, encompassing institutions, practices, infrastructures, networks, and other elements that underpin the intersection of society and technology. These innovations are designed to not only transform unsustainable production patterns but also promote essential cultural and behavioral shifts.

The article focuses on the process of adoption of the transformative STI policy approach and the Sustainable Development Agenda by the National STI governmental agency in *El Libro Verde 2030* in 2018. The analysis considers both the vision of a sustainable and inclusive future and transformations in broader institutions, practices, infrastructures, and networks, among other elements that sustain those realms where society and technology are embedded in the Global South (Ordoñez-Matamoros *et al.*, 2021). The authors identify the set of public actions and tools employed to facilitate and mobilize resources toward the creation, diffusion, and utilization of knowledge and innovation, with a focus on achieving long-term sustainability and inclusivity. The case reveals the existen-

ce of enablers, barriers, and constraints in its practical implementation in Colombia, as well as the contrast between policy as "political business" and the aspiration of transformative STI to effectively foster major long-term changes in sociotechnical systems.

A third contribution from Völker *et al.* (2023) tackles the problem of translation of the Responsible Research and Innovation (RRI) concept into practice and challenges of innovation governance raised from a territorial perspective. The authors put in value a shift towards evaluative inquiry, moving away from the concept of "implementation" and towards "translation." In this view, RRI is seen as a general principle that must be translated to function effectively and make sense within diverse scales and contexts. It acknowledges that RRI practices and principles need to be adapted and contextualized to suit different situations, rather than assuming a one-size-fits-all approach.

Based on the concept of "maintenance" that builds on the "maintenance work" of pre-existing networks, relationships, and repertoires of collaboration, they realize a comparative analysis focusing on various territorial RRI projects situated in three clusters in Lombardy, Catalonia, and Brussels-capital regions. The analysis explores how RRI is translated and implemented, examining the organizational and institutional context that influences their execution through different key approaches: a) Participatory and Deliberative Governance, where RRI is interpreted as modes of governance that emphasize participation and deliberation, aiming for transformative change; b) Citizen Science, where RRI takes the form of citizen science projects, involving citizens in scientific research activities, and c) Participatory Agenda Setting and Citizen Assembly, where RRI is enacted through participatory agenda setting and plans for citizen assemblies.

The analysis also delves into the changing concepts of citizenship brought about by these translations, highlighting the challenges and dilemmas associated with them. Additionally, the text underscores the significance of "maintenance" work in innovation discourses and practices, emphasizing that this often overlooked aspect is essential for enabling certain translations of RI. The study shows how contrasting translations of RRI are entwined in different regional clusters, how these innovation ecosystems contribute to shaping the particular translations, and how –in turn– they themselves are reshaped in the process. This perspective allows for a deeper exploration of the diverse conceptualizations of impact by different actors. The paper gives useful insights on processes to find a balance between transformation and maintenance with different methods to strengthen deliberative democracy in the development of territorial innovation strategy.

The fourth paper from Özbek *et al.* (2023) takes a novel approach to examining the use of procurement as a means of governance, focusing on the practical implementation of Public Procurement of Innovation (PPI). They propose a practice-based critique that emphasizes the dynamic and relational aspects of PPI, enabling a critical assessment of the work performed by public buyers to achieve the aims and expectations of public procurement policies and strategies. Drawing on the conceptual framework of constructive market studies by economic sociology and science and technology studies (STS), the authors challenge the notion that economic markets are pre-existing entities. Instead, they view markets as outcomes constructed through various elements such as rules, regulations, technical devices, discourse, and infrastructure. Within this framework, PPI is examined as part of concerned markets, where market components like choice, competition, and price are used as solutions to collective interest issues, particularly in sectors like healthcare. To illustrate their approach, the authors analyze a specific PPI case study involving the procurement of radiation therapy equipment for a university hospital in Stockholm, Sweden. They accentuate the discussion on the little attention paid to procurement-induced innovation and institutionalization of PPI as a complex process involving multiple actors. The study shows the complexities that stem from the particular requirements of the demand and the suppliers, the articulation of different actors' perspectives, motivations, and practices, the search for consensus and normative alignment around a particular health problem as well as the intended and unintended consequences of PPI—more specifically, different actors' claims about the value of PPI realized in practice. In doing so, the study overcomes the dominant discourse in the innovation policy literature on PPI and opens up for broader questioning of the potentiality of market-based instruments such as PPI to govern innovation, without delimiting an analysis of its consequences to a simplified dichotomy between success or failure (cf. Aschhoff & Sofka, 2009; Guerzoni & Raiteri, 2015).

This case study reveals the extensive efforts made by contracting authorities to implement PPI and highlights the disparities between initial expectations and the actual value of innovation achieved. Additionally, the paper offers a fresh perspective on PPI by focusing on its practical implementation and its impact on innovation governance, contributing to a deeper understanding of the complexities and challenges associated with using procurement as a tool for innovation.

In the fifth contribution, Falardeau (2023) considers the influence of historical elements on the governance dynamics of mountain territories and tourism innovation. By presenting a multiple case study of innovation governance in protected areas in three touristic regions (Aspen (United States), Mont-Orford (Canada) and Banff (Canada), the

author examines the duality between conservation and development, showing how the territories' characteristics contribute to or constrain social innovation -as identification of societal needs- and vice versa, how social innovation contributes to territorial dynamics. The paper shows that touristic and protected mountain territories are not "on the fringes" of innovation; rather, their characteristics (rugged relief, relative eccentricity, exceptional character) make them the breeding ground for distinctive social innovation confronted with the leitmotif of innovation "at any cost", imbued with the prevailing pro-innovation bias.

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I bet you don't look good on the dance floor

Re-examining the innovation policy dance metaphor in the case of Colombia

Juan Pablo Centeno[1], Mario A. Pinzón-Camargo[2]

[1] Facultad de Finanzas, Gobierno y Relaciones Internacionales. Universidad Externado de Colombia, Colombia. Technopolis Group, United Kingdom, Colombia. *juan.centeno@uexternado.edu.co*

[2] Facultad de Finanzas, Gobierno y Relaciones Internacionales. Universidad Externado de Colombia, Colombia. *mario.pinzon@uexternado.edu.co*

ABSTRACT

Innovation heuristics offer guidance on how to navigate through the complex dynamics of innovation governance. However, further discussion is needed on the premises of such analytical tools to inquire on their implications on innovation policy and practice. This paper builds on the innovation policy dance metaphor to better grasp the ever-changing interplays (or dance) between innovation practice (I), policy (P) and theory (T). We critically assess the basic underlying assumptions of this metaphor, by examining the extent to which its heuristic pretensions are relevant in the Latin American context. To do so, we explore three illustrative cases in Colombia, shedding light on some crosscutting opportunities and gaps for the dancing metaphor across different innovation I-P-T situations. Some derived lessons suggest that dancing occurs *within* and/or *between* different governance levels, where variables such as *politics* shape the innovation I-P-T interplay and *time* defines first and second order learning pathways.

Keywords: Innovation Policy; Governance; Innovation Heuristics; Interactive Learning; Colombia.

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INTRODUCTION

The systems approach on innovation policy has been widely accepted since the mid-1980s as a comprehensive explanation on the role of governments in fostering the production and diffusion of knowledge and innovations in a given set of institutional and network configurations (Freeman, 1987; Lundvall, 1992; Nelson, 1993; Edquist, 1997) . While the explanations offered by the innovation systems approach are originally based on empirical cases in the global north, Latin American scholars have long expanded the theoretical scope of the systemic perspective by up-taking lessons from the region and its own contextual features (Crespi & Dutrénit, 2014; Dutrénit & Sutz, 2014; Arocena & Sutz, 2020).

A core assumption of the systems approach is the interactive nature of innovation processes, leading to the interplay between multiple interdependent actors. Common heuristics to grasp such interactions have been provided by the multiple 'Helixes' approaches (Triple, Quadruple, Quintuple), which address the dynamics of innovation from the point of view of the different interfaces found in university-industry-government-public-environment interactions (De Oliveira Monteiro & Carayannis, 2017). However, these broad categories tend to overlook the micro-dynamics of science, technology and innovation processes, and offer a rather static illustration of the interrelations within innovation systems (Centeno, 2021).

Kuhlmann, Shapira, & Smits (2010) provide an alternative heuristic to account for the ever-changing dynamics in innovation systems. They focus on the interplay between innovation practice (I), policy (P) and theory (T) as 'dancing partners' that shape the governance of innovation in a given system. This metaphor suggests that multiple governance/ 'dancing' configurations appear depending on the rhythm of the music played and the actors playing the music, the type of dance floor hosting the dance, among others. Nevertheless, since this metaphor is mainly based on the traditional innovation systems literature, it might also fall short in grasping the differentiated dynamics of innovation systems in Latin America.

We believe that analytical potential of the metaphor may nurture from additional insights from the Latin American context, in order to further explore the opportunities and failures for the governance of innovation in emerging economies (Kuhlmann & Ordóñez-Matamoros, 2017). This is so as the conceptual foundations of the metaphor are deeply rooted in scholar traditions in the global north, where innovation systems are highly institutionalized, unlike the ever-changing Latin American innovation systems. In this con-

text, we believe that the innovation policy dance is often an unstructured set of moves with a high degree of improvisation and even conflict, rather than a well synchronized waltz.

Innovation heuristics define the problems to be addressed as well as the type of solutions thereof, which in turn is shaped by the values and interests that underlie innovation heuristics (Arocena & Sutz, 2020). In this regard, more attention is needed on their basic underlying assumptions, especially since metaphors have the potential to shape the reality of innovation policymaking and the acritical uptake of them might be problematic for the role of governments within innovation systems.

This paper critically assesses the underlying assumptions of the dancing metaphor as depicted by Kuhlmann, Shapira, and Smits (2010), by examining the relevance of its heuristic ambition in the Latin American context. We do so by exploring three illustrative cases in Colombia: i) the interplay between the national systems for STI and competitiveness, ii) the funding of subnational STI with mining royalties' income and iii) the implementation of projects of social appropriation of STI. These allow us to derive crosscutting lessons on the gaps of the metaphor that need further conceptual development.

We shed light on some particular features of the dance metaphor for the Latin American context. Some of our guiding questions are: Who is playing the music in innovation governance? What do we know about the beat of the music and the relationships between the dancers? To what extent the dance excludes grassroot innovation movements crucial for innovation policy? To what extent innovation practice is eclipsed by 'business as usual' dynamics according to which industrial actors can capture the dance?

The reminder of the paper is as follows: after this introduction, section 1 goes over the innovation policy dance metaphor; section 2 describes the three cases, focusing on the dynamics of the innovation practice, theory and policy interplay for each. Subsections 2 offer some crosscutting lessons learned from the cases; and then we conclude with some avenues of research for strengthening innovation policy heuristics.

1. EXPLORING THE BALLROOM: THE INNOVATION POLICY DANCE METAPHOR

The dance metaphor can be traced back to the early criticisms to the linear approach on the interaction between science and technology. By distinguishing their attitudes towards literature, Derek de Solla Price (1965) argued that scientific knowledge does not automatically translate into technology because the knowledge published is typically aimed at specific scientific peer groups. In this vein, he regarded science and technology as a differentiated pair of dancers or as independent but interlinked cumulative bodies of search, which often dance to the common rhythm of instrumentalities, i.e. accidental craft innovations in laboratories leading to technological change (de Solla Price, 1984a; 1984b). The author stressed the need for further inquiry on the rhythm and movements of both dancers in order to acquire a better understanding of the history of technology (de Solla Price, 1965).

Later on, Arie Rip (1992) praised the illustrative character of this metaphor, but warned about the risks of approaching science and technology as separated processes, rather than as part of the same continuum. By highlighting the social embeddedness of science and technology, Rip argued that the division of labour between science and technology is subject to permanent mutual adaptations in their 'dancing' as they are driven to anticipate each other's steps. This dancing is not pre-given, but rather shaped by specific historical circumstances, and the multiple configurations of relations between science and technology are usually changing, meaning that "the dancehalls themselves change" (Rip, 1992, p. 233).

Kuhlmann (2007) builds on the metaphor to explore the governance of innovation as a process shaped by the interaction between innovation practice (I), policy (P) and theory (T). For him, these are "partners on a dancing floor, moving to the varying music and forming different configurations" (p. 11), as represented in Figure 1. For instance, sometimes "practice and policy, argue and negotiate about the dance and music while the third, theory – not always, but often and to an increasing extent –, provides the other two partners with arguments and sometimes also with new music" (p. 5).

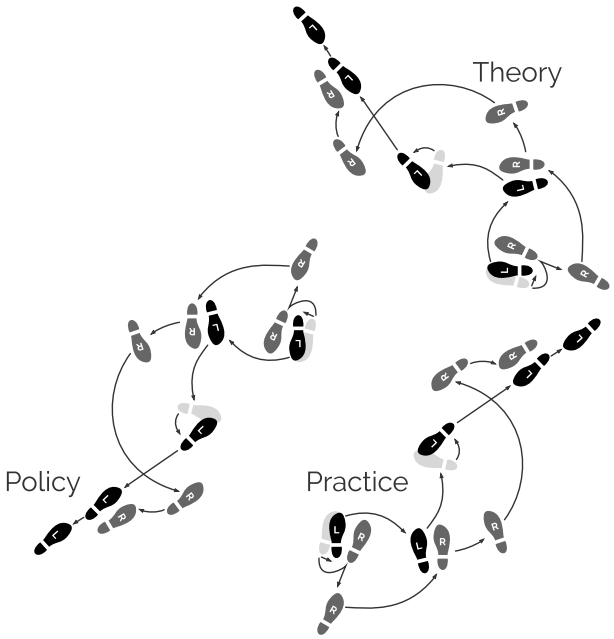

Figure 1. Innovation policy dance metaphor.
Source: Kuhlmann (2007).

As this one, there can be multiple configurations of interactions between I-P-T in which any of them can be the leading force, and these multiple modes of interplay are usually determined by the direction of learning processes. Kuhlmann, Shapira, and Smits (2010) highlight the following possible interactions: first, in the case of innovation Practice-Policy interaction, there is learning when, for instance, policy lessons derived from evaluations are translated into policy change (*learning by using*) or when policymakers receive direct feedback from actors on the field (*learning by interacting*). Furthermore, innovation practice is also shaped by policy when innovators and entrepreneurs learn from policy instruments (*learning by using*).

Second, in the interaction between innovation Policy-Theory, on the one hand, researchers learn and produce new ideas and theories based on the empirical insights that the policy process offers, whether it is by observing such processes (*learning by searching*) or participating on them (*learning by interacting*). On the other hand, policymakers often use theories as framings for policy design (*formal learning*) or receive the support of researchers as consultants in the policy process (*learning by interacting*).

Third, regarding the innovation Theory-Practice interface, there is a similar situation in which theory learns from practice by observing the experience of innovation as a living lab (*learning by searching*) and as a source of empirical insights (*learning by interacting*). Furthermore, innovation practice is driven by the frameworks offered by theory (*formal*

learning), as well as the inputs that researchers and academics can offer to practitioners (*learning by interacting*).

Therefore, an underlying assumption of this approach is that "the three dancers observe each other, and react on the partners' movements: They copy, comment, complement, counter-act, neglect, and thereby learn" (Kuhlmann, 2007, p. 11; Kuhlmann, Shapira, & Smits, 2010). Depending on the extent to which institutional arrangements are transformed, Kuhlmann, Shapira, and Smits (2010) distinguish between first-order and second-order learning, following Argyris and Schön (1978). While first-order learning entails strategic adaptations to a given set of institutions that maintain organizational performance and dancing patterns, second-order learning implies a transformation of institutions, strategies and visions, and, therefore, the melody of the dancing by introducing new modes of governance. In other words, second order learning involves institutional change and first order learning does not. Furthermore, the authors suggest that "external changes (new 'music fashions') could imply new roles of dancers on the floor, or even the appearance or (temporary) farewell of an actor" (Kuhlmann, Shapira, & Smits, 2010, p. 8).

Furthermore, Kuhlmann, Shapira, and Smits (2010) argue that the underlying rationales and instruments of innovation policy is the result of interactive learning between stakeholders taking part in the I-P-T dancing floor. Interactive learning processes are therefore at the core of the different dancing configurations that might take place. Such learning process often takes place in 'fora' for debates, which provide I-P-T with a dancing floor. Such fora are "institutionalized spaces specifically designed for deliberation or other interaction between heterogeneous actors with the purpose of informing and conditioning the form and direction of strategic social choices in the governance of science and technology" (Kuhlmann, 2007, p. 16). In this context, Kuhlmann (2007) also sheds light on strategic intelligence as a set analytical tools and sources of information that offer insights for strategic decision making.

The dancing metaphor provides relevant elements that synthetize the complex underlying dynamics of the governance of innovation. Nevertheless, we believe that the use of this heuristic must be cautious in order to avoid the oversimplification of the innovation policy process. Moreover, we believe that the early uses of the dancing metaphor in the field of science and technology studies (Rip, 1992; de Solla Price, 1965) offer some relevant insights beyond the dynamics of the dancing partners, including the role of the rhythm of the music and the dance floor that are yet to be further developed in the analysis of the governance of innovation.

2. THREE CASES OF 'THE DANCE' IN COLOMBIA

In order to assess the assumptions of the dancing metaphor and its relevance for the Latin American context, we analyse the I-P-T interplay by reflecting on secondary sources and research findings on three illustrative cases of STI governance scenarios in Colombia: i) the interplay between the national systems for STI and competitiveness (Pinzón-Camargo & Ordóñez-Matamoros, 2021), ii) the funding of subnational STI with mining royalties' income (Salazar, 2017; Centeno, 2019; 2021) and iii) the implementation of projects of social appropriation of STI (Pinzón-Camargo, 2022; Pinzón-Camargo & Centeno, 2020).

We followed a theoretical sampling approach (Glaser & Strauss, 1967) for the selection of the cases, based on their relevance and illustrative potential. Each case relates to different innovation policy situations, which allows us to draw crosscutting lessons to enrich the dancing metaphor. Rather than empirically detailing each case, we use them as illustrative devices to explore the governance of innovation.

Colombia offers a relevant case scenario given the distinctive features and dynamics of innovation governance in emerging economies in contrast to more developed countries (Dutrénit & Sutz, 2014; Kuhlmann & Ordóñez-Matamoros, 2017). Furthermore, the national innovation system of the country has gone through multiple transformations during recent years, representing an interesting case to inquire on the role of innovation theory, policy and practice in such changes.

In the following paragraphs we briefly describe each case, and characterize the dynamics of the innovation practice, theory and policy interplay for each.

2.1. Case 1: Systems for Competitiveness and for Science, Technology & Innovation

2.1.1. Case description

In Colombia, governance systems for STI, on the one hand, and competitiveness, on the other, have been developing since the 90s. Building on the notion of Innovation Systems, Colombia structured STI governance, organizations, institutions, and policies in the early 90s, similar to other countries in the region (Moncayo Jiménez, 2018). The Colombian National Innovation System (NIS) sought to allow a better relationship between State, Enterprises and Academia, following the Sabato and Botana's Triangle (Salazar, 2013), and it intended to engage them to work together. The NIS was explicitly oriented

towards using STI to achieve higher levels of economic growth to improve societal wellbeing, as defined in Law 1286 of 2009 (Pinzón-Camargo & Ordoñez-Matamoros, 2021).

The NIS was steered by the National Institute of Science, Technology and Innovation (Colciencias), currently the Ministry of STI,[1] and it was organized around the "Program Councils" (Salazar, 2013). The Councils were responsible for policy design and implementation by means of strategies and projects. Although the Councils were integrated by the three main actors of the NIS: State, Industry and Academia, the latter tended to be over represented, producing imbalances in their operation (Pinzón-Camargo & Ordoñez-Matamoros, 2021). With the transformation of Colciencias into the Ministry of STI in 2019-2021, the NIS structure was also reshaped, deleting the Program Councils and promoting the inclusion of Civil Society in the State-Industry-Academia interface.

In parallel to the evolution of the NIS in the early 90s, a National Council of Competitiveness was created (1994) with the purpose of fostering joint work between State, Academia, Industry and labour sectors to improve the productivity and competitiveness of the country in the context of an economic liberalization process. This council evolved into the National Administrative System of Competitiveness and Innovation (NASCI) in 2012 (Decree 1500), and it became an umbrella system to harmonize other public-public and public-private coordination schemes, including the NIS. It was steered by the Presidential Council for Competitiveness and Public-Private Management. In contrast with the NIS, the NASCI privileged the Industrial sector participation and implemented technical committees to address public and private issues that could affect national or subnational competitiveness.

Both systems, NIS and NASCI, had local organizational structures represented by the CODECTIs (Departmental Councils of STI) and CRC (Regional Commissions of Competitiveness), respectively.

[1] Colciencias became in the Administrative Department of STI in 2009 by the Law 1286 of that year. In 2021, this administrative department evolved into the Ministry of STI by Law 2162.

2.1.2. Innovation practice, theory and policy

In this case, the objective of increasing Colombia's productivity and competitiveness to achieve social wellbeing can be identified as a single music pattern across two different dance floors: the NIS and NASCI, both hosting similar actors, but with different leading roles. In the first system, the leading dancing partner was Academia, embodying a Theory (T) approach on innovation governance. In the second, the leading actor was Industry, which usually represents innovation Practice (I). In both cases, Policy (P) has been a secondary player, often following the steps of the leading dancing partners in each case, despite setting the organizational scene for the dance floors.

In this context, the existence of two dance floors for the same actors to interact has produced tensions between Theory and Practice as leaders in each one. These tensions are often related to deciding which floor is more attractive for the dancers to push their agendas according to their interests. In this regard, the NASCI (dancing floor A) has gained appeal by becoming an umbrella system that coordinates and encompasses other systems, including the NIS (dancing floor B). This resulted in providing the Industry with a better position for agenda-setting. Such tensions are also reproduced in the subnational structures of these systems. For example, Industry actors often accuse academic actors from being too detached from real world problems, while academia blames the industry for underestimating the role of research and innovation in entrepreneurship.

This has had implications in actors' strategies to better push their interests, moving their agendas from one dancing floor/system to another. Therefore, it may be possible to hypothesize that industry actors have prevailed over academic ones in defining the direction of innovation policy. By making the NASCI (dancing floor A) the core arena for decision making, they have been able to define an innovation policy driven by Practice rather than Theory.

Furthermore, in this case, actors in both dancing floors seem have been stuck in a first-order learning process in the sense that the music followed by the dancers has remained the same in the last 30 years. However, the existence of a single music pattern has not traduced into a better alignment between actors within and across systems, deepening the challenge of public-private coordination. Although several organizational changes have been put in place to prevent such misalignment (Pinzón-Camargo & Ordoñez-Matamoros, 2021), tensions remain and spread through different levels, eventually restricting coordination between the national and subnational levels in each system: between the NIS

and the CODECTI and the NASCI and the CRC. The lack of coordination at the national level sends contradictory signals to the local level about how to implement policies and coordinate efforts between actors at the same level and across levels.

Finally, the actors/dancers have also been the same for several years. Despite the NIS's intention to include civil society actors (Decree 1666 of 2021), further efforts are needed in practice. So far, organizational change proposals by the Ministry of STI only re-label actors from the Academia (i.e. Researchers) as part of the civil society, and it remains unclear how other actors, different from Industry and Academia, will be included effectively in the NIS.

2.2. Case 2: The Science, Technology & Innovation Fund

2.2.1. Case description

Investment on STI in Colombia has been historically low. Evidence of this is that R&D funding has never reached the 1% of the GDP, despite the multiple promises of governments in that regard. In 2011 the national government proposed the creation of a specific fund for STI, which allocated 10% of the national income from mining royalties to STI projects at the subnational level. This occurred in the context of a broader constitutional reform inspired by the experience of other countries in managing their royalties' profit (e.g. Norway), and intended to redistribute this income across the 33 subnational entities[2] of the country, since the concentration of it in those territories where extractive industries operate have proven to be inefficient and resulted even in the waste and misappropriation of resources.

The OCAD was created as a board to approve projects and allocate resources, composed by five representatives of the national government, six subnational governments and six public and private universities, each group entitled to one vote for decision-making. The creation of such governance structures for the decentralization of STI funding had, however, ambivalent results, raising questions regarding its efficiency: the resources available were not being used to a full extent and, in some cases, there was misappropriation of resources that inhibited the fund's overall goal to strengthen STI capacity at the regional level (Centeno, 2019). This raised a broad debate on the governance of regional STI and the institutional arrangement involved (Salazar, 2017), which can be further described by means of the 'dancing metaphor', as follows.

[2] Including Bogotá, the capital district.

2.2.2. Innovation practice, theory and policy

The interplay between practice, theory and policy can better explain the tensions regarding the fund's inability to enhance the performance of the regions in STI and its subsequent reform in 2017/2018, which illustrates second-order learning with significant institutional transformations. We illustrate this in a couple of 'dancing' or governance situations.

The first 'dancing' scenario is the transition to a competitive allocation of resources. At the beginning, those regions with the higher the population and poverty levels received a greater amount of resources, assuming that STI was most needed in those regions with more critical developmental challenges (theory). However, STI capabilities (and practices) defined a region's ability to submit robust proposals to get resources allocated, which was not the case of the regions with the highest poverty levels. As a consequence, those with the strongest capabilities were able to submit better proposals and, therefore, had a better chance of receiving funding, resulting in a sort of Mathew effect, i.e. those with more capabilities/resources have stronger capabilities to further attract funding at the expense of those with less capabilities who get allocated less (Merton, 1968).

Furthermore, since each of the 33 regions of the country had a fixed allocation according to the above-mentioned criteria and that they had the autonomy to set their own priorities, there was a fragmentation of the (policy) instrument in 33 mini-funds instead of a single one as intended, limiting the system's ability to mobilize resources towards broad national goals (Salazar, 2017). This fragmentation, among other design features, suggest that there is no 'music' being played to guide the I-P-T interplay.

The 2017/2018 reform insisted on the idea of one single fund by transforming the allocation mechanism by means of public, open and competitive calls for proposals. Now, actors of each region must compete for resources according to previously defined priorities by the CODECTIs. Under this mechanism, the Ministry of STI leads planification processes across regions in order to support the definition of priorities. The result is a biennial plan that includes the public calls that will be organized during that period, as well as the aggregated priorities defined by each region so that actors can submit proposals according to them. Although this transformation privileges meritocracy and scientific robustness of the proposals, it tends to deepen the capacity-based Mathew effect between regions. Furthermore, subnational governments were not sympathetic of this reform, since it limited their autonomy in using the resources, while being subject to the directives of the

national government. Innovation policy as defined by the national level and practice embodied by local actors may exhibit competing interests in this case.

The second 'dancing' configuration shows a diverse landscape of actors interacting and developing STI activities. Under the initial fund, only subnational governments could submit project proposals and, if approved by the OCAD, only *public* organizations could be designated as project executor, such as subnational governments and public universities. This led to a situation in which subnational governments negotiated their odds for executing the funding in their own jurisdictions, being the scientific quality, relevance and merit of the projects secondary criteria. Furthermore, it was argued that subnational governments did not have the expertise to be responsible for the implementation of STI projects, and public universities had a strong position in the execution of the resources (Centeno, 2021).

The subsequent 2017/2018 reform allowed any organization in the national STI system, whether *public* or *private*, to submit and implement projects. This represented a milestone for the opening of the system, allowing a more diverse set of actors to implement projects including firms, research centers, private universities, and civil society organizations (Centeno, Delgadillo, & Roa, 2020).

Overall, the 2017/2018 reform depicts second-order learning with institutional transformations, which in this case took more than 5 years to uptake early lessons from 2012-2013 on the form of strategic intelligence (Kuhlmann, 2007). This is a consequence of political negotiations and the constitutional status of this policy instrument. This reform, however, proved effective for the execution of resources, as the more diverse participation of actors increased the amount of proposals submitted and public calls allowed to group multiple projects in one single package for discussion and approval (Centeno, Delgadillo, & Roa, 2020). The allocation of resources transformed from a discretionary procedure-based approach in which the OCAD played a central role, to a peer-review-based one, involving experts that would judge the merit of the proposals according to a scoring system. Therefore, role of the OCAD as a 'forum' for debate seems now to be expendable since it was stripped of its primary function. The CODECTI's are expected to be the main fora for debate, although these are often limited to budgetary rather than strategic policy discussions.

2.3. Case 3: Projects of Social Appropriation of Science, Technology & Innovation

2.3.1. Case description

Colciencias began to implement the National Strategy of Social Appropriation of Science, Technology and Innovation in 2012, after a long process and several debates around the notion of Social Appropriation of Knowledge by the Academia. This Strategy allowed to design and implement two policy programs named *A Ciencia Cierta* (ACC) and *Ideas para el Cambio* (IPC)[3] by Colciencias. The first program (ACC) was designed to strengthen ongoing initiatives fostered by local organizations, where the communities use innovation to attend to their socio-economic challenges. The second program (IPC) encouraged local communities to identify their needs under a set of general challenges defined by Colciencias. At the same time, Colciencias invited solvers (researchers, academia, and advisors, among others) to present possible solutions to the community's needs. In this way, Colciencias aimed at building, strengthening, and boosting relationships between Academia and Local communities. Therefore, scientific, ancestral, traditional, and other possible types of knowledge were convened to co-create solutions to local needs. This process was named *knowledge dialogue*, aiming at a horizontal acknowledgement of these knowledges (Pinzón-Camargo, 2022).

ACC and IPC evolved in an experimental process of mutual learning and improvement based on public calls for proposals (Pinzón-Camargo & Centeno, 2020; Pinzón-Camargo, 2022). These public calls for proposals defined general rules for different variables. First, they defined the actors who could take part in the process. Second, the type of relationships and features associated with the actors involved in these publics calls for proposals. Third, the conditions to invest the financial resources provided by Colciencias. Since 2012, IPC and ACC have supported around 155 projects in 29 departments of 32 in Colombia. In a general overview, these programs have been focused on attending unmet basic needs in Colombia's rural areas (Daza-Caicedo *et al.*, 2020a, 2020b).

[3] For more detail, check: https://acienciacierta.minciencias.gov.co/ and https://ideasparaelcambio.minciencias.gov.co/

2.3.2. Innovation practice, theory and policy

This case unfolds a contrasting situation regarding the two dance floors in competence discussed in case 1. This case provides a dance process assembled on dance floors that work as layers overlapped between them. The first dance depicts a co-evolutive process where debates about the notion of social appropriation by Theory (Academia) gave the dance fundamentals to Policy (Colciencias). On this first dance floor, Practice was missing but considered a further dancer in the second layer/dance floor. In turn, based on the learning from Theory, Policy developed the dance steps. It improved them through an experimental process followed in designing and implementing ACC and IP and affecting how Practice (local communities) understood the dance. These elements illustrate second-order learning in this dance.

We suggest that the second dance floor emerged into the first one, or it overlapped. Policy led the dance on the second dance floor, triggering a process of *collibration* (Jessop, 2012) between Theory and Practice by the terms of reference designed to lunch both ACC and IPC. The terms of reference worked as a musical score that defined the different interplays between the dancers but gave enough space for improvising new steps. These new steps are linked to second-order learning that features this dance. It produces deep changes allowing new activities like processes of knowledge co-production between Theory and Practice.

The music played resonates with the notion of social appropriation introduced on the first dance floor. In this vein, the music in this dance entailed the intention of bringing different types of knowledge (i.e., Scientific with ancestral or traditional knowledge) to produce their acknowledgement and valuation between different epistemic communities and, based on that, build and co-produce solutions to local communities and their needs.

CROSSCUTTING DISCUSSION: THE INTERPLAYS AND PATTERNS OF THE DANCE

The above presented cases offer relevant lessons regarding the governance of innovation from the point of view of the dancing metaphor, specifically regarding 1) the type of learning that takes place according to each governance or dancing situation, 2) the type of dance floors and music involved, as well as 3) the performance of each dancer or component of the governance of innovation: theory, policy and practice. Table 1 below synthetizes the key elements of the cases, unveiling different types of coupling processes between the dancers from the three cases described above.

First, regarding the type of learning, we find different learning attitudes that highlights the relevance of time and policy change in innovation governance. For instance, first-order learning can prevail as a consequence of lock-in situations that reflect path-dependency dynamics (case 1). There is practice-policy learning in case 2 (by using and interacting), revealing that second-order learning often depends on institutional frameworks and political dynamics that allow to translate policy learning into effective policy change. This in turn relates to time-spans and actors' ability or will to translate policy lessons into strategic intelligence that facilitate its uptake for decision making and policy change. Case 3 shows formal second-order learning, facilitated by actors that play a role in theory and policy.

A second element that draws attention is the possibility of identifying more than one dance floor in the same case. While in case 1, there is a competition between the dance floors led by different dancers at the same level, in case 2 there are tensions between dance floors at different governance levels. Moreover, in case 3 a multiplicity of floors emerges as an overlapped process that allows different types of dances at different levels. Dancing floors are determined by 'fora' for debates which in case 2, for instance, also change as a consequence of institutional transformations resulting from second-order learning. In case 1, competing dance floors showcase competing forums that respond to the organizational features of each dance floor.

A third element relates to the type of music being played. Following Rip's (1992) early reflections on the metaphor for the case of science and technology, dancing patterns and dancehalls are not pre-given and change over time according to contextual circumstances. So is the case of the music involved, which typically expresses embedded policy goals that set the guiding directions of the dancers, and that must not be taken for granted for analytical purposes. Case 2 leads to considering the possibility of dancing without music when policy instruments are implemented with no clear policy objectives or fragmented ones. As part of the implications of such a situation, there is a risk of misalignment between actors and inefficient coupling processes between dancers. In this vein, music and its meaning emerge as a crucial variable in unfolding the dance. As in case 1, the existence of the same music in two different dancefloors may suggest redundant policy objectives across differentiated arenas. Furthermore, the fact that the same music can be played for long periods of time is symptomatic of the lack of second-order learning (case 1).

Finally, Table 1 offers a set of roles the dancers could perform. Those roles could be: i) a single-lead dancer, ii) a shared-lead dancer, iii) a following dancer, iv) a missing dancer, and v) a dancer who unwillingly takes part in the dance. Beyond mentioning the roles, questions appear around the rationalities that could explain, support, and encourage the performance of each of the roles. We argue that those questions resonate with the politics between the dancers. In this line, dancers' politics and music are key variables for further operationalizing the dance metaphor.

Table 1. Main dance elements from the cases.

Case	Learning process	Dance floor	Music	Dancers Performance		
				Theory	Practice	Policy
Case 1: Systems	First-order	Dance floor 1: Competitiveness	Innovation for competitiveness	Low participation in leading the dance	It has been leading the dance	It has followed the Practice
		Dance floor 2: STI	Innovation for competitiveness	It has been the dance leader	Low participation in leading the dance	It has followed the Theory
Case 2: Royalties	Second-order (I-P learning by using and interacting)	Dance floor 1: National level	No clear music/ Fragmented policy goals	Linear approach on innovation funding	Practice at the regional level up taken for policy change	Often leading the dance because of power relations
		Dance floor 2: Regional level	Own regional challenges	Often affected by theories underlying national policy guidelines	Capacity based, providing inputs for policy learning	Risk of fragmentation and competing with national policy
Case 3: Social Appropriation	Second-order (T-P formal learning)	Dance floor 1: Social Appropriation Strategy	Social Appropriation of knowledge	It led the dance	It was missing in this floor	It was followed by Theory
		Dance floor 2: ACC and IPC		It shared the leading with Practice	It shared the leading with Theory	Sometimes accepts to be guided by Theory or Practice

The lessons derived from the cases reveal that the *time* dimension matters in the dance. In long-term processes, it is possible to note switches between second-order learning and first-order learning, the type of 'fora' for debate, and the music being played. Cases 1 and 2 illustrate this situation, where dancers without previous contact got involved in second-order learning at the beginning of the dance. However, after a long time, they got familiar and switched to a first-order learning process. The permanence of music over long periods of time may express stability or institutionalization of policy goals, or conflicting path-dependence situations that only allow first-order learning.

Furthermore, the cases illustrate the *multilevel* nature of the policy dance, showing (mis)alignment patterns at different levels, *within* or *between* the 'dancers': policy, theory, and practice. On the one hand, we often see tensions *within* the policy domain across different levels, in which coordination issues as well as competencies to define policy goals limit the normal development of the dance. On the other hand, misalignment *between* policy goals at the national level and innovation practice at the local level may suggest implementation gaps that can be attributed to the underlying theory of the intended policies.

Interactions between and within innovation policy, theory and practice across different governance levels remarks the *role* of politics in shaping such interplays and learning processes. Policy-related actors, whether governmental or not, are more often in a position to define the rhythms of the dance by setting binding policy goals to which actors and other elements of the system have to respond to at the regional/local level. In case 1, Practice/Industry actors gained a better position for decision making across dancing floors, while in case 2 political positions alternated between subnational governments (in decision making) and universities (during project implementation). This suggests that hierarchical governance structures might shape power relations between actors, facilitating or restraining different types of learning, specially over long periods of time.

An interesting feature of the dance relates to the changing roles of actors across the theory, policy, and practice realms. Kuhlmann and Ordóñez-Matamoros (2017) associate specific groups of actors to each component of the innovation dance: innovators and entrepreneurs in Practice, innovation scholars in Theory, and government agencies in Policy. However, some of the above presented cases show that this type of actors can move from one realm to another, or even belong to multiple realms at the same time. In other words, the *performative* character of actors in the innovation dancefloor entails that they can easily change their dancing stance –from theory to practice to policy– or embody different dancers at the same time. In other words, there is not a strict correspondence between the actors in the Sabato's triangle (academia, State, industry) and the innovation dancing metaphor (theory, policy, practice).

For example, in case 2, policy actors (Departments) and Theory actors (Universities) performed the role of Practice implementing the royalties' resources through projects of STI. In turn, in case 3, the Policy was performed by actors with a strong academic profile giving the impression that Academia was performing the Policy's role as a dancer. These cases unveil the complexity and imbrication of the dancers once they must or are invited to dance. Therefore, it must not be assumed that Policy, Theory or Practice has a clear set of profiles of actors that could fit within these categories.

This implies that the dancers in the governance of innovation are complex settings which include but are not limited to actors: they encompass a broader set of interconnected elements such as institutions, practices, ideology, and strategies, among other factors that shape them as practice fields. As Kuhlmann & Ordóñez-Matamoros (2017) acknowledge, heterogeneity is a central feature of each component of the I-P-T interface, and tensions are part of the landscape involving opposing expectations, beliefs, paradigms, interests, power struggles, and multiple sets of resources, capabilities, and strategies. This is what actually may distinguish the dancing metaphor from other actor-based heuristics such as the Triple-Helix model or the Sabato Triangle.

Figure 2 depicts the above-described crosscutting lessons. It provides an illustration of how dancing partners often cross the border of I-P-T realms, while reflecting on domains at different levels and dancefloors with differentiated scopes.

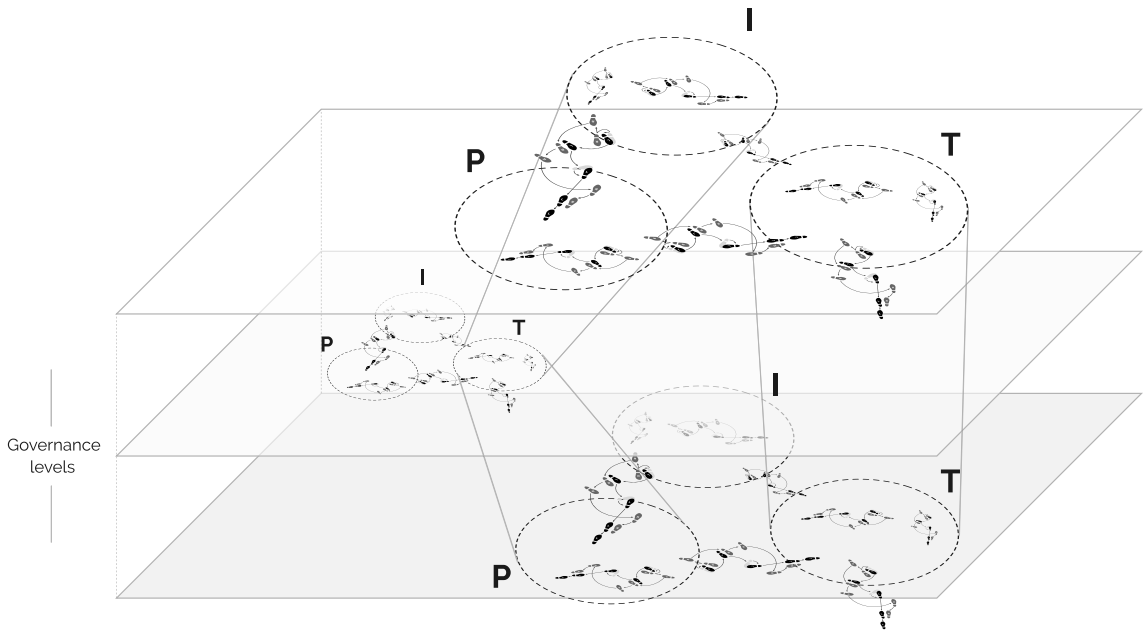

Figure 2. The multilevel and performative dynamics of the innovation policy dance.

It is necessary to shed light on the idea of understanding Theory, Policy, and Practice as practice fields to have more interpretative flexibility to operationalize the metaphor. This understanding of Theory, Policy, and Practice is not new. It resonates with Rip's (1992) ideas about the embeddedness of and imbrication between Science and Technology, which are part of a same continuum. In this sense, further analysis is needed on the imbrications between fields or dancers, avoiding aseptic assumption about the policy dance, and better reflecting the entangled relationship between science and society (Bauchspies, Croissant & Restivo, 2006).

CONCLUDING REMARKS

Using metaphors for explaining or making sense of reality has advantages like simplifying the social complexity. However, aspects could be hidden and crucial in making sense of such reality in this simplification process. In the dance metaphor, the idea that dancers represent the theory, practice and policy seem to leave aside the discussion around the kind of actors that dancers could represent.

In this paper we aimed at critically assessing the basic underlying assumptions of the dancing metaphor, by examining the extent to which its heuristic pretensions are relevant for the Colombian context. While operationalizing the metaphor in three illustrative cases in Colombia, we observe unsynchronized dancing patterns often led by, as argued by de Solla Price (1984a; 1984b), the rhythm of instrumentalities which lead to accidental policy learning and change.

This re-examination of the innovation dance metaphor stresses that the I-P-T interplays is rather unstructured given the emergence of variables that define what happens on the dancefloor. While the dancing metaphor remains useful in the case of Colombia, further considerations need to be highlighted in order to provide a more contextualised explanation of innovation governance dynamics in this context. Unlike innovation systems in the Global North, innovation systems in Latin America, and in this case in Colombia, tend to be contested and ever changing. These are arenas of debate and conflict in which politics play a central role in the definition of policies and institutional arrangements. Therefore, innovation systems in this context evolve in less structured ways, giving space for different types of interactions to take place.

The lessons learned suggest that we need to further advance in detailing the dance metaphor drawing attention on the elements and variables found in the cases. We suggest advancing in the operationalization of variables such as politics, multilevel interactions, time, and the performative nature of actors in the innovation policy dance to better grasp the governance of innovation in Latin America and other emerging economies, considering their often-contested institutional contexts.

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Logics and Enablers of Transformative Innovation Policies

The case of the Colombian Appropriation of Science and Technology Policy

Mario A. Pinzón-Camargo[1], Juan Pablo Centeno[2],
Ernesto Andrade-Sastoque[3], Gonzalo Ordonez-Matamoros[4]

[1] Facultad de Finanzas, Gobierno y Relaciones Internacionales. Universidad Externado de Colombia, Colombia.
mario.pinzon@uexternado.edu.co

[2] Facultad de Finanzas, Gobierno y Relaciones Internacionales. Universidad Externado de Colombia, Colombia.
Technopolis Group, United Kingdom, Colombia. *juan.centeno@uexternado.edu.co*

[3] Faculty of Behavioural, Management and Social Sciences, University of Twente, Enschede, the Netherlands.
e.andradesastoque@utwente.nl

[4] Centro de Investigaciones y Proyectos Especiales-CIPE, Facultad de Finanzas,
Gobierno y Relaciones Internacionales-FIGRI, Universidad Externado de Colombia, Bogotá, Colombia;
Faculty of Behavioural, Management and Social Sciences, University of Twente, Enschede, the Netherlands.
gonzalo.ordonez@uexternado.edu.co

ABSTRACT

In this work, we seek to answer the question, what are the main logics and enablers underlying the implementation of TIP policies in countries of the Global South? We address this question using the *Path-transformative heuristic* (Pinzón-Camargo *et al.*, 2020; Pinzón-Camargo, 2022). This heuristic combines two approaches, path dependency and institutional entrepreneurship theories, to explain the processes, decisions, and actions carried by actors in building an alternative path and how they face internal and external pressures that could support or damage their processes. Using an illustrative case based on the Colombian Social Appropriation of Science, Technology and Innovation policy, we examine in-depth interviews and secondary data on the underlying logics and enablers of innovation policies with transformative potential. This work allows us to identify six underlying logics in three of the four phases of the Path-transformative heuristic and six enablers extended through all the transformative pathway. Those elements bring a starting point to unfold and better understand TIP in the Global South.

Keywords: Transformative Innovation Policy; Path-transformative heuristic; Transformative innovation enablers; Transformative innovation logics; Colombia; Global South.

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INTRODUCTION

Recent debates on science, technology and innovation (STI) policy are moving rapidly towards new frames that are concerned with societal and environmental challenges and the needed transformative change in these realms. Particularly, since Schot and Steinmueller (2018) distinguished transformative innovation policy (TIP) as a new frame, it has quickly pervaded policymaking circles.

Transformative innovation encompasses a broad set of practices that adopt a direct approach on development (Arocena & Sutz, 2017) and that intend to foster major long-term changes in sociotechnical systems, i.e. transformations in broader institutions, practices, infrastructures, networks, among other elements that sustain those realms where society and technology are embedded (Geels *et al.*, 2004). This means that transformative innovations aim at transforming unsustainable production patterns, but also incentivizing the necessary cultural and behavioural changes (Steward, 2008; Weber & Rohracher, 2012). In other words, transformative innovation aims at producing radical paradigm/systemic transformations in broad societal functions and realms: transportation, agro-food, sanitation, energy, among others (Geels, Elzen, & Green, 2004; Steward, 2008), which have deepened unsustainable industrial patterns leading to environmental degradation and societal inequalities (Kanger & Schot, 2019).

Under this frame, transformative innovation policy (TIP) is "a set of public actions and instruments, through which governments mediate and mobilise resources towards more sustainable and inclusive sociotechnical systems via the promotion of knowledge and innovation production, diffusion and use with a long-term perspective" (Ordóñez-Matamoros *et al.*, 2021, p. 119). Here, innovations seek to introduce changes at the level of broad societal functions or sociotechnical systems (Geels, Elzen, & Green, 2004; Steward, 2008). This implies new rationales for governmental intervention that go beyond market and systemic failures (Woolthuis *et al.*, 2005) to include transformational failures that governments should address to boost transitions (Weber & Rohracher, 2012; Schot & Steinmueller, 2018).

This particular policy frame is acquiring a prominent popularity within scholar and policy circles in the Global South, with an active diffusion and impulse given by global partnerships, e.g. the Transformative Innovation Policy Consortium –TIPC– composed by innovation policy agencies from Colombia, Finland, Mexico, Norway, South Africa and Sweden, and coordinated by the Science Research Policy Unit –SPRU– at the University

of Sussex in the United Kingdom and its sister project Deep Transitions coordinated by SPRU and the Centre for Global Challenges of University of Utrecht. However, the growing fondness of governments towards the explicit implementation of this approach contrasts with its actual viability, especially in the Global South.

For instance, in the case of Colombia, a transformative STI policy approach was adopted by the national STI governmental agency in *El Libro Verde 2030* in 2018, a policy document that explicitly orients STI policy towards the achievement of the Sustainable Development Goals. Nevertheless, the implementation of this policy approach in Colombia has not gotten sufficient support, among other things because of political reasons.

In this vein, it is possible to identify at least three reasons that arguably explains why an explicit TIP has not been implemented in Colombia.

First, *El Libro Verde 2030* was launched during the final months of the government 2014-2018, and the last administration 2018-2022 was not clear about this frame in its governmental program. Furthermore, there has not been a visible support to this policy document by governmental agencies in other sectors different from STI. Part of the problem is perhaps that *El Libro Verde 2030* depicts a rather normative narrative with no clear implementation plan. A recently elected new government for the period 2022-2026 seems more attuned with the TIP discourse, but it is still too early to conclude about real change.

Second, the sort of systemic transformations proposed by this policy frame are difficult to achieve in a country whose economy relies heavily on incumbent regimes based on extractive industries (e.g. mining, monoculture plantations, extensive stock farming), with path-dependence dynamics sustained by political elites that inhibit transformative change at the regime and system level. In other words, pretending to foster systemic transformations on a top-down basis seems to be less viable in political terms than steering bottom-up transformations at the local level. In this respect, although the new government claims it will diversify the economy to be less dependent on extractive sectors based on oil, coal and gas, the real substitution will heavily depend on its ability to mobilise sufficient political support in an adverse context, where the war in Ukraine has led the economy to benefit from raising prices and pressing social demands needing government subsidies funded by such royalties. Even in the context of the new government narratives, knowledge, science and technology is not part of the equation where tourism, another extractive activity, is seen as the chosen sector to substitute the funding necessary currently originating from the mining sector.

Finally, the implementation of this approach in Colombia has been limited by the dissonance between explicit and implicit STI policies, i.e. when STI policies enacted in formal policy documents, laws, executive decrees, among others, are incoherent with implicit STI policies that express the actual demand of society for knowledge, as well as the role and value that people ascribe to knowledge to address societal challenges (Herrera, 1973). In this particular case, while *El Libro Verde 2030* was enacted as an explicit STI policy that intends to implement global development agendas on a systemic basis focusing on societal and environmental transformations based on people's needs at the local level, implicit STI policies focus on economic growth and competitiveness.

This example makes us ask about what are the main logics and enablers underlying the implementation of TIP policies in countries in the Global South. This overarching question leads to making a first step to explore those elements based on an illustrative case from Colombia. In this vein, the illustrative case we study aims to bring insights from the Colombian case as building blocks for further discussions about the logic and enablers of TIP policies in the Global South. Therefore, we are not looking to extrapolate results from an illustrative case for all Global South.

The study of the possible logic and enablers underlying the TIP policies requires changing the field of analysis. This change means moving from a normative stance towards a positive analysis of STI policies designed intentionally with a transformative ambition unattached to the multilevel perspective (Geels, 2002) and TIP conceptualisations (Schot & Steinmuller, 2018; Gosh *et al.*, 2021). This sort of policy has been thought of with transformative intentions and implemented for a while now to produce the societal and environmental transformations needed by communities at the local level.

We analyse the case of the Colombian Social Appropriation of Science, Technology, and Innovation policy (hereinafter SASTI-policy). This policy shows, we claim, a long trajectory and transformation in its objectives and policy instruments, thanks to key roles played by institutional entrepreneurs. Hence, while in the early 1990's it was mainly a policy focussed on fostering scientific knowledge diffusion in a vertical relationship between academia and society, at the beginning of the XXI century, its directionality was changed by key actors and events. This change entailed a different meaning of this policy at the national level and the development of new policy instruments to address societal and environmental challenges at the local level. Examples of these instruments are: i) *A Ciencia Cierta* and ii) *Ideas para el Cambio*, a couple of programs implemented in the frame of our main case study analysis, the SASTI-policy.

We approach this case using an interpretative heuristic: the Path-transformative heuristic (Pinzón-Camargo, Ordoñez-Matamoros, & Kuhlmann, 2020). It allows us to inquire on the role of institutional entrepreneurs in shaping innovation policies with transformative potential, in a broader context of interactions between innovation policy, theory and practice (Kuhlmann, Smits & Shapira, 2010; Kuhlmann & Ordóñez-Matamoros, 2017). With this, we contribute to the reflection on the third innovation policy frame identified by Schot & Steinmueller (2018), from the perspective of a country from the Global South. This enables us to identify the peculiarities of this type of policies and to forecast their implications in this particular context.

The reminder of the paper is as follows: after this introduction, section 2 presents the main tenets of the path-transformative heuristic, which offer the conceptual elements to analyse the Social Appropriation of Science, Technology and Innovation Policy (hereinafter SASTI-policy) case. Section 3 defines the methodological and heuristic approach, where the SASTI policy is briefly described, and section 4 presents the results of the analysis, the path-transformative heuristic is used to analyse the SASTI policy case. We discuss these results in section 5, and propose some final reflections in section 6.

1. CONCEPTUAL APPROACH

In order to understand the transformative potential of existing STI policies, as mentioned in the previous section, we are going to follow the *Path-transformative heuristic* developed by Pinzón-Camargo (2022) and Pinzón-Camargo, Ordóñez-Matamoros & Kuhlmann (2020). This heuristic offers a conceptual approach to understanding and unfolding processes of change based on the role of actors, mainly institutional entrepreneurs as agents of change. In this vein, the heuristic, as exploratory strategy (Kuhlmann, Stegmaier, & Konrad, 2019), combines in a layering process two literature branches, Path dependence and Institutional Entrepreneurship.

The path dependence theory, as the first heuristic's layer, is understood as a never-ending process of path dependence, path destruction and path creation (Hirsch & Gillespie, 2001; Martin & Sunley, 2006). This understanding of path dependence differs from the canonical comprehension of the concept developed by David (1985) and Arthur (1989), and it includes the interpretation offered by Garud and Karnøe about path creation (Garud & Karnøe, 2001a; Garud & Karnøe, 2001b; Karnøe & Garud, 2012). The second layer in the path-transformative heuristic is provided by the institutional entrepreneurship theory.

In this case, based on the works by DiMaggio (1988), Battilana, Leca, & Boxenbaum (2009) it is possible to position institutional entrepreneurs as agents who can explain the process of path creation, path destruction and path dependence. In this vein, these actors provide an endogenous explanation to the building paths processes and therefore, processes of institutional change (Pinzón-Camargo 2022). However, it is worth pointing out that these Institutional Entrepreneurs' agencies are distributed and relational (Garud & Karnøe, 2003; Cabero Tapia, 2019; Pinzón-Camargo, 2022), which means that institutional entrepreneurs are not heroes but are part of actors' constellations which work together performing differently roles.

Figure 1 depicts the path-transformative heuristic developed by Pinzon-Camargo (2022). It illustrates a process divided in four phases. Those phases are the Preformation phase, the Formation phase, the Creation phase, and the Development phase. The first one is focused on describing the dominant setting and the contextual conditions where the Institutional Entrepreneurs are embedded; the qualities and features of the Institutional Entrepreneurs; and the conditions that produced the critical juncture that boost the formation phase. The second phase describes the vision of change championed by the institutional entrepreneurs, the enabling conditions, strategies, and self-reinforcing mechanisms that support a niche building process. The creation phase draws attention to two activities. The first activity is to identify the practices that support introducing a change regarding the dominant setting identified in the first phase. The second one is to unveil the possible pressures that could undermine or stock institutional entrepreneurs' efforts to build the path-transformative process. Finally, the last phase tries to capture those endeavours by the institutional entrepreneurs to consolidate the new path, besides possible factors that contribute to or challenge such a consolidation process.

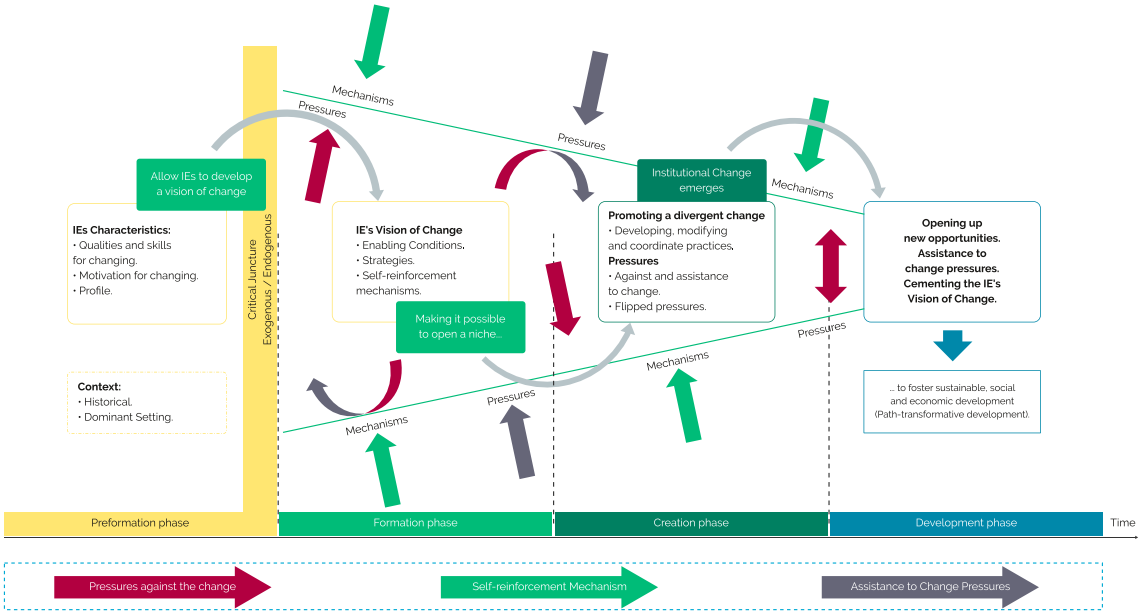

Figure 1. The Path-transformative heuristic.
Source: Pinzón-Camargo (2022).

Based on Figure 1, Pinzón-Camargo (2022) develops a set of crucial concepts to follow the set of phases in the path-transformative heuristic. Table 1 introduces the concepts and their definitions.

Table 1. Main concepts to consider in a Path-Transformative Process.

Concept	Definition
Institutional entrepreneur	IEs are "agents who initiate, and actively participate in the implementation of, changes that diverge from existing institutions, independent of whether the initial intent was to change the institutional environment and whether the changes were successfully implemented." (Battilana, J., Leca, B., & Boxenbaum, E; 2009 p. 69).
Critical juncture	These events can be both exogenous but also created by actors. In the case of exogenous events, they can be used by the actors to support their actions.
Increasing returns	Like critical junctures, the increasing returns can be produced and used strategically by the actors. They also emerge from "contingencies" that actors can manage to reinforce their path creation process.
Actors' strategies	It is a set of actions and behaviours made by IEs to support their vision of change and the introduction of the divergent change or to consolidate their Path-transformative process.
Vision of change	It is the set of narratives that combine the past, present, and future to support mobilizing skills and strategies from the IEs and their allies.
Practices development	They include old practices aligned with the new path's institutional logic and new practices. They are part of the niche that the IEs build by implementing their skills and strategies.
Lock-in	It is a state of temporary stabilization that allows both positive and negative outcomes based on the process of critical revision and mindful deviation done by the IEs.

Source: Pinzón-Camargo (2022, p. 208).

2. MATERIALS AND METHODS

As we mentioned in the former section, this study aims to understand the main enablers, and underlying logics of innovation policies with transformative potential. In this vein, we decided to follow the Yin (2018) case study methodology to build an illustrative study case that brings insights into the transformative potential of innovation policies in the Global South. Following that purpose, the Social Appropriation of Science, Technology and Innovation Policy was chosen. It is a policy led by the Ministry of Science, Technology and Innovation of Colombia. This case was studied in previous work by the authors (Ordóñez-Matamoros, G. *et al.*, 2021) as an illustrative example to understand what a Transformative Innovation Policy (TIP) could look like in practice. Although the case is the same, the analysis in this exercise takes distance from the first one in two senses. First, the amount of data (interviews and secondary information) is richer and deeply studied. Second, and more relevant, this work studies the case to understand in depth the underlying logics and enablers of innovation policies with transformative potential.

This case comprises a period between the early 1990s and 2021. In addition, the period was considered regarding the emergence of the idea of the social appropriation of Science, Technology, and Innovation in public policies in Colombia and its last advances. Before describing the policy and the data collected, it is worth pointing out why this country and this policy. Colombia was considered as an illustrative example of a country in the Global South with several complexities. In the first place, it is striving to find new path-transformative processes after more than 60 years of an internal armed conflict between Colombian state forces, paramilitary and guerrillas. In the second place, this country has been acknowledged as one of the most unequal countries worldwide, with problems of poverty both in urban and rural areas. In third place, Colombia shows a high dependency on extractive and other non-sustainable industries that have caused environmental damage, requiring Innovation Policies with a Transformative Potential that addresses such challenges. Finally, this country faces weak democratic institutions, high levels of corruption and an incipient sense of public good, which characterises many countries in the Global South.

These complexities have led to the necessity to find alternatives to transform the futures of Colombian society, like in most of the countries in the Global South. In this sense, SASTI-policy was identified as an effort of experimentation to build new development pathways in Colombia. This policy supported the study of the challenges associated with the operationalization of Innovation Policies with Transformative Potential in the Global

South. After the second part of the XXI century, the trajectory of this policy was changed by Institutional Entrepreneurs towards attending to the needs of local communities by using Science, Technology, and Innovation directly and involving different types of knowledge (Andrade-Sastoque & Balanzó 2017; Balanzó, Andrade-Sastoque *et al.*, 2021; Pinzón-Camargo, 2022). The objective of this policy was operationalized by two programs implemented since 2012, these programs were *Ideas para el Cambio* and *A Ciencia Cierta*. These programs used public calls that invite local communities and researchers to work jointly to address communities' needs or reinforce their path-transformative processes. Applications selected from these public calls receive funding and technical support to implement solutions co-created (Balanzó, Nupia, & Centeno, 2020) between the different actors involved.

The analysis in this study comprises a set of data constituted by three different sources. First, it includes seventeen interviews done in 2019 with current and former policy advisors at the Ministry of Science, Technology and Innovation (Before 2020 known as Colciencias) who intervened in the SASTI-policy and with actors from entities who have been working jointly with the Ministry. Second, it considers policy documents, official reports from the Ministry, proceedings from events and information from the Ministry and the Programs Ideas para el Cambio and A Ciencia Cierta websites. Finally, secondary information like news from local newspapers, videos, journal articles, book chapters, and dissertations that discuss directly or indirectly the case were studied. The data considered in this study were processed using the software, Atlas.Ti and following the categories described in the Path-transformative heuristic. Findings from the previous analysis were discussed between the authors and with other researchers in different forums.

3. RESULTS

The use of the Path-transformative heuristic leads to identifying the four phases that comprise a path-transformative process in the Colombian case, in particular in the SASTI policy. The results will be presented according to each of the four phases.

The Preformation phase

The Preformation phase began in 1994 in the frame of the *Science, Education and Development Mission* (Better known in Colombia as *Mision de Sabios*). It was a meeting called by the President of Colombia to discuss the role that knowledge could play in

Science and Education in the country's development process. Well-known researchers from different fields took part in such a meeting and delivered a blueprint about the role that should play the topics that convened the meeting (Daza-Caicedo & Lozano-Borda, 2013). In this frame, the notion of Social Appropriation of Science and Technology emerged in the public agenda (ColciCase-IT1, 2019; Daza-Caicedo & Lozano-Borda, 2013). This notion was developed to address the need of diffusing or spreading scientific and technical knowledge to society (Aldana Valdes *et al.*, 1996; Daza-Caicedo & Lozano-Borda, 2013). However, it is worth mentioning that efforts in science divulgation were present at that moment (COLCIENCIAS, 2005).

The Social Appropriation of Science and Technology was embedded in a dominant setting featured by four elements. The first one was a market liberalisation process triggered by the President between 1990 and 1994. Second, the role of Science, Technology, and Innovation (hereinafter Innovation) was understood under an indirect approach to development (Arocena & Sutz, 2017). Third, Innovation was understood under a linear mode of production. It also entailed that Innovation was considered a driver to foster industrial productivity and, therefore, increase economic competitiveness. Finally, this period was featured by a vertical relationship between the knowledge producers (Academia, Industry and Government) and the knowledge consumers (Citizens). These four elements supported a process of path dependency of the role assigned to Innovation in Colombia (Pinzón-Camargo & Ordóñez-Matamoros, 2021).

Discussions about the meaning and scope of the notion of Social Appropriation of Science and Technology increased their intensity between 2005 and 2010. The critical juncture was bordered by the enacting of two critical policy documents. The first one was the draft of the Policy of Social Appropriation of Innovation in 2005 that never was formally issued but it acquired certain legitimacy. Five years later, the second document was enacted, the National Strategy of Social Appropriation of Innovation. This critical juncture was built by the Science, Communication and Culture Division in Colciencias (hereinafter, Division). This Division was in charge of science divulgation activities since the early 1990s, and it was boosted after the *Mision de Sabios*. In this case, this Division embodied the role of institutional entrepreneur.

The critical juncture was featured by intense discussions fostered by the Division around relationships between Innovation and society. Those discussions were boosted by several activities promoted by the Division in the period of the critical juncture (Daza-Caicedo & Lozano-Borda, 2013). They revolved around two approaches that aimed to address

the relationship between Innovation and society. The first approach was represented by *deficit models* of innovation divulgation, and the second one was shaped by "strong" approaches of scientific knowledge appropriation (De Greiff & Maldonado, 2011).[1]

The Formation Phase

As institutional entrepreneur, the Division has seven features that strengthen its role. First, it had a distributed leadership among its members (ColciCase-IT1, 2019). This distributed leadership was helpful to deal with the job instability that features the public sector in Colombia. Second, the Division was shaped by members with a background or a strong relationship with Science and Technology Studies (STS). This quality contributed to defining the Division directionality. Third, the Division was constituted by heterogeneous members. Therefore, it gave them the flexibility to attend different work areas (ColciCase-IT1, 2019). Two qualities (fourth and fifth) that also distinguish this institutional entrepreneur are its opportunities tracking and strategic analysis capabilities. These features allowed the Division to:

> "advantage spaces or opportunities to involve political and conceptually the topic. For example, in 2015, the linking of social appropriation to the sectorial guide, which is the guide to finance projects from the Science, Technology and Innovation fund" (ColciCase-IT1, 2019).

The sixth and seventh Division's qualities are linked with the Division recursion talent and second order-learning (Rip, 1992; Kuhlmann, Shapira, & Smits, 2010).[2] These characteristics were reflected in the members' capacity to overcome challenges in working with communities in remote areas in Colombia (ColciCase-IT2, 2019) and designing and implementing policy tools to develop the Policy and the Strategy of Social Appropriation. The last characteristic of this Division as an Institutional Entrepreneur has been its resilience. This quality, along with its distributed leadership, has contributed to navigating the Colombian political and policy instability and building trust and credibility with local communities in the country.

[1] In this context, deficit models can be described as the relationship between knowledge producers and consumers mentioned in the previous paragraph. In contrast, the "strong" approaches acknowledge the capacity of knowledge production of any actor (consumer, citizen, researcher, policymaker, among others) and the necessity of fostering horizontal spaces of co-production of knowledge between them (COLCIENCIAS, 2010; De Greiff & Maldonado, 2011).

[2] Following Rip (1992) and Kuhlmann, Shapira, & Smits (2010), learning processes can be divided into first-order and second-order. Those categories can be defined as follows: "Whereas first-order learning focusses on improving a particular path without considering any change, in a second-order process, new understandings, objectives, actors and interplays could appear" (Pinzón-Camargo & Ordoñez-Matamoros, 2021, p. 154).

As mentioned, the Strategy of Social Appropriation entailed the vision of change introduced by the institutional entrepreneur. This vision of change emerged from the discussions around the alternatives to build bridges between innovation and society in the critical juncture at the path-transformative phase. The vision of change was featured by the stream of the "strong" approach to scientific knowledge appropriation. This stream acknowledges innovative capabilities in all of society and not only in the scientific community. In that sense, it considers that knowledge production can emerge from co-production processes between different actors and that those processes could address daily problems (Jasanoff, 2004) (COLCIENCIAS, 2010; ColciCase-IT1, 2019).

The Division implemented several strategies and self-reinforcing mechanisms to build a policy niche[3] and, therefore, align and develop new practices to support the introduction of divergent change.[4] Some of the strategies implemented by the Division are described in Table 2. In this table, the programmes Ideas para el Cambio and A Ciencia Cierta (hereinafter, the programmes) appear repeatedly, showing the centrality to foster the Path-transformative process.

Besides the strategies described in Table 2, the institutional entrepreneur used self-reinforcing mechanisms to strengthen the Path-transformative process. Some examples of those mechanisms were the institutional density (Pierson, 2000) and financial investments. The first set of mechanisms can be illustrated by enacting policy documents and anchoring critical elements of those into others. From a managerial perspective, the anchoring strategy produced financial and political arrangements between Entities that kept sustainability to the vision. For example, some of the public calls from the programmes have received funding from other National Entities like the Ministry of Information and Communication Technologies or the National Service of Learning (SENA by its acronym in Spanish). The second set of mechanisms have emerged from significant agreements between COLCIENCIAS and multilateral banks (ColciCase-IT1, 2019; ColciCase-IT2, 2019).

[3] Policy niches are very similar to socio-technical niches but in the context of policy's formulation and implementation. They are protected spaces where vision's change led practices to divert the trajectory of the mainstream of policy. These niches provide conditions to experiment inside the public sector, and in implementation policy spaces which can derive into deep socio-technical transformations. Examples of these policy niches are known as "public policy pilots".

[4] These practices and the divergent change will be described below as part of the development phase.

Table 2. Strategies implemented by the Division to foster the Path-transformative process.

Strategy	Example
Discursive Capability	The Division decided to name the Strategy of Social Appropriation of Innovation as "Strategy" to have a smooth and fast enacting process in 2010. Content-wise, the Strategy looks like a Policy. However, junctural situations like the beginning of a new presidential period and the traditional change of all persons in strategic positions, besides the complexity of negotiations with other entities that entail a policy, explain this strategic decision (ColciCase-IT10, 2019).
Looking for allies	Besides spreading the vision of change by policy documents and official presentations to researchers and policymakers, it was necessary to involve communities from cities and rural areas in the programmes: "So there was an intentional, a very intentional communication process in generating that facility and that confidence in the public so that they wanted to reach this type of experience. Moreover, from that, either it was the failure, or it was the triumph of the two instruments because we did it badly and we scared them, or we did it well, and we generated what we wanted with those instruments; And so, that was the story of the two. So that is why colours, texts, images, names and everything are special and different." (ColciCase-IT2, 2019). The process like building an allies' network to support the critical juncture or spreading the Division's vision of change is similar to what has been described by classical STI European and Latinamerican studies relied on activities like (Callon et al., 1982; Thomas et al., 2019): Forums (COLCIENCIAS, Universidad EAFIT, 2011; ColciCase-IT1, 2019); Agreements with international entities like the Interamerican Development Bank and the World Bank (ColciCase-IT1, 2019), and actors involved in each of the activities launched by the Division, like the sponsors, beneficiaries and other actors involved in the programmes (ColciCase-IT1, 2019). "This group has been characterised by looking for others to work with, not designing from here only, but seeking alliances with others who are already working, entities, and to be able to work better." (ColciCase-IT1, 2019). The opportunities tracking and strategic analysis example described below also depict the Institutional Entrepreneur efforts to involve other areas and instruments inside MinCiencias. The process of involving other areas inside MinCiencias has required periodical meetings to explain what the Division does (ColciCase-IT3, 2019; ColciCase-IT12, 2019) in a sort of continuous pedagogic process.
Motivating by Example	The results of the programmes are published on the two websites designed for those programs1, 2. Besides texts describing the projects supported by MinCiencias, those websites include videos with the community's testimonies. The institutional entrepreneur used these results to motivate other entities to follow their path (ColciCase-IT1, 2019; ColciCase-IT5(Part1), 2019).
Showing results	Besides using the results from the programmes to motivate other actors, the visibility and exposure that they brought for Colciencias contributed to standing the Strategy (Pinzón-Camargo, 2019).
Anchoring	To spread the vision of change and build the policy niche, the Institutional Entrepreneur anchored the Policy and Strategy of Social Appropriation of Innovation to: the Innovation Law of 2009; in critical methodologies for the Innovation sector like the model of research team measuring (ColciCase-IT1, 2019); in policy documents like National Development Plans (ColciCase-IT1, 2019); or international studies from entities like the OECD (OECD, 2017). In general, the Division was aware about anchoring the Policy and Strategy in strategic documents to keep sustainability to the Path-transformative process. "In this sector, in Colciencias, it is very important to be in the policy documents, because if you are there, then there may be resources, there may be implementation when you are not, it is an issue that can go unnoticed." (ColciCase-IT1, 2019).

Source: Own elaboration based on Pinzón-Camargo (2022). The definition of each strategy can be found in Pinzón-Camargo (2022).

The implementation of this set of strategies and self-reinforcement mechanisms by the Institutional Entrepreneur produced two results. The first result was the possibility to develop and spread its vision of change. The second result was built and shielded the policy niche where the practices that nurtured the change were developed or aligned to the vision of change. The analysis of this last set of results draws attention to the creation phase in the Path-transformative heuristic.

[5] *A Ciencia Cierta*, see: https://acienciacierta.minciencias.gov.co/

[6] *Ideas para el Cambio*, see: https://ideasparaelcambio.minciencias.gov.co/

The Creation Phase

In this case, the divergent change introduced by the institutional entrepreneurs boosted the development and alignment of four sets of practices that have their expressions in two levels, as Table 3 shows. The first level is named National. It entails the political process that the institutional entrepreneur has had to manage with its peers inside MinCiencias and the public and private stakeholders that traditionally have access to this entity. In this point, it is worth pointing out that the institutional entrepreneurship work is mainly a political process (Leca, Battilana, & Boxenbaum, 2008; Tracey, Philips, & Jarvis, 2011; Pinzón-Camargo, 2022). The second level could be named Local. It comprises the work deployed by the institutional entrepreneur with local communities and academia to attend to the local communities' needs by using Innovation. The institutional entrepreneur has channelized this work supported in the programmes. Those programmes have been implemented since 2012 using public calls. In total, it has launched six public calls under the frame of Ideas para el Cambio programme and five from A Ciencia Cierta.

Table 3. Examples of Practices identified in this case.

Practice	Example	
	National Level	Local Level
Organisational	MinCiencias have had to learn to work with local communities and citizens. It meant developing communicative skills and changing administrative procedures to attend to the needs of these communities. It also entailed the process of involving non-research partners to deploy the public calls at the local level.	Local Communities and academia learnt how to work together. Academia learnt how to apply their scientific knowledge to co-produce solutions to the community needs. The community discovered in academia a partner to overcome their challenges.
Technical	They must develop methodologies and policy devices to support the technical and organizationally programmes. One of these devices was the figure of Godparents. This figure is the name assigned to researchers who decided to support the projects without financial compensation and following a set of principles to interact with the communities defined by MinCiencias (COLCIENCIAS, 2015). By the time, the Godparents figure became a recurrent practice in all the public calls. Besides, they introduce experimental approaches as part of improving the public calls (ColciCase-IT5(Part2), 2020).	Local communities learnt or improved the use of ITC technologies to get in touch with the Ministry and other actors involved in the programs and make reports required by MinCiencias (ColciCase-IT2, 2019).
Managerial	Financial and legal procedures were developed and aligned inside MinCiencias to report the financial payments and legally bind agreements with local communities and researchers. Two examples can illustrate these practices. First, a legal producer's alignment was using a traditional instrument in MinCiencias, the public calls, to make agreements with local communities and not with research groups as it used to be the practice. Second, it was necessary to adapt reporting procedures to accept payments from using non-traditional systems of transport. "It was like sitting down with them to explain the nature of the project, to show them how people lived a little and what the realities that were in the territory were like so that they understood the adjustments we had to make there, internally, right. For example, the legalisation thing was crazy because, in the first version with the World Bank, they asked us to even RUT and invoice the donkey on which we went up. I mean, it was like: "no sir, there is no, I mean, they are indigenous, they do not have a RUT, sometimes they do not have an ID card". So, it was like making them understand those processes, to negotiate, for example, that a cash receipt would be worth me like this, or little things that sometimes became a super problem and that could stop the project or the strengthening process." (ColciCase-IT12, 2019).	The programmes contributed to developing accountant and management practices (ColciCase-IT17, 2020).
Social	The institutional entrepreneur introduced the role of innovation to attend directly to the local communities and citizens needs, including environmental, social, and economic needs, as a policy objective.	The programme's public calls objectives show the intention of addressing environmental, social, and economic practices. Videos and actors' testimonies from the programs' websites show, for example, the reinforcing of agroecological practices. The work by Pinzón-Camargo (2022) studies in-depth those practices based on three cases from the programmes.

The Development Phase

The last phase in the Path-transformative heuristic depicts a situation where the process fostered by the Institutional Entrepreneurs arrives at the consolidation stage. To achieve the Path-transformative process' consolidation, the institutional entrepreneur has continued implementing its strategies. The following are some examples of those strategies.

- The Institutional Entrepreneur remains showing results based on the programmes;
- It is looking for new allies like SPRU;
- It is anchoring the Strategy of Social Appropriation to critical sectorial documents like the Green Book (COLCIENCIAS, 2018);
- It is using its discursive capability to adapt its interests to appealing narratives like *social innovation*, *public innovation*, or *transformative innovation*.

All efforts to sustain its vision of change have had in the last two years two remarkable advances. The first one emerged from the new organisational transformation in COLCIENCIAS. This entity became the Ministry of Science, Technology and Innovation (MinCiencias) in 2019. In that transformation, it was settled the Vice ministry of Talent and Social Appropriation. Second, a new policy of Social Appropriation of Knowledge in 2021 was enacted. Both advances can be understood as part of the self-reinforcing mechanism of increasing the institutional density (Pierson, 2000).

To sum up, the above elements consider that despite the institutional entrepreneur efforts to foster its Path-transformative process, it is still far to be considered a consolidated process.

4. DISCUSSION

In the following do we show which are the operating logics and enablers of the transformative pathway in the analysed case, in particular in the preformation and formation phases of our heuristic. In the first place, we identified six logics underlying the path-transformative process studied in the preformation, formation, and creation phases. Those logics are: i) technological determinism; ii) knowledge-dialogue -typically framed in the

innovation systems approach (ISA)-; iii) technological facilitation; iv) mentorship; v) legality; and vi) visual representation and circulation logics.

On the second place, the enablers are extended through all the transformative-pathway heuristic. We identified at least 6 enablers, namely: i) legitimacy inception of transformation; ii) discursive force; iii) policy-niche inner force; iv) migration of critical policy content; v) public deployment; and vi) sustained vision-oriented of change.

Underlying Logics

A remarkable underlying logic of the transformative path deployed by SASTI-Policy in the preformation phase, is that innovation is considered a driver to foster industrial productivity and competitiveness. It affirms the linear mode of production of knowledge, also known as technology-push or market pull and reinvents the hierarchical and highly criticised mode of relationship between knowledge producers and knowledge consumers attached to the old-fashion paradigm of technological determinism (Feenberg, 1992).

In the formation phase, three underlying logics emerged based on the role performance by the institutional entrepreneur. Those logics contributed to breaking the dominant technological determinism logic from the previous phase. The three logics are: i) mutual learning between academia, communities and citizens at national and local levels (multiactor models: Sabato's triangle, Etzkowitz's triple helix model, ISA etc.) based on the idea of a non-hierarchical processes of knowledge-dialogue; ii) in technical terms, the ITC technologies play a relevant role contributing to building the path-transformative process of transformation pathway, which can be named technological facilitation logic; and iii) in social terms, the mentorship dynamics built up around the figure of Godparents, which can be named as a mentorship logic. These logics are key to trigger the creation phase of a transformative pathway.

Formation and creation phases shared common underlying logics. For instance, the knowledge-dialogue logic based on mutual learning was operating in both phases. In managerial terms at these phases at the national level, we also recognise the logic of legality. This means that transformation can acquire momentum laying on formal state mechanisms such as binding contracts with communities and researchers. Without this, any possible transformation could happen. Finally, visual representation is the last recognisable logic in these two phases. Audio-visual representation on web pages and other communicative pieces, as well as "real-people" testimonies of life transformation configure a public perception that "things are going well". An innovation policy such as SASTI-Policy,

and its implementation requires social circulation: transformations on "communities" does not exist if there is not social understanding and appropriation that transformations are ongoing.

Enablers

In the preformation phase there are at least 3 enablers that trigger transformations: i) when the high-level officials focus in STI and coven high level and prestigious scientist, science gain social and political importance. The 1994 Mision de Sabios' interactions enabled discussion on the role of knowledge and the need to spread scientific knowledge in all the levels of the society; ii) giving rise to the notion of Social Appropriation of Science and Technology, a very catchy name, enough catchy to produce a giant snowball that pervaded a very important amount of social and economic sectors until nowadays. Even enough, iii) to be part since then of the public agenda. These three enablers can be named together as legitimacy inception of transformation.

Additionally, between the preformation and formation phase, new conceptualisations and discussions on Social Appropriation of Science emerged. Apparently mirroring the old STS debate about the need to deepen the constructive character of the sociology of science exposed by David Bloor (1976), in 2000's in Colombia the notion of "deficit" in social knowledge circulation appeared as a way to point out the importance of making "strong appropriation of science" (De Greiff & Maldonado, 2011). This is, to stimulate a flatter micro-power dynamics in knowledge production, circulation and uses. In particular, when scientists have to work together with or for communities. This enabler can be name as discursive force.

In the "formation phase" the "who" and the "where" are very important as enablers. As it was explained pages above the Division in Colciencias was constituted by people with an STS background or a strong relationship with STSer's. A heterogeneous group of officials facilitated work flexibility and the inscription of the idea to make another science: more local, pertinent and critic. This facilitates action in politics, in particular, officials who were very committed with communities, tracked opportunities and make strategic analysis in their benefit. This deserves more research, specially to explore the "corpopolitics of knowledge" of the officials who conducts the innovation policy in the global south (Grosfoguel, 2011; Tlostanova, 2019).

Related to the latter, recursion of talent, second order-learning, resilience, and the capacity to to act strategically are very significant enablers (Rip, 1992; Kuhlmann, Shapira, & Smits, 2010). The transformative pathway in the formation phase requires a focus on people and what they interpret about their learnings, how they change their behaviour and how to stand and face adversities, in particular working with communities to gain trust and legitimacy. This enabler can be named as policy niche inner force.

Strategising on policy documents is also an important enabler. Anchoring critical elements of one document into others as well as keeping a low profile of them in the hierarchy structure of them permits the sustainability of the group of officials involved in the division which institutionalise the policy niche. This enabler can be named as migration of critical policy content.

At the creation phase, as well as in the logics section at the national, regional and local level the multiactor interaction producing learnings is a transformative enabler itself. However, at this stage, the IE action supported on policy instruments implemented during a period of a decade, launched periodically is the most important enabler of transformation. This enabler can be name as public deployment.

Finally, at the development phase, the vision of change and the formulation of a policy itself are important enablers. Officials' efforts to sustain a particular vision of change contributes to make possible a new policy. Both, vision, and policy constitute at the same time a self-reinforcing mechanism of increasing institutional density (Pierson, 2000), but determinant at the last stage of a transformative pathway in TIP in the south. This enabler can be named as sustained vision-oriented of change.

The positive turn of our analysis shows some logics and enablers based on the Colombian case. Those elements constitute a starting point to explain how can be set a set of public actions for mobilising resources towards more sustainable sociotechnical systems via the governmental promotion of knowledge (Ordóñez-Matamoros *et al.*, 2021), with or without an underlying transition or mission-oriented's ambition for TIP in the Global South. Policy experiments for localising SDGs (Boni *et al.*, 2021) and transformative outcomes (Gosh *et al.*, 2020) are both normative and explicit ways based on action-research of inquiring TIP in the south. We make a call to complement this type of TIP's research in the south, in particular, for the understanding of what is beyond of the last stage of our heuristic, this is the vision of change as an enabler of transformation.

CRITICAL REFLECTIONS

As the paper is focused on logics and enablers of TIP in the Global South, in the following we draw the attention on a few recognisable limitations proper to the Path-transformative process consolidation in such a context, both political and institutional, based on the Colombian case.

The first relevant context limiting the potential role of the TIP initiatives refers to when the first STI Minister's credibility as researcher was strongly contested after she assumed her position. This situation undermined the political position of the Ministry as a whole, including its peers' trust (academia, industry, public sector and society) and specially the SASTI plans due to her personal commitment to it. This animated a discussion on the possibility for her to leaving her position, which resulted in less attention giving to such policy.

Secondly, the Law that supported the organisational transformation of COLCIENCIAS from an Administrative Department to become a Ministry was demanded, the organisation came to a stall waiting for a new Law to enable its full operation. Under this frame, the advance in terms of the Viceministry of Talent and Social Appropriation was not safe, even till today that there is a hubbub caused to the turn from a right-wing to left-wing government.

Thirdly, the new policy of social appropriation received several criticisms. On the one hand, it does not solve the conceptual definition of the notion of Social Appropriation of Innovation that worked as an enabling condition to foster the Path-transformative process, issue that was brought since the formation phase until today. Finally, the policy was launch with a lack of enforcement because it was enacted by a resolution that is one of the weakest legal instruments in public policy in Colombia.

Finally, in conclusion, we want to highlight the following two points. First, further research from not only normative but positive stances is necessary to have a better understanding of TIP policies in the Global South. This endeavour entails opening a broad research agenda entailing fields like the role of politics in TIP policies, the path-transformative process of TIP policies, visions of change and actors' motivations, the transformative logics in transformative-paths, among other elements that contribute to an in-depth understanding and building of transformative policies from and by the Global South. Second, and hoping to continue working in this stream of knowledge, we convene and reflect on the importance of digging into i) futures change vision; ii) logic, enablers but overall, on barriers; and iii)

in general, on all those innovation policies aiming sociotechnical transformations looking for social and environmental justice detached to MLP theory and action-research. This proposal arguably can shed light on how policy-makers and officials in the global south have dealt with setting transition, social transformations or environmental sensitivity in innovation policy. A better understanding of TIP lies in other theoretical referents; even those based on different kinds of knowledges or local theory are helpful for this matter.

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Transformative Translations?

Challenges and tensions in territorial innovation governance

Thomas Völker[1], Rasmus Slaattelid[2], Roger Strand[3]

[1] Centre for the Study of the Sciences and the Humanities, University of Bergen, Norway.
thomas.volker@uib.no

[2] Centre for the Study of the Sciences and the Humanities, University of Bergen, Norway.
rasmus.slaattelid@uib.no

[3] Centre for the Study of the Sciences and the Humanities, University of Bergen, Norway.
roger.strand@uib.no

ABSTRACT

Since the 1990s, changing ways of producing and circulating knowledge have been accompanied by debates that diagnose and call for change in the relationship between science, society, politics, and innovation. Most recently in Europe, some of these debates emphasize the concept of responsible research and innovation (RRI). In this paper, we present a comparative analysis of different territorial RRI-pilots within the Horizon 2020-funded project TRANSFORM. In these pilots, different translations of RRI become visible. RRI (1) gets translated as participatory and deliberative modes of innovation governance aimed at transformative change, (2) takes the shape of citizen science projects; and (3) is enacted as participatory agenda setting and (plans for a) citizen assembly. We argue that it is the often-invisible work of establishing, nurturing, and caring for relationships within the territorial R&I ecosystems – what can the thought of as ongoing "maintenance work" – that creates the conditions for more responsive modes of innovation governance, and thus a shift towards transformative change in innovation policy. Through describing these translations and the related practices we will direct attention to the potential, challenges, and systemic barriers of this kind of work.

Keywords: Innovation Governance; Responsible Research and Innovation (RRI); Translation; Maintenance.

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INTRODUCTION

Since the 1990s we have witnessed a debate about changing ways of producing and circulating knowledge both diagnosing and calling for changing relations of science, society, politics, and innovation. Most recently in Europe, some of these debates emphasize the concept of responsible research and innovation (RRI) (Owen *et al.*, 2012). One of the central aims of RRI is to rethink how science and society become responsive to each other in order to gear innovation processes and practices towards a common good, and transformative change. As such it is a move beyond linear narratives of innovation (Strand *et al.*, 2016), which calls for locally situated engagements with innovation cultures, practices and processes (Pfotenhauer *et al.*, 2019). The Rome Declaration on RRI in Europe states that "RRI requires that all stakeholders, including civil society, are responsive to each other and take shared responsibility for the process and outcomes of research and innovation."[1] To achieve that objective the European Commission launched its Science with and for Society (SwafS) programme, which funded a sizeable number of projects that aimed to implement ideas and principles of RRI. This framing of implementing RRI, is usually entwined with particular ideas about impacts, benefits, and success criteria of such projects, not the least due to the increasing projectification of publicly funded work, and the marked audit culture of the European Commission.

While it is generally commendable to reflect on how exactly RRI projects become responsive and what their contribution to transformations in regional RRI ecosystems is, this framing also comes with a set of challenges. Implementation as a concept implicitly assumes that there is a right way of doing RRI, a script of sorts, or a core set of principles that can be applied and followed. The idea then, is that these principles can be put into action in the right or the wrong way, leading to implementation success or failure, respectively. The problem with this framing is that it overlooks a central insight from science and technology studies, namely the pervasive importance of context and situatedness in the practice and governance of research and innovation (Pfotenhauer & Jasanoff, 2017). Within the SwafS programme, this tension was almost constitutive to the projects, in that several of the calls for funding described the expected impact of the projects to be funded in terms of standardised and highly decontextualised criteria, the so-called MoRRI indicators (Völker *et al.*, 2023). This brought what was called the SwafS ecosystem to consider alter-

[1] https://digital-strategy.ec.europa.eu/en/library/rome-declaration-responsible-research-and-innovation-europe, accessed August 15, 2022.

native approaches to monitoring their own progress, such as evaluative inquiry (Fochler & De Rijcke, 2017). This paper is one instance of this development towards evaluative inquiry, in which we move from the framing of "implementation" to that of "translation" (Konopásek *et al.*, 2018; Soneryd & Amelung, 2016), seeing RRI as a general principle that has to be translated in order to work, and to make sense, at different scales and contexts.

Specifically, we present a comparative analysis of different territorial RRI projects within the Horizon 2020-funded project TRANSFORM[2] that carves out a range of different translations of RRI in territorial pilot projects in the three TRANSFORM clusters in Lombardy, Catalonia and the Brussels-capital region, while also directing attention to the organizational and institutional ecosystem that both enables the pilot projects' work and shapes how it plays out in practice. In these pilot projects RRI (1) gets translated as participatory and deliberative modes of governance aimed at transformative change, (2) takes the shape of citizen science projects, and (3) is enacted as participatory agenda setting and (plans for a) citizen assembly. Thus, we see different translations of RRI steered by diverse actors and confronted with distinct tensions and challenges. We are interested in precisely these multiple translations of RRI, the organizational and institutional orderings with which they co-emerge, shifting notions of citizenship, and the challenges and dilemmas that come with these translations. Related to this, we emphasise the often invisible and neglected work of "maintenance" in innovation discourses and practices, and how maintenance work is a necessary condition for enabling certain translations of responsible innovation. In doing so, we able to unpack the different conceptualizations of impact that surfaces in the accounts of our interviewees.

[2] https://www.transform-project.eu/, accessed September 20, 2022.

INNOVATION, RESPONSIVENESS, AND MAINTENANCE

> 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) (von Schomberg, 2012)

From its very start as one of the central concepts in innovation governance in Europe in the 2010s, the notion of Responsible Research and Innovation (RRI) included the principle of "responsiveness" to describe what were considered desirable science-society relations. The Rome Declaration described responsiveness as a "shared responsibility for the process and outcomes of research and innovation" and von Schomberg relates responsiveness to questions of "acceptability, sustainability and societal desirability" of innovation processes and their outcomes.

This way of thinking about the relations between science and society marks the latest iteration of a debate that can be traced back to the so-called "linear model" of innovation, often ascribed to Vannevar Bush (1945) and the discussions about this model in the decades after its initial formulation (see e.g. Godin, 2006; Strand & Funtowicz, 2016). Post-WWII, the idea that strengthening basic research will lead to economic growth and social welfare[3] became powerful to the point of becoming an often-unquestioned point of departure in innovation governance. It still underpins European Union policy (see e.g. the Lisbon Treaty, initiatives like "Innovation Union"[4] or the European Green Deal[5]) where it is often imagined as a "panacea" for societal challenges (Pfotenhauer & Jasanoff, 2017).

Academically, the linear model is largely discredited. Godin (2006) points out that the contemporary idea of innovation as a linear path from basic research to economic growth and well-being was very much promoted and stabilized not by Bush himself but that this is rather a retrospective ascription. Regarding the idea of innovation itself, scholars have called out the simplistic assumptions about cause and effect and searched for more

[3] This argument resonates with earlier thinking about the relation between science and society as well as economic progress (in a free market) in the work of Francis Bacon and Nicholas de Condorcet (Strand & Funtowicz, 2016). Citizens will profit from this in the form of employment and better consumer products; thus, they enter the relationship mainly as employees and consumers.

[4] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0546&from=EN, accessed August 19, 2022.

[5] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en, accessed August 19, 2022.

dynamic accounts on innovation processes and their governance. (Etzkowitz & Leydesdorff, 1998; Strand & Funtowicz, 2016). In addition, the idea that there can be universal models to describe innovation is rejected and instead, more granular approaches that allow for increased attention to the situatedness of innovation processes are suggested. Pfotenhauer and Jasanoff (2017) direct attention to what they call "models of practices", i.e. the local ideas and assumptions about how innovation works and what actors need to be involved and how.

So-called third generation innovation policy calls for modes of innovation (and its governance) geared towards the public good and transformative change, supplementing if not replacing first generation innovation policy related to the linear model and the idea that new scientific discoveries would translate into technological innovation through applied R&D in the private sector. In between, second generation innovation policies have been more focused on globalization and the idea that knowledge production is also an interactive learning and capacity building process, where stimulating competition and entrepreneurship is key. (Diercks *et al.*, 2019; Pfotenhauer *et al.*, 2019; Schot & Steinmueller, 2016, 2018). RRI may be seen as one policy concept that responds to the call of third generation innovation policy. A central element in RRI as in the entire third generation innovation mode, is the need to rethink the range of actors who could and should legitimately participate in innovation practices and processes as well as their repertoires of interaction.

Broadening the range of "response-able" actors

Parts of these debates about innovation governance and practice crucially also address the actors who are and should be involved. Who is given a voice and can thus become a responsive societal actor? In this way it resonates with the principles of responsible research and innovation. This should come as no surprise as this notion grew out of debates of changing relations between science-society and innovation asking the question of who should be "response-able" (Felt, 2017) to whom, by what means, under what conditions and through which practices?

From the early 1990s there has been a debate about new modes of knowledge production between diagnosis and calls for changing relations between science and society. These debates are captured in various terms, and Mode 2 science, post-normal science (PNS), and Triple Helix are among the most influential of these.

In terms of the actors involved the concept of the triple helix (Etzkowitz & Leydesdorff, 1998) can be considered the most faithful to Bush's vision, in the sense that the main three actors involved are governments, universities and industries. However, the model of interaction is no longer a linear one, but rather one that is captured by the metaphor of a "helix". The aim of using this metaphor is to move beyond "the ideology of basic research" (Etzkowitz & Leydesdorff, 1998, p. 205) and towards a more dynamic model that envisions a "continuous series of experiments between science, industry and government" (ibid.). The endless frontier in that way becomes an "endless transition". While initially the set of actors who are supposed to become responsive to each other was very close to Bush's vision, more recently this idea has been extended by notions of a quadruple or even quintuple helix, pointing to the importance of involving publics (the fourth helix), and the environment (the fifth helix).

While work using the Triple Helix metaphor thus focuses on changed relations between science, industry, and governance, Mode 2 focuses very much on forms of transdisciplinary knowledge production and thus acknowledges the importance of what is called "contexts of application" for knowledge production practices (Gibbons ,1994; Nowotny, Scott, & Gibbons 2001). This in turn means that a broader set of actors is envisioned to contribute to knowledge production and innovation processes from the outset. The idea of post-normal science entails a similar conclusion, arguing for an "extended peer community" that evaluates inputs from science into decision-making (Funtowicz & Ravetz, 1993). In this way responsiveness is thought of as a democratization of science in the sense of nurturing public debate about science and technology.

A parallel and partly overlapping strand of literature also works toward a re-ordering of science-society relations, but this strand focuses more on keeping science (& technology) in check. Different forms of technology assessments challenge the assumption that untethered science will automatically lead to economic wealth and societal progress and wellbeing, with negligible side effects. Therefore, some version of checks and balances need to be put in place. Accordingly, methods of technology assessment (Guston & Sarewitz, 2002; Rip & Kulve, 2008) have moved from a more post-hoc and reactive endeavour (Nordmann, 2014) towards real-time assessment (Schot & Rip, 1997) and modes of anticipatory governance (Barben *et al.*, 2007; Guston, 2013). Research on the Ethical, Legal and Social Aspects or Implications – ELSI or ELSA – Is usually regarded as the immediate predecessor of RRI (Fitjar *et al.*, 2019)

While these concepts challenge our understanding of what responsiveness can mean in the context of innovation governance, there is still some critique of the temporality involved in this kind of work. Assessments and reflections on the potential consequences and implications of newly emerging technoscientific fields tend to be relegated to isolated work packages in projects or conducted towards the end of innovation processes. One of the core ideas of RRI is to move these reflections "upstream" (Krabbenborg & Mulder, 2015). The idea of Responsible Research and Innovation grew out of these strands of work in both academia and policy. It proposes a mode of governing technoscientific innovation by making a broad range of actors responsive to each other across various sectors of society (Frahm *et al.*, 2021; Owen *et al.*, 2012; Rip, 2016). In recent years different approaches towards citizen engagement and deliberative democracy have become the dominant mode in which RRI gets translated. Knowledge production and innovation practices are thus taking on board ideas of care and maintenance.

Alternative ways of thinking about innovation and its governance: maintenance and care

The idea of care has been part of the conceptualisation of RRI from its early days (Groves, 2013; Kjølberg & Strand, 2011). Stilgoe, Owen and Macnaghten (2013) explicitly relate this notion to the governance of science and technology: "Responsible innovation means taking care of the future through collective stewardship of science and innovation in the present." (Stilgoe *et al.*, 2013, p. 1570).

Care – as presented in this quote as well as in other work on care in technoscience – is an explicitly temporal concept and positions itself also normatively in at least two ways: care calls for long-term engagement in contrast to short-term or one-off decision-making that follows a logic of choice. In addition, following a logic of care in the governance of technoscience is about the timing of engagement with certain issues or technoscientific objects. At what point in the knowledge production and innovation process are which actors expected (or empowered) to become responsive to each other? Whereas many approaches of engagement in the governance of technoscience (think TA or ELSI/ELSA) intervene towards the end of the process, following a logic of care means early intervention and ongoing collaboration throughout the process. The aim of such a shift is "to emphasize caring responsiveness in technoscience" (Puig de la Bellacasa, 2011, p. 87). On a broader level, this position resonates with a critique of the "Cartesian dream" of control (Guimarães Pereira, 2015). The idea is that instead of aiming for control, innovation governance and practice should be guided by a logic of care and consequentially strive for "caring

transformations to sustainability facilitate adaptation, ongoing tinkering, fine-tuning, and repair of processes and products by users situated in their settings." (Arora *et al.*, 2020, p. 248).

More recently a similar notion has entered discussions about innovation: the idea of maintenance. Maintenance is presented as an alternative way of thinking about innovation, a way that does not fetishize the new but focuses of taking care of what is already there (Vinsel & Russell, 2020). Maintenance is therefore positioned in contrast to more "traditional" ideas of innovations:

> "In some ways, maintenance is the opposite of innovation. It is the practice of keeping daily life going, caring for the people and things that matter most to us, and ensuring that we preserve and sustain the inheritance of our collective pasts. It's the overlooked, undercompensated work that keeps our roads safe, our companies productive, and our lives happy and secure." (Vinsel & Russell, 2020, p. 14f.)

The idea of maintenance as presented by Vinsel and Russell is also a decidedly temporal perspective on the issue of responsiveness. It is about taking care of our "inheritance" and about "persevering" and "sustaining" what is already there. We believe that these concepts sensitize our analysis to the often neglected, invisible and marginalized practices of building networks, nurturing relationships and in doing so slowly transforming cultures of responsibility in innovation governance. This perspective requires an extension of Russell and Vinsel's definition of 'maintenance' to encompass not only technical and physical orders (Russell & Vinsel, 2018), but also social orders, under which we subsume techniques for involving and rendering responsive different societal actors in RRI. Understood in that way, focusing on the role of maintenance work in the regional translation of RRI may also be a good way to think about the impact of such projects. When it comes to concrete RRI projects such as those funded by the EU SwafS programme, responsiveness is operationalized in terms of 'impacts' and 'benefits', a direct consequence of the general rules of play, that is the accountability measures of EU funding schemes for research and innovation. 'Impacts' and 'benefits' are notoriously hard to measure, however, especially when it comes to transformative innovation governance.[6] One way of explaining why is to notice that transformative governance ambitions are not well suited for top-down, command and control intervention logics. Rather, RRI is better addressed in terms of network approaches and self-governance (Strand *et al.*, 2015). But this means that the metaphor of 'impact' as the result of an external force hitting the system is ill-chosen.

[6] For more background on this discussion in the context of RRI see the discussion paper published by the H2020-funded project Super MoRRI: https://super-morri.eu/findings/, accessed August 23, 2022.

The aim of this paper is thus to zoom in on RRI activities in three different regions to ask how responsiveness is practised within different R&I ecosystems, explore the role that care and maintenance play in the translation of RRI in the different regional clusters, and carve out how this relates to and creates tensions with notions of (long-term) impact and benefits as well as with aspirations of transformation.

FROM IMPLEMENTING TO "TRANSLATING" RRI

Translation as a literary concept refers to the transfer of a text from one language into another. In science and technology studies, it is used similarly as a relational concept, denoting a process of replication through imitation and differentiation (Barry, 2013). Translation focuses on both similarity and difference simultaneously: "When public participation instruments are situated in specific local contexts, however, their ideas, values, formal rules, and tools become remixed, giving rise to new meanings." (Soneryd, 2016). This way of thinking about translation directs attention to the shifts – 're-mixes' – in meaning of concepts like participation, citizen, or expert, to the making and re-making of links between different actors, and, finally, to the political and organizational settings in which they are applied. Hence, we see a double movement of translation: RRI is translated in a specific way in different cases of RRI application, be it through different methods, approaches, or tools. This in turn means that also these methods are translated as RRI in specific ways. Importantly, these shifts and changes are not random or arbitrary. They are entwined with the political and organizational contexts in the three different clusters.

In other words, the term translation can be used to understand exactly how ideas – or policy concepts like RRI – travel and materialize in ever-new forms. This is especially relevant in the SwafS (Science with and for Society) projects that are precisely concerned with the idea of RRI travelling from a transnational context to regional or territorial scales, and across different sectors in the quadruple helix. In these processes of translation and travel, RRI itself gets transformed and assembled in new ways.

In this paper, we explore different translations of RRI in territorial pilot projects in the three TRANSFORM clusters in Lombardy, Catalonia and the Brussels-Capital region, while also directing attention to the organizational and institutional ecosystem and the often-invisible maintenance work that enables the pilot projects' work and further shapes how it plays out in practice. Through describing these translations we will also draw attention to some of the implicit challenges in an effort to overcome attempts at governance of

complexity – with its remnants of dreams about prediction and control – on the way towards what has been referred to as governance *in* complexity (Kovacic *et al.*, 2020).

MATERIALS AND METHODS

We present a comparative analysis of RRI pilot projects in three different regions: Lombardy, Catalonia, and Brussels-Capital region (BCR). These pilot projects are part of the broader project TRANSFORM, which is funded by the Horizon 2020 SwafS programme. The aim of the project – as described on the project website[7] – is to put "RRI principles into practice" by bringing together these three European regions "to design, test and disseminate three sound co-creation methodological frameworks (participatory research agenda setting, design for social innovation and citizen science) within their Smart Specialisation Strategies (S3)." The overarching goal is to "establish more open, transparent and democratic R&I ecosystems for more responsible territorial development." The authors of this paper were participants in the project, with responsibility for a work package called "Monitoring and Evaluation". This paper presents results from that work package.

In these pilot project we see different translations of RRI: it takes the shape of citizen science projects, design thinking, participatory agenda setting and (plans for a) citizen assembly. These translations are mediated by the actors involved and their relative positions within the different R&I ecosystems.

To carve out these translations, we draw on data gathered in the project TRANSFORM. The core material consists of interview data from 12 semi-structured interviews (Lamont & Swidler, 2014) with 15 project partners working in the different territorial RRI pilots of the TRANSFORM project. Two of these interviews involved more than one interviewee. The interview guide addressed four key themes:

1. the concrete activities in the RRI pilot projects, how they put RRI into practices, and the various rationales that are guiding this work;

2. the specific (systemic) challenges and also resistances that our colleagues were facing in their work. During this section of the interviews, we also discussed the different institutional-political contexts of the regional pilot projects;

[7] https://www.transform-project.eu/about-transform/, accessed August 19, 2022.

3. the lineage of their work in terms of how experiences with previous attempts of doing RRI and RRI-like work in the region informed their TRANSFORM project activities;

4. the legacy and impact of their work, including reflections on what they expect will happen in the aftermath of the various pilot activities.

The interviews were conducted partly in person and partly online, lasted between 60-120 minutes, and were transcribed and coded. Furthermore, project documentation and relevant policy documents have also been analysed. The analysis followed a framework approach (Srivastava *et al.*, 2009) which means that we developed a coding framework based on a thorough literature review while also allowing for additional codes to be developed during the analysis (Charmaz, 2006). In addition to that, we participated in project meetings and had several online meetings with colleagues from the TRANSFORM clusters discussing our monitoring activities and the progress of the project's pilot activities. We participated in project meetings as project members and did not do participant observation. The coding of the interview transcripts was done in NVivo with 10 items that correspond to the structure of the interviews described above. These items included 'activities', 'R&I ecosystem', 'predecessors', 'legacy', 'carriers and mediators', some of which were divided into dimensions.

Our empirical work follows recent developments in the literature on evaluation, which stresses the importance of moving away from solely relying on quantitative measurement and more towards 'indicating' (Marres & de Rijcke, 2020) and 'evaluative inquiry' (Fochler & De Rijcke, 2017):

> " 'Evaluative inquiries' are not solely structured along the lines of externalizing explanations and metrics. They are also capable of representing the heterogeneous associations and practices that constitute our work. (…) Evaluative inquiries perform a shift from a predominantly bureaucratic to more substantive modes of assessment. In this, a standardization of indicators and methods is less relevant than "staying with the trouble" (Haraway 2016); staying closer to the epistemic missions, frictions and resonances of the work under scrutiny." (Fochler & de Rijcke 2017, p. 34)

This approach allows for representations of complexity by paying close attention to the different missions and frictions, and by asking how they are entwined with social, epistemic, normative and organizational orderings. The aim of the analysis is to explore in detail regional translations of RRI in the different pilot projects in the three TRANSFORM

clusters, and to further ask what challenges the actors have encountered – in particular challenges of creating long-term impact of their work. This also entails looking carefully at how ideas about impact, benefits, and the temporality of these concepts enter translations of RRI.

RESULTS

We have explored translations of RRI in the three clusters of the TRANSFORM project and analysed how these translations relate to distinct forms of maintenance work. Our results fall into two main parts. First, we describe the activities in the different clusters together with the distinct translations of RRI and how are expected to become responsive to society. We then move on to examine the work that is taking place simultaneously with these core pilot activities; work that – taking inspiration from Vinsel and Russell (2020) – we came to see as "maintenance work".

Part I: Translating RRI in pilot activities

Participatory agenda setting in Lombardy

The Lombardy part of the TRANSFORM project focused on a participatory research agenda setting process conducted by Fondazione Giannino Bassetti (FGB) and their partners from the regional administration, Regione Lombardia (the Region) and Finlombarda between April and May 2022. The aim of this exercise as described on the project website was "to render S3 more inclusive and transparent, ensuring that citizens' voices are heard, and opinions are taken into account in setting up key regional R&I policies (deliberative process).".

This process involved a telephone and online survey of one thousand Lombardian citizens with the aim of getting a representative sample of the population and then to focus on a single topic selected from the surveys through a qualitative process. This topic – which turned out to be energy transition – was selected based on the survey and because of its relevance to the EU and to national and regional policymaking. The qualitative process was an 8-hour deliberative workshop with the title "Just Energy Transition in Lombardy", conducted online with 18 participants on a Saturday. The workshop was divided into an information phase, a discussion, and time for the elaboration of recommendations. The objective of this workshop was to collaboratively work on recommendations for work towards a just energy transition.

> "In our case in the participatory agenda setting it was very important to understand the needs of the citizens because the activities were focused on these and it was very helpful and also the social demographic variables were very important to understand." (Int_06)[8]

Citizens were engaged as holders of certain "needs" accessible through different kinds of survey and interview methods. This conceptualization also ties into a particular theory of change in which these needs of the citizenry had to be expressed in order to be properly understood, needs that were pursued further in the workshop. Once these needs would be understood by the Region, innovation strategies that are developed by the Region together with different innovation clusters (populated by "stakeholders" from industries and academia) were imagined to address these needs. The relation of innovation policy and society in this translation of RRI is thus one of providing solutions to regional problems.

In addition to understanding the needs of the Lombardian citizenry, there was another important rationale for conducting this kind of participatory agenda setting process.

> "So, the first was to really to think about representativeness of the citizens to have this broad survey with sample of representation of a population in Lombardy. So to show the Region that that means to consult your population in a, from a strong methodological point of view (…)" (Int_05)

By producing a methodologically sound, representative "consultation", one could provide a showcase for the Region. In that way the participatory agenda setting process was also a way to develop and nurture the relations between FGB, the Region and Finlombarda. This way of showcasing the potential of certain approaches is part of work that goes beyond the pilot activities themselves in important ways. We shall return to this point below.

[8] Throughout the empirical section of this paper, we use quotes from the interviews. These quotes are lightly edited for clarity and readability.

Waste management and health services in Catalonia

The Catalan part of the TRANSFORM project – similar to the work of the Lombardy cluster – could rely on a close collaboration between the research and administrative partners. Furthermore, the cluster partners could draw on a rich culture of various forms of citizen engagement in the region, and they had a clear sense of how RRI could fit into what was happening in Catalonia and of how the actors were responsible – and should be held responsible – for this kind of work. However, two differences are noteworthy: firstly, the existence of two pilot activities, both guided by citizen science approaches; and secondly, the so-called "Think Tank", a group of stakeholders from across the regional innovation ecosystem who were strategically recruited based on their actual or potential interest in RRI.

The Waste Game

One of the Catalan pilots applied a citizen science approach to work with young citizens (secondary school pupils) in the suburban town Mollet del Vallès and several departments of the municipality with the aim to improve local waste collection practices. This was done through the co-design of an interactive digital waste game and the subsequent use of this game with the assistance of secondary school students. The rationale behind this activity was to address actual problems in a certain region by increasing the knowledge about waste collection and management and by learning more about the preferences of the citizens. As one interviewee told us, "it would be nice if we can work with somebody's real challenges" (Int_01). This in turn also means that the particular situation – the regional context – in which this pilot takes place strongly shaped what was being done:

> "So, what we want to do with the game is to co-create with people like the ideal waste collection system for their neighbourhood. And then you of course need to be able to implement that. So also people in charge needs to be flexible and understand that maybe not all one solution fits all. That maybe you need to have different solutions for the different neighbourhoods." (Int_01).

In terms of RRI, the pilot aimed to align the technical waste collection system better with the values, needs and demands of the local population. The role of the young participants was to serve as ambassadors and door openers to the wider population of the town. The pilot worked towards RRI outcomes in the sense of improved transversal communication and collaboration in the municipality of Mollet del Vallès, between the technical, financial and educational services. This is a translation of RRI that aims for responsiveness at the community level of knowledge production.

Endometriosis

Based on the interactions and ideas that emerged in the Think Tank (see below), an additional pilot project with the objective of improving service for the diagnosis, care and support in relation to endometriosis was developed. This pilot also employed a citizen science approach and involved patients, medical staff at Hospital Sant Pau in Barcelona, and the Catalan Agency for Health Quality and Assessment. The goals of this pilot activity were twofold: firstly, co-creation of recommendations to inform a new protocol for endometriosis care in Catalonia; and secondly, capacity-building and improved transversal communication and collaboration between public administration, health personnel and patients.

> "[I]n her team there were some other people working on that and she saw a very good opportunity to advance in a different way on this. To talk with the patients and involve them in all of the process. And they are super happy and in fact they are changing the protocols in the hospital." (Int_01)

The activity thus combined a conventional research interest with a willingness to do things differently by involving the patients. What we see here is the application of citizen science to gather information on the needs of a vulnerable group of people and then involve members of this group in the creation of an improved health service protocol.

Overall, these pilot activities are exemplars of a multi-faceted translation of RRI as citizen science. First, there is an element of gathering information about the needs and expectations of citizens in order to integrate them into policy – and decision-making processes. This idea is supplemented with the aim to work on "real challenges" (Int_01) in the region through "involving people that are (…) actually contributing to the research" (Int_01). Hence, actors on different levels are ascribed agency in these pilots, they are conceptualized as epistemic actors. Still, there is also an element of education and awareness raising in the translations of citizen science in the Catalan activities, something that is quite common in citizen science projects, see e.g. Strasser *et al.* (2019). We will return to this point.

Urban development and engagement with innovators in the Brussels-Capital Region (BCR)

There were two pilot activities in the part of the TRANSFORM project conducted in the Brussels-Capital Region (BCR). RRI was translated in two quite distinct ways: first, as an urban development project addressing problems with regard to unsold food, and second as quadruple helix engagements following a design thinking approach with young researchers at the Catholic University of Louvain.

Unsold Food

This pilot activity addressed the issue of how to deal with unsold food in the BCR, an issue that was brought up by local citizen-led initiatives, not-for-profit and for-profit organisations. Several different initiatives were addressing the challenge of food waste in Brussels that were in competition with each other. The cluster partners Be Participation and INNOVIRIS organized engagement activities to co-develop solutions for this issue. The general aim of RRI, as it was translated in the BCR cluster's work, was to provide a service or to give support to publics already formed around a certain issue.

> "It's this project called No Javel! that is a citizen initiative, so it is completely unstructured. It exists as a non-for-profit thing, association, but it's totally handled by volunteers, citizens and they go and get tons and tons and tons of unsold products from organic supermarkets, only organic places and they redistribute it to poor people." (Int_09)

This stance resonates with Callon and Rabeharisoa's idea of "the wild" and with work from Noortje Marres on the simultaneous formation of publics and issues. The pilot engaged with locally situated knowledge and lived experiences of food production and consumption systems combined with social innovation for groups described as "disadvantaged" and "people who don't feel entitled or interested" to participate in political processes. So, what we see is a clear normative stance in the objective to contribute to an improvement of regional governance approaches.

The ethos of "being of service" is crucial here. It is a central pillar of what it means to do "good engagement" in this case and also a translation of the idea of R&I becoming responsive to society. In the Unsold Food pilot this meant, for example, identifying needs and building networks, a version of responsibility that focuses on "facilitating meaningful engagement" with regional bottom-up initiatives focused on social innovation.

Simultaneously, the pilot aimed to be useful for the project partner from the regional administration. This particular idea of service we see here – focused on the "sustainability" of the initiative – managed to integrate INNOVIRIS into this translation. For INNOVIRIS a central concern is the longevity of the initiatives they fund: this is simultaneously about the initiative and maintenance of local RRI projects. Thus, the idea is a twofold one: on the one hand to help solve the problems by facilitating "meaningful engagement", and on the other hand to find ways to avoid such situations by influencing the evaluation grid at INNOVIRIS in a way that makes it sensitive to such issues.

AcquaSens and Algorella – Working with Innovators at UC Louvain

The second pilot in BCR focused on practices of co-designing innovations, specifically on the development of water sensors (AcquaSens) and in the broader area of circular economy (Algorella). The consortium partners BeParticipation and the Catholic University of Louvain worked together with PhD students on their projects and innovations.

RRI here took the form of design-thinking in so-called quadruple helix workshops. RRI got translated into a network of BeParticipation (a civil society organisation), a university and PhD committees, students and their innovation projects, selected actors from civil society, industry and academia, INNOVIRIS, and potential evaluation mechanisms at (potentially) several levels. These quadruple helix workshops constituted a form of organized and guided deliberation. There were several interdependent and entwined aims which included (1) discussing the political issues involved in the innovations, (2) a process of collaborative prototyping, (3) feedback on the marketability of the innovation as a product, and finally (4) a showcase of the Spheres protocols (we will return to that point in the next section).

These activities were explicitly discussed by the actors as a form "upstream engagement" organized over a long span of time on several occasions with different foci. The figure of the "innovator" is crucial here. Innovators are developers of a certain product to be. At the same time, however, they are PhD students primarily concerned with research. Their PhD research brings in a particular idea of innovation that resonates with RRI principles: the concept of a "360 degree view of innovation". RRI translated as quadruple helix engagement here is explicitly linked to Jasanoff's idea of "technologies of humility" (Jasanoff, 2003).

Interestingly, while the partners in this pilot argued strongly in favour of the integration of heterogenous actors into innovation processes, there was also a palpable attentiveness to the "risks" of such engagements and a sensitivity to the need to protect PhD students and their projects to a certain degree. We observed a careful demarcation or purification work on the side of the researchers. There are areas where engagement is "not interesting" (Int_12), e.g. in "highly technological" (Int_12) areas where also simple models of knowledge transfer work. Thus, we see a simultaneous processes of entanglement and purification. Citizens appear in multiple roles: they appear as providers of valuable feedback for the innovators that can help to improve the innovators work, but they are also seen as posing some risk to these projects. That is, there is a risk and potential for the projects to get in "trouble", for example if the citizens negatively evaluate a PhD-project. This idea ties back to a translation as publics or citizens as an obstacle in need of being tamed.

What we see in the BCR cluster are two distinct translation of RRI, one focusing very much on co-creation and community-based needs and goals (Ludwig & Macnaghten, 2019), the other centred around changing innovation cultures in the education of engineers at universities.

Part II: RRI, impact and maintenance work

As will be clear from the previous section, the regional clusters were busy with conducting their RRI activities, but they were also doing something else. As one colleague insisted when discussing their work: "yes, but there is more than that". Another colleague described their pilot project as "technical but not so technical". These statements point to important work that goes beyond what can be captured in the description of work in grant agreements and even beyond what is measurable in project assessments. In what follows, we would like to highlight some of these activities, ask for their enabling conditions, and indicate some of the systemic barriers that make this kind of work difficult.

The "more than" preparatory stage in Lombardy

The participatory agenda-setting activities in the Lombardy were grounded in a broader idea about legitimate purposes and rationales of RRI work. First and foremost, this meant working with decision-makers:

> "So, you can talk about and you can make responsible innovation if you work with people really involved and key in governing innovation, which means not only of course policy-makers but the people in charge of decision-making" (In_05)

With this strong focus on the governance realm, RRI was understood mainly as a form of innovation governance in which policy, and decision-makers, are the primary collaborators. Furthermore, there was a clear idea about what constitutes "good" engagement, demarcated from "fake" participation. This distinction points to perceived risks in the work of the Lombardy cluster. "Fake" here means engagement without any commitment to act on what has been discussed, similar to the phenomena of regulatory capture and window dressing (Schot & Steinmueller, 2016). One of the main ambitions in the work of the Lombardy cluster was to ensure that citizens' input actually mattered in the innovation governance work.

The actors in this cluster saw it as key to nurture and maintain existing relations with administrative partners. Maintenance work was thus a central element of all the activities in this cluster, be it in the form of collaboratively developing the engagement process and methods, activities to build awareness and capacity within the Region, or through working towards more visibility of RRI principles on a national level.

The distinction between a "preparatory stage" and the actual "engagement activities" has already been briefly mentioned, but deserves some more attention here:

> "So, before the concrete starting of the engagement stage, we had a preparatory stage which was the key to be sure that the public engagement activities were actually actionable from the Region." (Int_06)

The aim of the preparatory stage was to make sure that the activities were "actionable" (Int_06). To that end, several meetings were organized to define the scope and purpose of these activities. In addition, these meetings were also used to build capacity, awareness and mutual understanding. What is important to note here is that this work is premised on a pre-established relationship of trust, and that this work contributes to the maintenance of the relationship. FGB could rely on an already existing network within the regional administration before the project started – a network that at the start of TRANSFORM was already convinced that RRI is important.

These actors then worked towards convincing and enrolling others within their ecosystem. Without these people and the work done before (and after) the actual TRANSFORM project, the project activities would have looked very different and might not have been

possible to conduct at all. Our colleagues from the Lombardy cluster described this relationship as a dynamic one. One should find actors that are interested and then slowly build a relationship with them, so that they become allies within the regional administrative ecosystem:

> " … I met the team [from the regional administration] a few times before TRANSFORM. […] And I think that their approach, their attitude towards this kind of engagement activities really changed a lot. The knowledge also. Now when we talk, we are sure that we are talking about the same things." (Int_06)

This is also where it becomes clear that the so-called "preparatory" stage was actually more than that: it was careful maintenance work that made the project activities possible. Once these relationships were established and somewhat stabilized, the actors became more willing to work towards transformations within the organizational cultures of the regional administration, to "disseminate" this kind of thinking and working together within the different departments of the Region.

Such work is not without fragility. The reliance on individual actors within the administrative ecosystem bears the risk that, in case these actors are either moved or themselves decide to move, you need to start over again. Therefore, the relationships with the Region needed constant care and maintenance:

> "And that's why as I said I think it's very important that we have these outreach communication activities within the Region, with the other civil servants. We also need to plan the public event to share the TRANSFORM results and also this will be very important." (Int_06)

Thus, in parallel with the work on the project activities – that is the core and most visible of the work done in TRANSFORM – the cluster members were constantly reflecting on how to best expand the network. What we see is thus a constant process of translation, also in the more classical sense of enrolment and enactment developed by Latour and Callon (Callon, 1986; Latour, 1987).

The overarching objective of these activities, then, was to try and influence the "cultural environment" (Int_07) and also attempt to "shape the public administrative discourse" (Int_07). This clearly resonates with the core objective of RRI, which is to have a transformative effect on cultures of innovation governance (Strand *et al.*, 2015). What is sometimes imagined happening more or less automatically by inserting funding into a certain system, needs constant – and in terms of project assessment often marginalized and invisible – work that involves adapting and making something fit into a certain context.

Doing RRI as citizen science and "more than that" in Catalonia

Similar to the collaboration in Lombardy, also in Catalonia we see a strong connection with the administrative partners. In particular, the Generalitat of Catalonia (GENCAT) played a very active role in the pilot projects in this cluster. This became visible in the way the so-called Think Tank was used in this cluster. In general, the rationale for establishing Think Tanks in this project was to actively engage regional stakeholders to contribute to the cluster activities throughout the projects. The partners from the Catalan cluster, however, explicitly highlighted how the Think Tank was one of their central elements in developing the pilot projects:

> "I mean we talk first with the more active actors in the Think Tank and it was the city council of Mollet del Vallès on waste and they agreed to lead the challenge to define the pilot on that area. Then with Hospital de Sant Pau where we are working with endometriosis, and they just agreed. (…). So, we couldn't have the three but these two we're running and they're working very well because they are real." (Int_01)

Here we see how the idea to have "real" activities is closely linked to the model of citizen science as co-creation and a form of participatory governance that is a central pillar of this cluster. The Think Tank was the central means for integrating local administrative actors and other regional actors. What is important to note here, however, is that this kind of integration and creation of responsiveness may reach well beyond the project-lifetime of TRANSFORM.

> "And in fact, the idea at the beginning was to have much less people in the Think Tank. I think in the proposal you only need to have like ten people involved but because in this case, [NN] is the right key player and involved a lot of people. And then that's why we had so many people at the first session especially of the Think Tank and then the pilots were so successful." (Int_01)

There are two things that are noteworthy here. First, this is about temporalities and the limits of R&I governance through project funding. One of the reasons why the Think Tank was considered successful by the project members is the fact that the regional administrative partners were able to draw on previous work in the selection of actors. Second, it was also this experience that led to a particular framing of the Think Tank:

> "I told them that if we want to have impact we need that Think Tank. That was, it has been like a process. For the Think Tank we selected stakeholders that were already somehow engaged in the work I was doing and that could have some relation to citizen science and we open it a little bit more also." (Int_03)

The Think Tank in this framing was a process to select not only pilot activities but also to build and stabilize relationships with actors from the Catalan R&I ecosystem. As such it built on previously established links and was a means to make use of those. So, in a sense the Think Tank was a way to select both pilot projects and also partners who were interested in collaborating.

As a consequence, the Catalan Think Tank brought together a comparatively large number of actors in the beginning and the scaled it back as the project progressed. Before that, the Think Tank was used to discuss citizen science as a way of working or governing with a broad audience of potentially relevant stakeholders. The Think Tank was understood as a way of "changing mindsets" (Int_03) not necessarily just for TRANSFORM but potentially also for future projects. In addition to nurturing relations between stakeholders in the R&I ecosystem, TRANSFORM as a project also aimed at establishing new organisational links within the regional administration:

> "For example, in the city council the people in the environment department never work together with the people in the participation department. Never. And this is happening now." (Int_01)

The reason why the administrative partners needed a project like TRANSFORM for this is – as one actor from the administration told us – that in order to be able to do things differently, there is always the need for some mandate, "it's an opportunity also to start talking" (Int_02). A project like TRANSFORM then is described as an opportunity or "umbrella" (Int_03) to do this kind of nurturing work within the administration. And this nurturing – doing something "different" – reaches beyond the administration and also includes understandings and translations of citizen science of the different partners in the pilot activities. Here we come back to a point we raised in the previous section about the translation of citizen science as education or awareness raising. And this point is crucial, because what we see in the pilot activities of the Catalan cluster is a multi-faceted translation of RRI as citizen science:

> "The doctors talking about awareness which is OK and yes I agree with them but the project is more than that. Otherwise, you just can hire a company, a media company and they will do a big campaign with a similar money amount on the problem itself, the health problem that people is not aware of. But the idea is also that without even them not be fully conscious that they're starting to navigate through this much more complex ecosystem, no." (Int_04)

Our project colleagues were very aware of certain – one could argue – narrow framings of citizen science in terms of education and awareness raising. The crucial point here is, that they were ok with that. The idea of awareness has its place and importance in these activities, as long as there is "more than that", as one colleague was eager to stress. This something more is precisely the maintenance work of creating and nurturing of new links between different academic, governance and (civil) society entities as well as within these different entities and in doing so subtly re-arranging the Catalan R&I ecosystem. Through their participation in TRANSFORM, certain actors began to "navigate" through the ecosystem in a different way.

This directly relates to the particular theory of change that we encountered in this cluster and to the temporality of responsiveness that is implied in this theory. TRANSFORM – and other projects like it – were not framed as something completely new or as something that is expected to initiate something entirely novel. Much rather, projects like this are part of a long lineage of activities, it is an enabler of sorts, that makes it possible for actors in the Catalan R&I ecosystem to actually try to do "something more". To do so, they crucially depend on work that is done by the project team before and after the actual project. One colleague from an administrative partner stated that "it never works if you build things from nowhere […] these projects have no [significant, our comment] money for anything so you need to connect with something that is already happening in the territory." (Int_03)

It is this kind of invisible work that makes projects successful and has the potential to initiate long-term cultural change that will lead to an integration of RRI principles in territorial innovation governance processes and practices.

Building a network in a fragmented R&I ecosystem in the Brussels-Capital Region

In many ways, the situation in the BCR case provides a contrast to both the cases in Lombardy and in Catalonia. Where the former two can build on and further develop already established and stable relations between the research and administrative partners, the BCR cluster activities basically started from zero. This case therefore allows us to focus on what the absence of certain kinds of relationships means for RRI work and its impact.

In conversations with project partners from the BCR cluster, the overall situation in the R&I ecosystem was described as fragmented and "complex" (Int_11) both by the research and the administrative partners. In addition, the system is perceived to be characterized by "constant movement" (Int_09) or as a "cycle" (Int_09) of the various actors, which made it hard to know who actually is a relevant actor:

> "So, there's this constant movement of, because they are all functionaries, so civil servants. So basically, there were some of the people who were in the ministry ended up in Innoviris. Some of the people who were in Innoviris ended up in the in the government. So, there is constant cycle." (Int_09)

The central challenge here thus was to decipher this R&I ecosystem and to identify or carve out spaces for RRI inspired pilot activities. Additionally, the issues that were supposed to be addressed through RRI approaches needed to be identified, as one of the consequences of the dynamic situation in the administrative part of the R&I ecosystem was that topics and priorities tended to shift. Overall, the activities in the BCR cluster are perceived as more "disconnected" (Int_09) compared to the other cases. These difficulties were already becoming apparent in the process of setting up the project in the proposal stage, where different partners from the administrative realm were envisioned as contributors at different points in time. It was only at the very end of the process Innoviris turned out to be the partner who would contribute to this project. Innoviris describes their participation in the project as "accidental" (Int_11). Another crucial difference between the Brussels-capital region and the situation in the other clusters is the standing of the research partner, who see themselves as "newcomers" (Int_09).

What we see in this case, then, are various translations of RRI that co-emerge with the particularities of the R&I ecosystem and the place of the pilot activities within them. This also corresponds to a different form of maintenance work geared towards building trust and finding niches.

The overarching idea for how to deal with this situation in the BCR cluster is to provide what is called a "protocol" that enables actors from the R&I ecosystem to assess projects and give advice on how to make them more resonant with RRI principles: the so-called "Spheres protocol". In this protocol RRI is described as a set of "techniques" or "scripts". As such it has the ability to "travel" across different sites and sectors, and it can be taught from one actor to another. This necessarily implies an objective of standardization. Framed like this, this protocol solves a number of problems that are specific to this cluster: it can be used in a university setting to introduce students to a broader view of innovation and it can easily be connected to evaluation procedures at Innoviris. As such it works as a boundary object to discuss concepts of innovation through the evaluation infrastructures in place.

In our conversations the "Spheres" pilot was described as a "protocol" but was also talked about as a "prism", a "service" or a "vehicle". As such it is intended to be used as a lens for analysis and as a set of guiding principles that give input to these projects. Spheres,

then, is about "first analysing what could be interesting to bring to the project from the RRI like tools and then organise some activities based on the need that we have identified" (Int_10).

This would mainly be a service for researchers and could help them take into account issues that they had not previously considered – in accordance with RRI principles. There is also a strong element of research and analysis – using RRI concepts – but always as a means for a service to be provided, never as an end in itself.

As we described in the previous section, the cluster partners from UC Louvain used the Spheres protocol in their PhD training programmes with the aim of establishing it as a standard part of the University's PhD education. This approach implies a particular theory of change and thus how to create impact. This theory starts with the concrete things developed by researchers in the community of researchers and innovators. The idea is that by changing the perception of the innovators through the pilot activities a long-term change in the cultures of research and innovation can be achieved. Hence, the aim is also to establish this as a standard activity within universities and PhD projects – built around the idea of a "360 degree" view of innovation. Maintenance work then takes the form of participating in PhD committees and trying to convince university managers of such a change in the very notion of innovation materialized and institutionalized in the university's PhD education. The Spheres protocols play a crucial role in this model. They are introduced into a PhD program as a sort of "test" of whether or not an innovation can be an actual 360 degree view of innovation. The impact of this could initiate a cultural shift towards RRI with the next generations of innovators-in-training in a sense.

CONCLUSIONS

In this paper we proposed to think about RRI through the lens of translation. This meant to focus on how different versions of RRI are stabilized in the territorial RRI ecosystems and to ask how these ecosystems contribute to shaping the particular translations and how – in turn – they themselves are re-shaped in the process. We combined this perspective with an interest in the often-overlooked work of creating, nurturing and caring for the relationships that allow for research and innovation to become 'responsive' with society – one of the central aims of RRI.

In the territorial clusters that provide the case studies explored in this article, RRI gets translated as a set of distinct approaches or methods: as participatory agenda setting, shared agendas, and (a move towards) citizen assemblies as a means of innovation governance. In addition, RRI pilot projects take inspiration from design thinking and citizen science. We showed how these translations are entwined with the particular R&I ecosystems in the different regional clusters and how they enable certain kinds of work while rendering others more difficult.

However, while RRI is often understood as an alternative mode of innovation governance – as a remedy, an antidote or antiserum to the runaway train of (biotechnological, biomedical or nanotechnological) innovation, with the aim of infusing "irresponsible" (amoral or immoral) research and innovation with 'good' values and thereby changing and correcting its directionality – what we see in the work of the different regional clusters of the TRANSFORM project, is something different. We see efforts to implement change in the way innovation is practised and thought of. This resonates with work in the innovation literature that calls for broadening the notion of innovation and for developing ways to work towards community-based goals (Ludwig & Macnaghten, 2019). This change is not necessarily a change in research and innovation trajectories. Rather, it is social and political change, change in public administration practices, policies, social interactions, and social dynamics.

This becomes visible in the different purposes and objectives of the RRI pilots in the regions: regional RRI pilots can strive towards introducing deliberative democracy into territorial innovation strategy development, a pilot can aim at transforming regional urban development or may attempt to re-shape how innovation is conceptualized in the education of engineering PhDs, or activities can have the objective to transform health and waste management projects by introducing citizens perspectives.

One important shared feature that draws this plurality of objectives and purposes together is the fact that the work that is being done mostly does not start from zero but builds on pre-existing relationships and repertoires of collaboration. While these clearly correspond to RRI principles (often selectively so), what is happening in the different activities might be better understood as a form of "maintenance work". What we mean by maintenance here is that existing relationships are cared for or re-kindled, networks are nurtured and further developed (by extension or by cutting unnecessary elements) (Arora *et al.*, 2020; Puig de la Bellacasa, 2011). The absence of such pre-existing relationships (or previous work to build on) can cause significant trouble and frustration for the actors involved.

While maintenance work is crucial for creating the conditions for actors and organizations to become "response-able" (Felt, 2017), we also encountered a number of challenges for this kind of work. First, it is often dependent on individual actors that are already convinced about these approaches and become the 'inside (wo)man'. Second, this work is often marginalized and invisible, which also means there are no clear measures for success or performance, which can become an issue when such projects are judged against traditional project performance criteria in terms of impact and benefits. Third, this may lead to a focus in RRI projects to prioritize 'easy-to-sell' success stories, instead of working towards cumbersome and long-term cultural change. And finally, there is a tension between the aim of becoming responsive and the risk of 'regulatory capture' when it comes to questions about what is a relevant topic and where it makes sense to involve citizens and where to keep them out. This is a challenge that also Schot and Steinmueller (2016) point to in their discussion of different framings of innovation policy.

What the actors in the different clusters thus strive for, is to find a balance between transformation and maintenance. One could even argue that they try to achieve long-term transformation towards sustainability through careful maintenance work. This is often achieved through activities and practices that are 'invisible' to the project impact assessment, and thus rather different from the 'heroic' acts so common in mainstream innovation narratives (Vinsel & Russell, 2020). Fetishizing the 'new' and 'unique' of singular projects makes it harder to adequately value the 'old' or that which is already there. Without the already existing relations, there is nothing to maintain. Based on this finding, we argue that it is crucial to develop ways to make this kind of work 'visible' in how impacts and benefits are conceptualized and described – in the SwafS program and beyond. This is necessary in order to provide the conditions for this kind of work and thus for research and innovation to become more responsive to multiple facets of society.

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Markets for Promoting Innovation in Health Care?

A Market Practice Study of Public Procurement of Innovation (PPI)

Nurgül Özbek[1], Linus Johansson Krafve[2], Hans Kjellberg[3], Ebba Sjögren[4]

[1] Center for Market Studies, Stockholm School of Economics Institute for Research, Stockholm, Sweden.
nurgul.ozbek@angstrom.uu.se

[2] Center for Market Studies, Stockholm School of Economics Institute for Research, Stockholm, Sweden.
linus.johansson.krafve@mdu.se

[3] Department of Marketing and Strategy, Stockholm School of Economics, Stockholm, Sweden.
hans.kjellberg@hhs.se

[4] Department of Accounting, Stockholm School of Economics, Stockholm, Sweden.
ebba.sjogren@hhs.se

ABSTRACT

This article critically analyzes public procurement of innovation (PPI) as an instance of using markets or market-like aspects as a means to resolve public concerns. It reports findings from a case of procuring radiation therapy equipment for a university hospital in Stockholm, Sweden. By extending a line of literature built on economic sociology as well as science and technology studies (STS), the study elaborates on public actors' efforts in framing markets to promote innovation. The case illustrates how the participating actors constructed the notion of *innovativeness* to be introduced into health care as means of addressing various public concerns. It also reveals the intended—and unintended—consequences of PPI as manifested in various actors' claims on the value of PPI realized in practice. The study suggests that it is extremely difficult to frame a market for the realization of innovation via procurement as a policy instrument because we cannot predict the ultimate impacts of devices and practices employed in such initiatives. By formulating a practice-based critique of PPI, our study invites important questions about the potentiality of such instruments for governing innovation without delimiting their consequences to the success-or-failure dichotomy as prescribed in predefined tools and strategies.

Keywords: Health Care; Innovation Governance; Market-based Instruments; Medical Technology; Public Procurement of Innovation (PPI).

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INTRODUCTION

Public procurement, defined as the acquisition of goods and/or services by public bodies by means of market transactions (Arrowsmith, 2005), is increasingly proposed as a critical policy instrument to achieve broad industrial, social, and environmental objectives. For example, the Europe 2020 strategy included public procurement as a key market-based instrument for supporting goals such as environmental protection and good social conditions (European Commission, 2010). More recently, the European Commission (EC) issued a directive that aims to reform procurement processes in its member states to make them more efficient, while also ensuring that public actors make optimal strategic use of public procurement to spur innovation (Directive 2014/24/EU). Furthermore, the importance of public procurement as a critical policy instrument has attracted greater attention due to the recent transformative turn attributed to innovation policy (Boon & Edler, 2018; Diercks *et al.*, 2019), and growing calls for mission-oriented policies (Mazzucato, 2018). In this paper, our purpose is to critically examine the practical use of public procurement as a market-based instrument of innovation governance. In particular, we focus on the so-called *public procurement of innovation* (hereinafter PPI), an instrument whose use is broadly encouraged by policymakers aiming to improve the performance and functionality of public services through innovation (EC, 2021; OECD, 2017). By investigating how PPI is done and what it achieves, we aim to contribute to a broader discussion on the use of markets as a means of addressing public concerns.

The implementation of market instruments is not new to the *new public management* (NPM) agenda of modernizing the public sector and improving the effectiveness as well as the efficiency of public services. Much of the critical literature about procurement as a means of governing revolves around the inherently conflicting nature of aligning market instruments with public values in principle; for example, how public procurement takes a central role in public domain marketization (Öjehag-Pettersson & Granberg, 2019), and how it delimits societal problems and their solutions to market matters (Olsson & Öjehag-Pettersson, 2020). Similarly, critical voices on innovation question the dominant premises of innovation in its current state, which are often wedded to neoliberal ideas of economic growth and market extension (Godin, 2021). Hence, such market initiatives are often considered to comprise ideological foundations wherein innovation is strongly promoted as good *a priori* and a generator of economic and social value.

In this paper, we approach the question of using procurement as a means of governing from a different angle by directing our attention to the practical details of how PPI has been performed. In doing so, we propose a practice-based critique that can offer a more dynamic critique of PPI as a governing instrument due to its emphasis on the processual and relational aspects. Specifically, this approach allows us to critically assess the work performed by public buyers to make markets work to achieve the aims and expectations set out in public procurement policies and strategies. It does so by foregrounding a detailed empirical view of the tools and practices in the process, as well as the reflexivity of participating actors. To develop this practice-based critique, we draw conceptually on *constructive market studies*, a line of literature inspired by an emerging research tradition in economic sociology and in science and technology studies (STS). According to this approach, economic markets are not pre-existing entities, but are rather outcomes of the construction, transformation, and reconstruction of arrangements of various elements such as rules and regulations, technical and calculative devices, discourses and material infrastructures (Callon, 1998; Callon *et al.*, 2002; Callon & Muniesa, 2005; Kjellberg & Helgesson, 2006, 2007). Within this conceptual framework, we critically assess PPI within the notion of concerned markets, whereby we focus on the expanding trend of purposefully using markets or market components—such as choice, competition, and price—as potential solutions to pressing matters of collective interest (Frankel *et al.*, 2019; Geiger *et al.*, 2014). Markets such as health care are prototypical *concerned markets* in this sense, wherein PPI is a market-based instrument introduced in attempts to enhance the *value for money* of public services by promoting innovation.

We achieve this by critically analyzing a specific PPI case study in which radiation therapy equipment was procured for a university hospital in Stockholm, Sweden. The case demonstrates extensive efforts made by contracting authorities to deploy PPI. Our study highlights the differences between what had been envisioned, both before and during the procurement process, and the claims made in subsequent controversies about the value of *innovation* that was ultimately realized. Sweden has long been considered a leader in promoting innovation policy goals through procurement, as evidenced by its strategic industrial research programs and specially designated government procurement agencies (EC, 2016). In this regard, our study provides an opportunity to probe the workings of a *developed case* of an otherwise globalized discourse of innovation governance via public procurement.

The structure of the article is as follows. First, we briefly review the background of PPI by outlining the regulatory space of strategic public procurement in the European Union (EU), and its promises in prescriptive policy suggestions and in innovation policy literature. following that, we introduce constructive market studies literature that provides the conceptual background for our study and informs our critical approach on PPI. Subsequently, we outline our materials and methods, followed by the description and analysis of our case. Finally, in the concluding section, we summarize and discuss our findings.

BACKGROUND: THE PROMISES OF STRATEGIC PPI

In the EU, the traditional view on public procurement regulation is that it falls under the scope of economic policy, with the primary goal of ensuring competition and efficiency in public sector contracts (cf. Graells, 2015). Over time, however, further visions and strategies have been proposed that look beyond purely economic objectives. Particularly in relation to the EU 2020 goals, public procurement ambitions were directed toward addressing challenges pertaining to social and environmental concerns as well as innovation-related issues (EC, 2010). Such strategic components of public procurement were subsequently entered into the regulations in 2014 through the new EU Procurement Directive (EU Directive 2014/24).

Procurement of innovative solutions forms a central element in the 2014 reform. This was later defined as "any procurement that has one or both of the following aspects: (1) buying the process of innovation – research and development services – with (partial) outcomes, or (2) buying the outcomes of innovation" (EC 2021/C 267/01, p. 6). In the guidelines, innovation is presented as a means to achieve various public policy goals, among which were modernizing and delivering higher quality public services on an optimal budget (EC 2021/C 267/01, pp. 7-10). The new directive takes up the idea of *most economically advantageous tender* (MEAT) and integrates it with the new objectives. This implies that cost or price considerations remain part of the award criteria for public buyers; however, additional quality aspects – such as those based on the environment, society, or innovation – may also be used to identify the MEAT. At the same time, a number of new procedures and tools were introduced by the new directives, which opened up possibilities for fostering innovation in public services through the *innovation partnership* and the *competitive procedure with negotiation* (Handler, 2015). The latter is closely related to *competitive dialogue* in that both procedures offer possibilities for dialogue and negotiation with potential suppliers and have similar purposes and use conditions.[1] Innovation partnership,

on the other hand, is a procedure that begins with a tender for the development of products and solutions for a specific need or societal challenge that does not yet exist in the market (Directive 2014/24/EU 2014).

It is generally agreed that *value for money* is the main objective of EU public procurement. Indeed, EU regulation as a whole is traditionally viewed as emerging from the free market economic approach and principles consistent with neoclassical economic theory (cf. Graells, 2015; Trepte, 2004). The assumption underlying EU regulations is that the efficient operation of the market will ensure that the public sector is well served by the most efficient suppliers, leading to significant savings in public spending. This perspective reflects a mainstream textbook economics perception of markets (i.e., that they function according to neutral forces or natural-like laws that allocate resources to their expected highest valued uses once market barriers are removed). Such a system emphasizes the need for maximum competition in public contracts to achieve efficiency and requires public purchasers to seek value for money as a proxy for profit maximization (see Kunzlik, 2013, for a detailed analysis of EU public procurement law with respect to neoliberalism). Accordingly, the most common understanding of value in public procurement terms relates to economic worth, where value is ranked by price levels or cost-benefit analyses and different outcomes of non-economic objectives can be taken into account if translated into a common metric that can be added together and compared (Halloran, 2020).

It is worth noting that, more recently, public procurement with its strategic elements has assumed a prominent role in an ongoing international discourse at the intersection of innovation policy and public procurement – more specifically, on the use of public demand as an engine for the development and diffusion of transformative innovations (Chicot & Matt, 2018; Georghiou *et al.*, 2014; Uyarra *et al.*, 2020). The main argument driving this academic discussion is that today's societal challenges require innovative solutions. In their purchasing processes, public buyers should therefore focus on both current *and future* problems of public service delivery instead of privileging the solutions that are already available in the market. By exercising their purchasing power, they can demand transformative solutions (Boon & Edler, 2018) while also addressing calls for public actors to tackle societal challenges in a mission-oriented manner (Mazzucato, 2018).

[1] The primary distinction is that the competitive procedure with negotiation begins with an initial tender as a foundation for later negotiation, whereas it is not a condition of competitive dialogue (Directive 2014/24/EU 2014).

The literature on PPI has largely focused on a macro perspective, often at national levels, with a frequent emphasis on technological goals (Uyarra *et al.*, 2020; Miller & Lehoux, 2020). The effectiveness of PPI is typically measured by the number of new products developed or, more broadly, the degree of R&D-intensive technology change in a sector (see Aschhoff & Sofka, 2009; Guerzoni & Raiteri, 2015). Research in this stream emphasizes the importance of public procurement in managing markets and highlights the need for procurement officials to possess the necessary skills and capacity to do so effectively (Caldwell *et al.*, 2015). Such studies show that the selective use of the public procurement policy instrument can allow public organizations to act as a *lead customer* for innovative products, incentivize developers of new technologies, legitimize product standards, and create new markets (Edler & Georghiou, 2007). However, significant barriers to implementing PPI exist, including a lack of technical skills, risk aversion among buyers, insufficient supplier incentives, and regulatory challenges (Uyarra *et al.*, 2014). Public procurement is a complex process that demands a broad range of capabilities – including defining needs, exploring solutions, and conducting procurement –which can overwhelm public buyers.

PPI is attributed a greater strategic potential than conventional public procurement. However, in the mainstream literature, both approaches are tied to a similar conceptualization of markets and their functioning. Specifically, markets are tools for (more) efficient fulfillment of societal demands since they harness competition in the service of public concerns. Where the two approaches differ is in the role of public buyers; PPI envisages a more dynamic role for public actors as active participants in the market and emphasizes their capacity to create or shape markets for the generation of creative solutions to pressing societal problems.

On a principal level, this paper shares an understanding with the mainstream literature that there may be different ways to organize markets to take societal challenges into account. At the same time, our perspective departs from this literature by deliberately side-stepping prescribed strategies and ambitions of PPI based on ready-made assumptions of what markets can and cannot do in practice. To this end, we turn to constructivist market studies for our conceptual starting points, including the notion of concerned markets. This literature specifically asks what happens when markets become intertwined with aspects of social life that are commonly not considered to be market-involved.

STUDYING PPI FROM A CONSTRUCTIVIST MARKET STUDIES PERSPECTIVE: THE FRAMING OF MARKETS FOR PUBLIC CONCERNS

There are two central tenets in constructivist market studies (CMS) that informs our work. First, CMS conceptualizes markets as practical outcomes of multiple actors' organizing efforts rather than as static entities governed by invisible laws (Callon, 1998; Geiger & Gross, 2018; Kjellberg & Helgesson, 2006; Neyland *et al.*, 2019). Second, and related, CMS recognizes that markets come in many shapes, thus preferring to speak of *markets* (plural) rather than *The Market* (singular). To account for this heterogeneity, CMS emphasises how markets are continuously formed and reformed (Callon, 1998; Kjellberg & Helgesson, 2006, 2007). Here, the notion of *concerned markets* is used to denote markets that are being formatted by, or provoke ethical, moral, or social concerns (Geiger et al 2014; Frankel *et al.*, 2019). The term thus highlights the political character of many efforts to (re)organize markets. In such markets, market governing involves "evaluation, diagnosis, design and repair" of specific arrangements that make the market work the way it does (Frankel *et al.*, 2019, p. 154).

Such market arrangements are socio-technical in character; they combine ideas, humans, texts, artifacts, technologies. One example is how economic agencies rely on specific instructions and tools for their ability to calculate (Callon & Muniesa, 2005). Importantly, as Callon (1998) notes, this ability to calculate is intimately linked to *framing* – the specification and fitting out of a 'stage' on which economic agents can engage in exchange as if independent of the world 'off stage'. Established markets are thus the results of framings that define objects of exchange, actors, qualities, rules, and relations (ibid.). At the same time, market actors bring their own expectations, conceptions, projects, interests, and concerns regarding how markets should function. Therefore, market frames are always partial and temporary, subject to challenges that address various collective concerns. Framing and stabilizing the qualities and value(s) of goods is a particularly important activity in shaping markets toward public concerns (e.g., to become more socially and environmentally sustainable or more innovative). *Market devices* – such as protocols, valuation tools and models, material forms, charts, presentations, and digital formulas – play a key role in framing because they make certain qualities more visible, economically valuable, and marketable (Doganova & Eyquem-Renault 2009; Doganova & Karnoe, 2015; Muniesa *et al.*, 2007).

Previous studies have demonstrated that specific practices and devices are important parts of market-oriented policy instruments (Doganova & Karnoe, 2015; Geiger *et al.*, 2014; Johansson Krafve, 2015; Neyland *et al.*, 2019). For example, Neyland *et al.* (2019) show how efforts to develop *advanced market commitments* contributed to incentivize innovation and balance private and public interests in the development of malaria vaccines. Webb and Hawkey (2017) show how technical-economic models contributed to create a market for sustainable energy in British heat network infrastructures. Reijonen and Tryggestad (2012), finally, studied how market actors constructed different versions of *environmental friendliness* in the market for urinary drainage bags, defining, negotiating, and situating these versions in relation to one another and in relation to other product qualities. Their findings suggest that there is nothing inherently *green*; rather, *greening* is an ongoing process of shaping the socio-technical arrangements of the market to take various matters of collective concern into account (p. 229).

This suggests that the use of markets to address public concerns is not only a choice from 'the outside' but also an issue that needs to be handled from 'the inside', in market practice (Geiger *et al.* 2014). However, as Frankel *et al.* (2019) stress, it is far from given that concerned markets will magically transform into democratic fora where the voices of concerned groups are recognized and heard. Indeed, increased reliance on markets may propel new types of expertise that exclude solutions that are framed in other terms. For example, economists are increasingly engaged in designing markets to fix public concerns; one prominent example being the discourse on strategic procurement. Skeptical of this trend, Nik-Khah and Mirowski (2019) warn against blindly trusting market solutions to address problems. They suggest all markets are imbued with neoliberal politics and governmentality, pointing at the chronic problems in health care, education, and environmental pollution as cases in point. While this constitutes a valid critique of specific market initiatives, it also downplays one of the central tenets of CMS, namely that of the heterogeneity of really existing markets.

Building on this literature, we critically interrogate the PPI process as an attempt by public buyers to construct a particular market frame to promote innovation in health care. We examine the process of how a market-based instrument is composed, enacted, and given effect (Neyland *et al.*, 2019). Our approach aligns with the style of critique found in critical studies of innovation, situating an innovation within the institutionalized socio-technical configuration in which market framing takes place (Laurent, 2021). This style of critique is distinct from making epistemic statements about a true value or uncovering the ideology behind an innovation. Rather, it involves examining the connections between dis-

courses, practices, institutional structures, regulations, and policy instruments (Lascoumes & Le Gales, 2007), as well as market organizations and devices (Callon, 2007). To this end, we thus incorporate into our analysis the diverse understandings, definitions, and concepts of innovation and markets mobilized by the actors under study. Our critical interrogation follows three explorative themes: (1) the economic and political motivations behind the choice of PPI as a tendering method, (2) the specific practices and devices deployed in public buyers' efforts to frame the market to promote innovation in health care, and (3) the intended and unintended consequences of PPI—more specifically, different actors' claims about the value of PPI realized in practice.

METHODS AND MATERIAL

Our case study concerns the process of buying radiation therapy delivery in Region Stockholm, Sweden, through innovation procurement – rather than buying readily available equipment and service solutions in the market. The procurement process in question occurred between 2013 and 2018. At the time of our investigation, the procurement had been completed; however, not all the items in the contract had yet been delivered. The case study was conducted between April 2019 and June 2020 as part of a larger research project that involves all of the co-authors. The project deals with how valuations of medical devices impact the conditions and prospects of new products coming to the market. Empirically, the study is based on qualitative research with interviews with market actors, and analysis of policy and bidding documents as well as news articles.

We interviewed authorities and governmental bodies in the medical device market to achieve an understanding of the workings of the Swedish market in general. We also interviewed the persons who are identified as relevant to the specific PPI case. The selection of persons rested on two considerations. First, we searched to include diversity in terms of key actors in the market we are interested in, which included sellers, buyers, and assessing authorities. Second, so as not to overlook important actors, we snowballed informants we were advised to interview from other informants. In total, we conducted 20 interviews (10 interviews about the Swedish medical device market in general and 10 interviews about the focal procurement process); all but one were recorded and transcribed. The duration of the interviews varied between 23 to 80 minutes (see the Appendix for the list of data sources).

The documents we used in this research are news articles, reports and presentations from market actors, procurement and assessment documents, as well as court decision protocols (total of 51 documents). Most documents were available online; others, such as the procurement and court documents specific to the case, were provided by our informants. To access national press articles relevant to the case (2013–2020), we used the Business Retriever database. The articles reviewed have enabled us to follow important actors' expressions of expectations and reflections on the process in real time.

Data analysis was conducted through the iterations between analyzing the data, writing narratives, and revisiting the literature (Alvesson & Sköldberg, 2017). First readings of the collected material aimed at identifying the activities, actors, rules, metrics, tools and processes involved in assigning value to the radiation therapy equipment and were used to write a detailed case description. We then analyzed our case by addressing our three exploratory themes.

CASE STUDY: PPI OF RADIATION THERAPY EQUIPMENT IN THE STOCKHOLM REGION

Case Context

Health care in Sweden is largely tax-funded and universal for all citizens. The main paragraph in the Health Care Act (SFS, 2017, p. 30) states that the goal of Swedish health care is good health and equal care for the ‚whole population. Respect for autonomy, human dignity, and cost effectiveness are also central values in the national and local documents regulating health care. Responsibility for health care in Sweden is highly decentralized, shared by the central government, 21 regions, and 290 municipalities. The steering system is both national and regional, in that self-governing regional councils are responsible for the financing and provision of health care in different regions. These councils are named after the regions they govern; for example, as in *Region Stockholm*.[2]

The incorporation of innovation into the Swedish national procurement law is very much embedded in the latest EU directives, but the origin of the innovation procurement notion in Sweden goes back to the state's Innovation Procurement Strategy from 2010

[2] The "region" title was adopted by the regional councils when the county councils of Sweden (*landsting* in Swedish) were officially reclassified as regions (*regioner* in Swedish) in January 2020 (Proposition 2018/19:162). Region Stockholm, which is the name used in this paper, was previously named "Stockholm County Council" (known as SLL in Sweden).

(SOU, 2010, p. 50) that sets clear goals to improve the conditions for increased application of innovation procurement in the country. For example, since 2011, the Swedish Governmental Agency for Innovation Systems (in Sweden, known as Vinnova) financially supports national procurers to undertake innovation procurement via its Innovation Capacity in the Public Sector program (EC, 2016; Vinnova, 2020). Furthermore, the National Agency for Public Procurement (*Upphandlingsmyndigheten*) and the Swedish Competition Authority (*Konkurrensverket*) have been working strategically to provide contracting authorities with PPI methodology and guidelines (*Upphandlingsmyndigheten*, 2019a). Although the share of PPI in all public procurement performed in the country is considered fairly small,[3] it is highly encouraged. For example, the government has recently made further investments in increasing nationwide use of PPI, including the establishment of a collective platform aiming to expand public buyers' involvement in the topic (Axelsson, 2021).

Sweden does not have a national innovation procurement policy in the health care field; however, health care is one of the central areas outlined in these national strategic activities (SOU, 2010, p. 50; *Upphandlingsmyndigheten*, 2019a; Vinnova, 2009). The main motivation of PPI is to deliver innovative solutions that may enable better health care for the patients, help governments meet growing demand, and reduce costs by developing more advanced and efficient services (Vinnova, 2009). Promotion of PPI in health care further includes exchanging best practices and case studies as well as organized seminars by state agencies (*Upphandlingsmydigheten*, 2019b) as well as industry associations (Nordic Medtech Growth, 2017).

Radiation therapy is one of the most common treatments in cancer care and is performed in specially equipped medical facilities in different regions. With few exceptions, radiation therapy equipment in Sweden is procured through competitive public tenders by regional councils. At the time of the procurement, radiation therapy treatments within the Stockholm region were available at two physical sites: Karolinska University Hospital and Södersjukhuset. The procurement was intended for the acquisition of equipment partially to replace the existing equipment at Södersjukhuset and partially to be installed at a newly built hospital which would replace Karolinska University Hospital's existing site. The new hospital building is called *New Karolinska Solna (NKS)*. During the procurement, NKS was still under construction; thus, the procurement was part of a program for supplying medical technologies to the new hospital construction project.

[3] In 2021, procuring organizations announced 18,421 procurements in all public sectors in Sweden. Of these, 809 were designated as PPI (Upphandlingsmyndigheten: https://www.upphandlingsmyndigheten.se/statistik/upphandlingsstatistik/statistik-om-annonserade-upphandlingar-i-sverige-2021/innovationsupphandling/).

Motivations Behind the Choice of PPI

PPI for increasing international competitiveness of the region

The formal decision to build a new university hospital was made by Region Stockholm in 2008 (Karolinska, 2022), and equipment was to be installed at the launch of the hospital in 2017/2018. The project was characterized by high expectations for future innovativeness and competitiveness of the region. In the political vision, the hospital has repeatedly been described as a hub in the health care system with "world-class" care, research and education, and as a "prestige project," both in Sweden and internationally (Grafström, Qvist, & Sundström, 2021, p. 10). Region Stockholm's own view of the NKS project was best depicted in the following decision material (Decision Protocol, 2008, p. 2, in Johannesson & Qvist, 2019, p. 6):

> New Karolinska Solna is one of [Region Stockholm's] most extensive projects ever and will have great significance in a wide range of areas. The hospital will be the hub of a regional and national health care system that is internationally competitive. NKS will be a special hospital for the region with a focus on highly specialized care and shall play a central role in the development of the Stockholm region into a biomedical powerhouse.

The new hospital building was constructed as a private–public partnership (PPP) between Region Stockholm and a private consortium called Swedish Hospital Partners, which consists of the Swedish project development and construction company Skanska, in partnership with the British investment fund Innisfree (Karolinska, 2022). The PPP agreement involved the design, construction, financing and operation of NKS. Although the extensive medical technology equipment needed at the hospital was not included in the project agreement with the consortium, medical equipment was nevertheless a large part of realizing the NKS project. As regards the equipment, "flexibility and generality" were specifically emphasized in the project vision. The hospital would be built to be able to replace equipment as quickly and easily as possible, and offer an infrastructure to accommodate the parts needed for all kind of heavy equipment (Grafström *et al.*, 2021).

Despite the high expectations, the NKS project has been the subject of much debate and controversy in Sweden, where the process received heavy criticism for poor planning, execution, and management as well as accusations of corruption (Lundberg, 2013; SVT, 2018). Thus, Region Stockholm's decision to buy new radiation therapy equipment, as well as its procurement, took place in a setting that included the ambitions and controver-

sies concerning this project. This fact was considered to further complicate the radiation therapy procurement. On one hand, the project attracted much public attention and naturally involved pressure for the contracting authorities. On the other hand, medical equipment was a crucial part of the NKS "world-leading hospital" vision, which oriented the procurement toward innovation from the outset. In our interview, the public buyer responsible for the procurement of radiation therapy equipment clearly stated that their aim included the hospital's leveraging of innovation (Public Procurement Officer, Region Stockholm, 2019): *We wanted to secure that it was the latest technology supplied and also which would be upgraded over time, over a long period of time*.

PPI for bridging the gap between society's need for radiation therapy and ability to pay

Region Stockholm commissioned the management consultant company Ernst & Young (EY) to develop an innovation procurement methodology specifically to buy medical equipment for the new hospital. With the financial support of the Swedish Governmental Agency for Innovation Systems (Vinnova), an innovation action pilot project was carried out during 2012–2013 with a specific emphasis on the needs of health care services in the region. The work from this project resulted in three innovation procurement methodology books (EY, 2014), and the experiences from the specific PPI were spread through various conferences and events in the region (*Dagensmedicin*, 2015). The claims in the books and materials presented at the seminars were grounded in innovation's assigned role in meeting future health care challenges. The specific emphasis was on the risks of a widening gap between society's needs and ability to pay. The objective of PPI was often formulated to meet this challenge, while fulfilling Karolinska University Hospital's mission and long-term goals and creating the world's best university hospital (Carlsson & Andersson, 2015). This was depicted in the descriptions of the radiation oncologist who was involved in the specific procurement process as a clinical user (Interview, NKS, 2019):

> That [innovation partnership] was something that came from outside, so we weren't really participating in discussing the pros and cons of that. That was part of the scope. I think it was decided that all the tender processes of NKS should be an innovation partnership because there was a theory that as the health care costs rise more and more, you should have an innovation aspect of it because that could sort of pay some of the expertise. So I don't know, but I think that was sort of the idea.

PPI for better cancer care, accessibility, and equity in radiation therapy

Radiation therapy is an integral part of Swedish cancer care, and how it is organized is often viewed as having a major impact on the public health service (RCC, Stockholm-Gotland, 2016). The number of devices – and thus, the extent of accessibility to the treatment across the regions in Sweden – varies (SBU, 2003; RCC, Stockholm-Gotland, 2016), and Stockholm is not ranked among those with the highest accessibility per capita (RCC, 2016). In Stockholm, patient waiting times in cancer care, a well-accepted measure for care quality in Sweden, has long been a major concern and an area of underperformance despite a number of policy measures over the years (Wilkens *et al.*, 2016). Although investment in devices is not the only indicator of treatment capacity, the situation still raises concerns about the accessibility and equity of cancer care for those who live in the Stockholm region.

Surprisingly, the procurement in the case did not promise a real increase in the number of existing devices (12 pieces in total for the region). Given the growing need for treatment and the existing problems due to under capacity, this was noted as a concern in the analysis of the region's cancer care report (RCC, Stockholm-Gotland, 2016). Although not clearly stated, it seemed likely that the decision to keep the same number of existing devices came from the availability of the treatment rooms, which was decided already within the NKS construction project. The infrastructure that the operations require is a binding factor when it comes to the number of devices. The rooms that each device operates (called bunkers) must be built strictly according to the directives given by the National Radiation Safety Authority. Our interviews with both the clinical users and the management consultants suggest that the solution to this problem via the specific procurement was to maximize the capacity in the region with innovative solutions, and that there is a high degree of technical and managerial innovation in the resulting contract. When referring to the number of devices ordered to be placed at NKS, one of the management consultants explained the process (Interview, EY, 2020):

> I think the problem was when they [Region Stockholm] said eight accelerators, they didn't have that idea, because if they did, then they probably would have made ten rooms. So, there was definitely at least an opinion from the hospital that the bases for those eight rooms were not calculated well enough. So, the effect was that then we have to use them quicker. I guess you can say that.

Efforts to Make PPI Work: Framing the Market to Promote Innovation

The process of performing the specific procurement activities comprised buyers' efforts of outlining the object to be exchanged, the actors to be involved, and the devices and methods of assessing the value of innovation (described in detail below).

Innovation negotiated: Device or the software (capacity, speed, interoperability, and efficiency at stake)

At the very early stage of the process, Region Stockholm formed a procurement group specific to this purchase. The group included users of the device (such as physicians, physicists, engineers and nurses) as well as administrators, procurement officers, lawyers and consultants. The group attended several workshops between 2013–2014, led by the management consultants, to define the goals and the scope of the tender. One major concern regarding the scope was the focus of innovation – more specifically, whether the eligibility criteria to join the tender for the potential suppliers would be focused on the device or the software. In addition to the (highly technical) device, radiation therapy also involves the use of well-functioning specialized software with information and image management solutions, generally known as the oncology information system (OIS) and treatment/dose planning system (TPS) (SBU, 2003). Our interviews suggest that the clinical users in the group were well informed about the technical developments in the market, and that there was substantial attention directed specifically at developments in the software for planning and running treatments more effectively in the radiation therapy area.

The other major concern was whether the procurement would be designed for a sole supplier or a multi-supplier solution. Despite claims of potential advantages, working with several suppliers was considered a major hindrance in terms of interoperability. The overall radiation equipment market is highly consolidated, dominated by two major players: US-based Varian and Sweden-based Elekta (the rest is primarily shared in smaller parts between US Accuray and German Siemens). Both Elekta and Varian provide their own oncology information and treatment planning systems integrated to the hardware and their service. At the time, all devices operating in Stockholm were from a single vendor, Varian (except one Elekta device placed for research purposes). Thus, they all shared Varian's information systems – the Aria OIS and Eclipse TPS (Doc: LS 1310-130) – and it was critical for the procurement to set the conditions in such a way that different devices could "talk to each other." According to our informants, different scenarios about the procurement's scope, and the pros and cons of each possibility, were discussed in a number of workshops

– mostly by the clinical users – that amounted to hundreds of hours (Interview, Radiation oncologist, NKS; 2019):

> It was a long process, so we from the profession also had several groups that worked closely to define the tender, define the scope. That was managed by a team of consultants, but the definition and the scope was made by the professions of physicians, physicists and engineers.

Following these workshops, the first procurement document sent to the potential suppliers was an invitation by Region Stockholm to join a competitive dialogue in 2014 (Doc: LS 1310-1308, 4/9/2014). On the document, the scope was defined as a single-supplier solution with a focus on the software. The orientation toward a single-supplier solution was presented in the condition of being an eligible supplier to the invitation. It was framed as ability to provide (or outsource) the equipment together with the software, whereas the first and foremost eligibility criterion was defined as the ability to demonstrate the technical capacity of providing and maintaining the oncology information system (the software, not the device) (Doc: LS 1310-1308, 4/9/2014, p. 20):

> Bidders must have competence, resources and such an organization that it can be expected that Bidders have the ability to lead and carry out deliveries of radiation treatment equipment as well as certain related equipment, software and services. As can be seen from section 3.2, it is necessary that the Bidder also has the ability to deliver and maintain a verification system (OIS) in order to function as a Bidder in the Procurement. This is because [Region Stockholm] and Karolinska University Hospital see the verification system (OIS) as the core of the Procurement as it is expected to form the backbone of the future solution.

The invitation also required that the eligible supplier be able to become a long-term *innovation partner* with the hospital and engage in improving treatment operations in the region. Innovation partnership was perceived as a fairly new idea by the clinical users, at least at the time. The features of a desirable partner were highlighted as willingness and ability to cooperate. The dialogue phase was expected to take approximately five months (between August 2014 to January 2015). Three to five suppliers were expected to join the dialogue; they would then be asked to prove their qualification to join the tendering process. According to the procurement officer interviewed (Region Stockholm, 2019), three vendors were interested in the first phase of the process, and eventually there were only two left to be chosen to join a dialogue with the region: Elekta and Varian.

Assessing and rewarding the most economically advantageous innovation

The assessment model in the tender was based on the logic of *the most economical alternative gets the contract*, which refers to a combination of price and the fulfillment of certain criteria. Accordingly, one major task for the buyers during the procurement was to define the qualifications and measures to appropriately assess and compare the suppliers' bids in the tender. Several more workshops were dedicated specifically to bringing together all the preferences into concrete measures in such a way that the formulation would facilitate comparison of the bids, including the potential partnership with the selected supplier. These included defining and formulating specifications in a list of criteria in a valuation model. It continued with distributing the weight in each criterion based on their significance for radiation therapy services in the region. All criteria were matched with monetary values in terms of benefits or cost savings. The goal was to achieve a single MEAT value in the form of a cost-benefit ratio representing the worth of the offers from the buyer's perspective. Finally, on March 3rd, 2015, Region Stockholm sent out the tender invitation to both potential suppliers, asking them to fill in the valuation model. The invitation was for equipment, software, updates and training, together with a proposal for an innovation partnership agreement. Eventually, on September 1st, 2015, the contract was awarded to Varian (Doc: LS 1310-1308).

INTENDED AND UNINTENDED CONSEQUENCES

The procurement process takes a legal turn

In September 2015, Elekta appealed to the Administrative Court in Stockholm for the review of the tender and requested the reiteration of the process, which found in favor of Elekta (*Förvaltningsrätten*, Mål nr. 19616–15). More specifically, Elekta claimed that there was something wrong in the procurement's Excel pricing tool that prevented the company from quoting their correct total price. The problem with the Excel file was verified and the new procurement, which began in April 2016, ultimately awarded the contract to Elekta (Doc: S2016-0113). The basis for Region Stockholm's decision was reported to be Elekta's more advantageous offer, which was lower than Varian's offer of €54.4 million. However, not long after, it was Varian's turn to appeal this decision (*Förvaltningsrätten*, Mål nr. 19667-16). Varian argued that Region Stockholm's procurement schedule had violated the Swedish Procurement Law. However, the Administrative Court in Stockholm declined Varian's tender review request (*Förvaltningsrätten*, Mål nr. 19667-16), so Varian brought the matter

before the Court of Appeal in Stockholm (*Kammarrätten*; Mål nr 4068-16), marking the fourth occasion that the case had been taken to court. Varian claimed that a tender period of 41 days was insufficient due to the extent and complexity of the contract. Furthermore, Varian argued, Elekta had a language advantage because all the tender documents were to be prepared in Swedish. On November 30th, 2016, the court ruled against Varian (Mål nr 6757-16). Finally, in December 2016, Region Stockholm signed a contract with Elekta for the entire order, worth €46.1 million.

In July 2017, problems began with the delivery of equipment and software to NKS by Elekta. The situation was controlled by an independent inspector, who did not approve Elekta's delivery of the technical requirements agreed upon in the contract. Elekta's spokesperson later stated that there were mistakes in connection with the inspection and that the entire system could be tested only when Elekta installed all the equipment (Froste, 2017). After a few months of correspondence between Region Stockholm and Elekta, the final decision became public on December 12th, 2017: there would now be a direct procurement (without a new competitive tender process) and two separate contracts would be signed with both suppliers. The first was with Elekta for the device and software at Södersjukhuset. Equipment would be installed and gradually prepared to operate in 2020. The other agreement was with Varian for the supply of the device and software to be clinically operational at the end of 2018 at NKS (*Region Stockholm News*, 2/26/2018).

Appeals and tender reviews were considered common practices during such large procurements in Sweden (*Nordic Medtech Growth*, 2017). According to the buyers, the challenge was inherent to the EU public procurement framework, where even the tiniest incongruencies in the contract offered openings for appeal. The assumption was that in such a complex procurement case, everyone would be capable of finding a hole in a contract hundreds of pages long, and company lawyers were expected to start identifying holes from day one in case their client were to lose. Thus, Region Stockholm could expect one tender review to delay the process, but when it compounded into a protracted series of reviews and appeals, time ran out and the procurement took a turn toward potential problems (Interview, Consultant EY, 2020).

The aftermath of the procurement and controversies

The process resulted in disagreements between Region Stockholm and Elekta. In a letter from Region Stockholm to the press, Elekta was described as having acted carelessly. According to the region, deliveries had not been up to par and the delays risked affecting patients. On the other hand, Elekta refuted all criticism. According to the newspaper, Elekta's spokesperson reported in an email (*Dagens Industri*, 11/16/2017):

> We have a completely different view. Elekta maintains the view that the system meets all the requirement specifications in the contract. Elekta has also proposed a far-reaching solution to meet [Region Stockholm's] expectations.

Besides such conflicting views of the supplier's performance, newspapers reported clinical users' claims that the reason for the delay was to be found in the procurement process itself. They believed that the region's procurement allowed the supplier to present a technology that they did not have, and which they could not develop in such a short time, either. The problem (according to the reporters' sources in *Svenska Dagbladet*, 5/22/2017) was that Region Stockholm had recognized the problems earlier and had mobilized lawyers who already started working with different options. However, they could not break the agreement before reaching the deadline for delivery in the contract; otherwise the supplier could claim that the region did not give them the opportunity. According to the users, this would have the most serious consequences for the health staff and the patients. Former chairperson of the Labor Union at Karolinska Hospital, who had insight into the procurement process over the years, commented: *"We have sounded the alarm so many times, but those involved in this do not listen to the health care staff"* (*Svenska Dagbladet*, 5/22/2017).

In time, the results of the procurement attracted further nationwide attention, and the process itself was being questioned in the press for poor public administration. The most central issue brought up was patients' limited access to treatment in the region. According to the reports in the press, to undergo treatment, many breast cancer patients were forced to travel to clinics not only in other regions of Sweden, but also in neighboring countries (*Dagens Nyheter*, 7/23/2019). Region Stockholm attributed the patients' travel to personnel shortages, rather than solely to low equipment capacity. Accordingly, the equipment would be fully used once the personnel issues were fixed. However, this did not spare the region from harsh criticism. The Chairman of the Stockholm Medical Association drew attention to the badly managed use of current resources, such as the very premature closure of the existing radiation therapy operating site (Svenska Dagbladet, 8/19/2019).

> Of course, the devices will be used if you can get hold of enough staff, for the patients' sake, and for that it is much cheaper. But the whole planning is like that, mismanaged from start to finish, that you would rather send patients across the country and to Finland until further notice.

Moreover, the costs incurred by sending patients abroad, as well as the extra costs of rebuilding the new hospital's radiation therapy rooms to accommodate Varian's equipment (as it was built initially according to Elekta's devices), drew further criticism. The source of discussions extended beyond Stockholm, where Region Stockholm was accused of creating overload on other regions that were already suffering from capacity issues (e.g., Juntti, 2019).

At the time of our investigation (2019 to early 2020), there were eight new Varian devices with the corresponding software at NKS, and three devices with software from Elekta at Södersjukhuset. One new Elekta device was still to be installed later during 2020. According to our informants at the operational sites, the devices were in use 12 hours a day, and seven days a week. Patients were distributed between the two sites; Södersjukhuset specialized in treating breast, prostate and rectal cancers, while the equipment at NKS was used for all other cancer patients. Because the procurement had to be split between the two vendors, users felt that the goal of interoperability across the two sites was not achieved. Furthermore, innovation partnership was not actively in use at any of the sites, either (Interviews, NKS, 2019 and Södersjukhuset, 2020).

DISCUSSIONS AND CONCLUSIONS

The purpose of this paper was to provide a critical analysis of PPI as a case of innovation governance via a market-based instrument. Through this analysis, we aim to contribute to the broader discussion on the use of markets or market-like features as a means of addressing public concerns (Geiger *et al.*, 2014; Frankel *et al.*, 2019). Our literature review embedded the promises of strategic PPI within its regulatory landscape, as well as previous research that both analyzes and promotes the development of PPI. In our analysis, we employed the interdisciplinary constructive market studies approach to formulate a practice-based critique on PPI. Our case narrative gives a detailed empirical account of the work performed by public buyers to make markets work to achieve the aims and expectations set out in public procurement policies and strategies.

In summary, PPI in our case was given a central role to govern innovation in delivering radiation therapy in the region. The process lasted almost five years (including prestudies). The case manifested various concerns about the economic and political motivations behind the choice of PPI as a tendering method; these ranged from enhancing the region's competitiveness and prestige to cost effectiveness, accessibility and equity of cancer care. The buyers wanted to enact an innovation procurement that included investments in a variety of new and existing procurement tools specifically developed to perform a PPI. Extensive efforts were made to specify needs and identify possible solutions. Various actors and resources were mobilized, including region representatives, professional buyers, users, technicians, potential suppliers, management consultants, and lawyers. Further investments were made in developing the evidential basis for assessing the innovative solution and costs to be saved, and the numerous factors at play were classified and evaluated. Eventually, the procurement process concluded by rewarding a vendor for supplying an innovative equipment solution at the lowest cost. However, the process did not end there but dragged on through several court appeals and tender reviews that turned the procurement into a duel between the two participating vendors. This public conflict was dogged by debates about the long patient waiting times, capacity issues, extra economic costs, and dubious efficiency of public resource use that directed substantial public attention to the procurement.

What can be learned from our critical analysis of this process in terms of innovation governance? First, our observations align with earlier work in the constructive market studies literature (Callon & Muniesa, 2005; Neyland *et al.*, 2019; Reijonen & Tryggestad, 2012), which shows that socio-technical arrangements of the market play a crucial role in defining the solutions to public concerns. Our case traces how public buyers constructed a particular form of *innovativeness*, even though its precise meaning remains uncertain to this day. The *innovativeness* in the PPI was defined and negotiated by various actors – first and foremost in relation to its form, namely whether it was a medical device or software. Specific accessibility concerns and capacity problems were framed in the procurement, especially in the form of speed and technical expectations of the equipment needed to treat all cancer forms. A further concern was efficiency, as provided by a single-vendor solution and interoperability across devices and sites.

The *innovativeness* anticipated in the case was shaped primarily during the carefully designed and executed workshops and formulations with the expertise of management consultants (e.g., via developing scenarios, using risk analysis tools, and various other management techniques). Here *innovativeness* was articulated in such a way that its qualities

could be translated into contractual terms. Notably, the potentiality of innovation was framed primarily as the development of the software as well as the terms and conditions of the innovation partnership contract. These qualities were then associated to monetary value, which was later calculated and compared to determine the solution that offered the *best value for money*. During this process, we have also seen that the concrete work to realize the aims of the procurement led to mistakes in Excel files, calculation formulas, the language of forms, and rules about the number of days.

To us, more than anything, our findings indicate that it is extremely difficult to frame a market for the governance of innovation via procurement as a policy instrument. The emergent character of such procurement processes makes it impossible to know beforehand the outcome of tools and practices used in PPI. As such, our study highlights the important role played by the practices, expertise, and material tools in framing markets and in determining what becomes *innovative* in practice (Muniesa *et al.*, 2007). We see that PPI processes are not simply about effectively applying the specific procurement tools prescribed by regional or national policies to achieve greater innovation in public services, for example through competitor dialogue or innovation partnership. Rather, the meaning of *innovativeness* is constructed during the procurement process. Therefore, our analysis emphasizes the critical role of socio-technical organizing work of innovation governance in the specific practices of PPI. It establishes a connection between policy instruments and markets by shaping the meaning of *innovativeness* through various valuation tools and practices, as also demonstrated by Reijonen and Tryggestad (2012) in relation to the espoused goal of *greening* procurement.

What, then, can our critical analysis say about the use of markets as a means of addressing public concerns? Our case has illustrated how PPI produced both intended and unintended consequences. The intended consequences were demonstrated in the existence of a competitive tender that framed a market situation in a contractual form to enable decision-making based on the best value for money – including *innovativeness* as a value. The unintended consequences were the delays in the delivery of equipment, insufficient radiation therapy capacity within the region, and the conflicting stakeholder views on the value of the *innovation* that was delivered.

Our empirical study suggests that diverging market concepts mobilized during the process, such as *competition* and *value for money*, contributed to the unfolding of these unintended consequences. In particular, the notion of competition that is embedded in PPI aligns with a neoliberal ideal of free-market efficiency. Market competition is understood

here as a type of distributed collective intelligence mechanism that surpasses planning or democratic decision-making in finding innovative solutions to public problems (Frankel *et al.*, 2019). It thus follows that competing vendors will come up with the best solution to any problem at the lowest cost, thereby ensuring the highest value for money for the buyer. Our case highlights how buyers viewed competition as an essential market component to be actively pursued and conditioned to address public concerns about radiation therapy in the region. However, the participant suppliers' understanding of competition differed from the buyer's interpretation. Suppliers clearly positioned competition in relation to the public buyer's role in safeguarding 'the market' from state intervention, in line with EU and national regulatory frameworks. This clash led to appeals and tender reviews between the vendors and the region, significantly delaying the process as an unintended consequence.

Similarly, the value-for-money formulation in the procurement (i.e., the most innovative solution with the best price) was contested in the aftermath of procurement. For example, various parties argued that value associated with enhanced access or shorter waiting times for patients was inadequately accounted for in this formulation. Instead, the clinical users and the Labor Union at Karolinska Hospital claimed that PPI and the competitive pressures it mobilized allowed the supplier to present a technological innovation that they did not possess and, furthermore, that the supplier could not deliver within such a short time frame. In short, the value of an innovative solution and future *innovativeness* that was carefully designed during the procurement process did not fulfill expectations of value that privileged continuous care delivery over other outcomes (very much associated with political motivations of enhancing the region's competitiveness and prestige at the cost of accessibility). Our analysis is therefore in line with previous studies that have highlighted how practitioners involved in designing and implementing market-based instruments often bring their own definitions and conceptions of markets. The making of a particular market-in-practice in line with different definitions and components of markets-in-theory can lead to conflict, as pointed out by Frankel *et al.* (2019).

In highlighting the consequential interplay between different versions of markets and its practical functioning, our paper contributes to the current special issue on innovation governance by showcasing a theoretical lens that does not treat markets or innovativeness as inherently fixed concepts. This diverges from the dominant discourse in the innovation policy literature on PPI, which routinely focuses on the benefits of, and barriers to, implementing PPI to achieve desired societal goals (e.g., Uyarra *et al.*, 2014). By foregrounding the distributed and contested effort to render innovativeness in practice, our study opens up for broader questioning of the potentiality of market-based instruments

such as PPI to govern innovation, without delimiting an analysis of its consequences to a simplified dichotomy between success (*yes, there is innovation*) or failure (*there is no innovation*) (cf. Aschhoff & Sofka, 2009; Guerzoni & Raiteri, 2015). For example, our case underscores that PPI will take form in action, notwithstanding how policies outline guiding principles and best practices. It is how abstractions such as innovation, competition, and value for money are given concrete form through practices and devices that determine what PPI can and will become. Thus, making markets *innovative* requires a careful consideration of these practices and devices, including ostensibly technical details such as timelines and Excel sheets, as well as seemingly obvious things such as the object of exchange, the meaning of competition, and the (also challenging) issue of which qualities/characteristics actually constitute innovation.

We do not claim to have fully addressed solutions to these challenges in this paper, and we expect future research to explore PPI in diverse contexts beyond health care and dig deeper into the questions, such as who is involved in their design, what kinds of expertise are employed (including management consultancy and beyond), and what role is attributed to them in relation to innovation governance and societal problems.

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Appendix: List of data sources.

Data type	Data collection points	Number of points
Documents	News articles in Swedish press retrieved from database Business Retriever	21
	Decision protocols – Region Stockholm	6
	Procurement/tendering documents	9
	Court decision protocols	5
	Vendor annual reports	10
		Total: 51 documents
Interviews	State agencies • Dental and Pharmaceuticals Agency (TLV) • Regional Cancer Center, VästraGötaland • National Strategic Innovation Program within medical technology (Medtech4Health) • Swedish Agency for Health Technology Assessment & Council for new medical devices (MTP-Council) • Council for new therapies (NT- Council)	6
	Public organizations • Region Stockholm public procurement office • Swedish Association of Local Authorities and Regions (SKR)	4
	Health care providers (hospital radiation therapy units) • NKS, Stockholm • Södersjukhuset, Stockholm • Hospital Ryhov, Jönköping	3
	Consultants (in the management consultant company specialized in health care external to the regional government)	1
	Vendors (radiation therapy equipment and software)	2
	Swedish Industry Association, Medical Devices	4
		Total: 20 interviews

In-NOvation in protected and touristic territories

Isabelle Falardeau[1]

[1] Université du Québec à Trois-Rivières, Québec, Canada.
isabelle.falardeau2@uqtr.ca

ABSTRACT

Protected areas are tourist destinations where, contrary to popular imaginaries, communities live. In and around those territories, actors implement solutions that meet the needs of their community (Soubirou & Jacob, 2019); they demonstrate social innovation. In doing so, they contribute to new compromises and new forms of regulation or governance (Klein et al., 2014). Sometimes, out of attachment to the territory, they choose alternative paths (Crosetti & Joye, 2021) such as NOvation (Godin & Vinck, 2017). The objective of this study is to analyze how mountain touristic territories articulated around protected areas generate innovation in order to face the challenges they encounter. In the form of a multiple case study, three territories are studied: Mont-Orford (Canada), Banff (Canada) and Aspen (United States). Contemporary issues are discussed in the continuity of their historical roots (see Crosetti & Joye, 2021). The results highlight the specificity of mountain tourism territories where protected areas are found, and the resulting double valuation they are subjected to (by tourism and conservation), that sometimes constrain but also foster (social) in-NOvation (in-NOvation [sociale] in French), a term introduced to name a broadened conception of innovation. It manifests itself in unsuspected spheres: the past, nature, within government institutions, through governance and dynamics of the territories. Touristic and protected mountain territories are not "on the fringes" of innovation, rather, their characteristics (rugged relief, relative eccentricity, exceptional character) make them the breeding ground for a distinction between (social) in-NOvation and the leitmotif of innovation "at any cost" (Everett Rogers, 1963 in Godin & Vinck, 2017). Considering recurring or acute issues, this study contributes to the scientific study of innovation, which is imbued with the prevailing pro-innovation bias (Boutroy et al., 2015; Godin & Vinck, 2017).

Keywords: Tourism; Social Innovation; NOvation; Protected Areas; Governance.

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INTRODUCTION

Banff, Mount Everest, Yosemite… These powerful mountain icons also have in common that they are protected areas. The links between mountains and protected areas are multiple and intrinsic. Yosemite, with its famous El Capitan, is the world's first natural park, created in 1864 to "be held for public use, resort, and recreation" (Library of Congress, n.d.). Mountains host a third of terrestrial protected areas worldwide (IUCN, 2021).

Protected areas, and their emblem, national parks, are destinations that have long attracted tourists. They are also places in and around which communities live. Touristic and protected territories in the mountains, by their characteristics and contexts, are the theatre of contradictions, dynamics and issues. In some cases, the actors of these communities seek and implement solutions that meet their needs (Soubirou & Jacob, 2019), which corresponds to social innovation (Duret & Angué, 2015). Sometimes, out of attachment to their territory they resort to alternative paths such as NOvation (Crosetti & Joye, 2021; Godin & Vinck, 2017). True to their history, they put their creativity towards renewing their territorial functions through a range of strategies ranging from strategic territorial envisioning to resisting to some forms of development (Crosetti & Joye, 2021).

This article aims to analyze the innovation and governance innovation that mountain touristic territories articulated around protected areas generate in order to mitigate the challenges they face. After painting a theoretical portrait of protected areas, innovation and governance, a multiple case study is presented. Aspen (United States), Mont-Orford (Canada) and Banff (Canada) are retained because all three are mountainous destinations that developed around protected areas. The results and discussion highlight how the double valuation (through conservation and tourism) of mountain protected areas contributes to issues prompting communities to mobilize innovation. This innovation manifests itself in addition to and beyond technological innovation. It can be found in unsuspected spheres: the past, nature, within governance or governmental institutions. For mountain protected area, the dual *mise en valeur* both constrains and contributes to dynamics. Finally, the idea of (social) in-NOvation is introduced.

CONTEXT

Protected areas and tourism

Protected areas are defined by the International Union for Conservation of Nature (IUCN) as a: "clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley, 2008). From the end of the 19th century, with industrialization and difficult living conditions in urban areas, the idea of preserving "untouched" nature appeared as a solution to counter the disturbing impact of humans (Cronon, 1996; Vidon, *et al.*, 2018). Thus, emerged an emblematic type of protected area: national parks (Sandlos, 2011). But national parks were not solely created for the intrinsic value of nature, accessibility and belonging were also central. Sites have often been chosen not only for their biodiversity and landscapes, but also according to their geographical location accessible to city dwellers (Campbell, 2011). The potential for tourism had a key influence in the creation of the first national parks (Sandlos, 2011; Cronon, 2011), and their development potential through tertiarization of the economy continues to be put forward (Lapointe & Gagnon, 2011).

The dichotomy between conservation and tourism in protected areas created a somewhat «insoluble paradox» (Héritier & Moumaneix, 2007) and led to issues related to changes in the traditional use of natural resources, the local economic structure, way of life and culture or in the mode of territorial governance, etc. (Lapointe and Gagnon, 2011). The socio-territorial dynamics associated with these issues call for adaptation strategies by the communities.

(Social) In-NOvation

Innovation has been a fashionable concept for decades (Gaglio *et al.*, 2019). Technological innovation, also named Schumpeterian innovation, although only one of its forms, has gradually become synonymous with innovation (Gaglio *et al.*, 2019). Faced with this hegemony, social innovation has (re)appeared as an alternative (Gaglio *et al.*, 2019; Godin, 2017) as a way of cutting short criticism and legitimizing innovation (Richez-Battesti *et al.*, 2012). In the broad sense, social innovation can be defined as an action aimed at meeting a social need by strengthening social ties (Duret & Angué, 2015). The *Centre de Recherche sur les Innovations Sociales* (CRISES) defines it as:

> New social, organizational or institutional arrangements or even new products or services with an explicit social purpose resulting, voluntarily or not, from an action initiated by an individual or a group of individuals to respond to an aspiration, meet a need, provide a solution to a problem or take advantage of an opportunity for action in order to modify social relations, to transform a framework of action or to propose new cultural orientations (CRISES, 2021, n.p.).

This represents an acceptance that includes action within institutions. Another conception of social innovation focuses on the non-institutional or the alternative, finding its source in the community (Godin, 2017). In this sense, it responds to the insufficiencies of the modern institutions in providing solutions to social problems (Klein *et al.*, 2014). Social actors are therefore implementing compromises and new forms of regulation or governance (Klein *et al.*, 2014). Social innovation reflects the decisions of the territories and actors involved who seek to improve their social and ecological conditions (Mehmood & Parra 2013; Moulaert 2009; van Dyck & van den Broek, 2013).

Social innovation contributed to widening the scope of innovation beyond technological innovation (Gaglio *et al.*, 2019). In order to be mindful of neglected aspects of innovation, some authors invite to innovate in innovation research (Godin & Vinck, 2017), a call also heard in the field of tourism (Sørensen & Hjalager, 2020). NOvation appeared as the critical approach in the study of innovation. NOvation takes various forms: resistance (e.g. to sociotechnological solutions [Thomas *et al.*, 2017]), non-adoption (e.g. innovations that are rejected or whose adoption is discontinued [Rogers, 1983]), slow innovation (e.g. business strategies slowing down innovation [Leinter, 2017]), innovation by withdrawal (the reduction or elimination of a practice [Goulet & Vinck, 2012] or a succession of withdrawals [Borgnet, 2019]), exnovation (departing from a previously adopted innovation [Kimberly & Evanisko 1981]), illicit innovation (resulting illegal practices [Söderberg, 2017)].

In this article, we propose the expression (social) in-NOvation to name an encompassing understanding of innovation that combines innovation in the Schumpeterian sense, that is to say centered on business and technology (Godin, 2004), with innovation critical approaches aimed at building a better representation of innovation for society (Godin & Vinck, 2017).

(Social) innovation, protected areas and governance

The links between social innovation and tourism have received little attention in the academic literature (Torres *et al.* 2017; Mosedale & Voll, 2017) although they offer a field of possibilities for research (Peterlin & Dimovski, 2015). Social innovation is also scant in the literature on protected areas (Castro-Arce *et al.*, 2019). Although tourism governance, on the other hand, is an established research subject, few contributions have been made at the meeting point of social innovation, tourism and governance (see Jacob, 2017).

Governance, a polysemic notion used in various disciplines and contexts including tourism, can be defined as formal and informal arrangements between private and public actors, from which decisions are taken and implemented (Le Galès in Gerbaux *et al.*, 2004), divided into two streams: the corporate (businesses control system) and the political (power and decision-making) (Bichler, 2021). In the case of protected areas and tourism destinations, the francophone notion of territorial governance (*gouvernance territoriale*) seems insightful. It refers to non-hierarchical community cooperation in the construction of territories (Pasquier *et al.*, 2013, in Jacob, 2017).

Governance highlights the plurality of actors involved in decision-making (Gerbaux *et al.*, 2004) and the importance of the local community as an agent of development and change in our societies (Tremblay *et al.*, 2009). Protected areas are coveted by different actors with divergent objectives, which creates governance challenges. The governance system of a protected area must therefore be adaptive and capture the various human-nature relationships (Castro-Arce *et al.*, 2019). Furthermore, innovation can differ according to the nature of a territory in terms of governance (Favre-Bonté *et al.*, 2020). For protected areas, social innovation can mediate between bottom-up initiatives and official bodies, thus contributing to governance systems embracing community (Pradel-Miquel *et al.*, 2013; Spijker & Parra 2018 in Castro-Arce *et al.*, 2019). Protected areas governance is sometimes transformed from a top-down model towards a more collaborative approach (e.g. through volunteering) (Kwiatkowski *et al.*, 2020). Some authors have researched how the duality between conservation and use can be transcended through governance innovation (Kwiatkowski *et al.*, 2020). In tourism, governance innovations, "rework existing and bring into use new collaborative modes and mechanisms", and have been conceptualized on a spectrum ranging between a neoliberal perspective and a broader multiple stakeholder, collaborative format (Hjalager, 2020).

RESEARCH PROBLEM AND OBJECTIVES

Protected areas are subject to a double valuation, by conservation and by tourism development. This duality manifests itself through contradictions and challenges experienced within these territories. This study focuses on certain forms of (social) innovation or NOvation mobilized by the communities, and the interlinkages with their governance.

The main objective of this research is to analyze how touristic territories articulated around protected areas generate (social) innovation or NOvation in order to mitigate the challenges they face. Three specific objectives derive from it:

1) Circumscribe the influence of the duality between conservation and development on (social) innovation in protected areas.

2) Explore how the territories' characteristics contribute to or constrain (social) innovation through illustrations of how (social) innovation contributes to territorial dynamics.

3) Determine the participation of different social actors and governance of (social) innovation.

METHODOLOGY

Following Héritier and Moumaneix (2007) and Crosetti and Joye (2021), a critical approach putting into perspective the influence of historical elements on the current challenges experienced in mountain territories is adopted. These issues relate to social and environmental considerations at stake around competing activities in and around protected areas (Héritier & Moumaneix, 2007). How these territories have dealt with such issues sheds light on the contemporary phase of a development continuum (Crosetti & Joye, 2021). This research is based on a multiple case study methodology used to describe and obtain an in-depth understanding of a social phenomenon (Yin, 2003; De Urioste-Stone *et al.*, 2018) and to shed light on a general problem through the examination of specific examples (Urioste-Stone *et al.*, 2018).

Three mountain destinations in the vicinity of protected areas are studied: Mont-Orford (Canada), Banff (Canada) and Aspen (United States). They share certain characteristics (presence of major infrastructure such as a ski centre in protected areas; are overvalued, one or more crises have exposed pre-existing issues), but differ in other respects (e.g. types of protected areas, geophysical characteristics). Three issues other than these characteristics, one for each of these territories, are addressed. In the Mont Orford region, accessibility has been a source of citizen mobilization since the creation of the national park. In Banff, the (over)visitation of a national park, which encompasses a small town within its borders, gives rise to urban-type issues within a natural site. In Aspen, the high cost of living in a location popular for tourism and amenity migration represents an "impossible math" (Stuber, 2020) for the middle class. The juxtaposition of the cases allows exploring their challenges and the (social) innovation they mobilize, which are interwoven to governance. The territories were also selected due to the intellectual interest and background of the author (De Urioste-Stone *et al.*, 2018) who has lived and worked for several years in mountain destinations. This in-depth knowledge and experience of the researcher about the phenomenon studied contributes to analysis (Yin, 2003).

Several complementary sources were consulted: scientific and professional writing, legislative and administrative documents, press articles, documentary film, audio and internet content, and field visits. The data generated produced a rich description of each of the cases and their context (De Urioste-Stone *et al.*, 2018). The analysis is carried out by cross-case synthesis (Yin, 2003). Each case is treated individually, then the results are aggregated in order to draw cross-conclusions (Yin, 2003).

RESULTS

Aspen: amenity migration, cost of living and mitigation

The modern roots of Aspen date back to the 1940s, when business people and intellectuals reinvented the then-devitalized former mining town (Aspen Historical Society, 2017a). Skiing and recreational practices replaced extractive uses, in a new boom, that of "white gold" (meaning snow) (Aspen Historical Society, 2017b; Stuber, 2020). The "Aspen Idea" is attributed to Walter Paepcke, a wealthy businessman inspired by the splendour of the mountains, who imagined a community identity combining spirit, body and soul (Sieg, 2019). This represented a (business) opportunity to attract "great minds" who could "help find solutions to the great problems of humanity" (Aspen Historical Society in Sieg, 2019).

Paepcke founded Aspen Skiing Company to finance the Aspen Institute and the Aspen Music Festival (Sieg, 2019), three institutions which are still active. A (social) innovation if there is one, this influence of business people, sportsmen, intellectuals, celebrities, etc. (Walter and Elizabeth Paepcke, Friedl Pfeifer, Frederic "Fritz" Benedict, etc.) explains the abundance of cultural life that still characterizes the city (Aspen Historical Society, 2017b; Stuber, 2020) as well as the diverse actors involved in the community (Stuber, 2020).

Aspen can be considered a "high-natural-amenity based community" (Pavelka, 2008). Indeed, certain geographical characteristics are intrinsically linked to the creation of the city, the development of its community and tourism. Aspen is nestled at the base of Aspen Mountain, in the Roaring Fork River Valley in the American Rocky Mountains. The high-altitude alpine climate provides conditions sought after by skiers (e.g. sunshine and powdery snow).

Aspen's location can be described as "relatively isolated" (Browning Wilson, 2008). Compared to other destinations in the region (e.g. Vail), Aspen is farthest from Denver, the regional centre and tourist gateway (RRC Associates, 2019). It is also relatively isolated, butting itself on both sides with the mountains of the Roaring Fork Valley and the limits of the White River National Forest surrounding it. These geographical constraints have "naturally" limited the inhabited footprint, creating scarcity (Blevins, 2021).

National forests are a type of protected area administered by the United States Forest Service responsible to sustainably manage reserved territories hosting multiple use, including extractive activities (agriculture, forestry, mining), hunting, fishing, recreation and tourism (Briggs, 2000; United States Forest Service, n.d; Featherman, 2013). Superimposed on the territory of the White River National Forest are also areas of wilderness "untrammeled" by humans, enjoying the highest protection status through the National Wilderness Preservation System (United States of America Congress, 1964). Consequently, portions of the national forests with almost diametrically opposed protection statuses cohabit.

Due to its attractiveness, Aspen receives an influx of various amenity migrations, from ski bums to global stardom. In the 1980s, the influx of privileged new residents, famous or wealthy, began to change the socio-economic portrait (Bob Braudis, retired sheriff, in Sieg, 2019). In destinations such as Aspen, the privileged classes fuel labour needs through their consumption patterns (Moore *et al.*, 2006). This led to tensions, difficulties, even exclusions, particularly with regard to the high cost of living, the precarious-

ness of many residents, and a recurring shortage of affordable housing.[1] "The cost of housing here went from fairly expensive to unreachable for the working person" (Bob Braudis, retired sheriff, in Sieg, 2019: n.p.). This appears an "impossible math" (Stuber, 2020).

To resolve this social discontinuity, a form of territorial governance (Jacob, 2007) through a yearlong cooperation process between local stake holders including citizens, government, developers, and vacationers emerged (Stuber, 2020). Mitigation measures have been put in place, mainly aimed at regulating real estate development (Stuber, 2020). For example, due to the very high cost of housing and residential properties, local authorities have instituted mechanisms for more affordable housing for workers (APCHA, n.d.). Aspen Pitkin County Housing Authority (APCHA) is the non-profit organization, officially created in 1982 by an intergovernmental agreement between the City of Aspen and Pitkin County (Intergovernmental Agreement 66-82, 1982). Other measures exist, including urban planning and zoning regulations, special real estate fees, dedicated taxes on real estate transactions or the obligation to build an affordable housing on the property of an opulent residence (Stuber, 2020). As in other tourism destinations, private organizations also offer affordable accommodation for their employees. For example, Aspen Skiing Company operates 800 beds in affordable units (Aspen Skiing Company Housing, 2003-2020).

The scale of the mitigation measures in Aspen has the middle class nicknamed "subsidy class" (Stuber, 2020) by some critics. Even so, much of Aspen's workforce chooses or is forced to reside in nearby towns (Basalt, El Jebel, Glenwood Springs) and beyond. The daily commute can easily represent 2 to 3 hours, entailing significant expense and inconvenience. This situation is not unlike that of workers in large cities, but appears singular in a place like Aspen, with its small population and its "natural" context.

Certain contradictions have recently been highlighted by COVID-19. In ski resort destinations, the crisis of March 2020 hit at the height of the tourist season: spring break. In the Aspen region, unemployment rose from an historical low[2] (The Aspen Times, 2020; Wyrick, 2020). Considering that 40% of Americans do not have an emergency reserve, the community rallied together to support those in need (Schendler, 2020). For example, Aspen Skiing Company committed human and material resources through its sustainability enga-

[1] In the Aspen vicinity, it is estimated that 28% of the residents spend more than 30% of their income on housing, the threshold targeted by authorities to avoid excessive burden (Navigate *et al.*, 2016; Larrimore & Schuetz, 2017). This is without considering the rise in the value of single-family homes, which although subject to significant fluctuations, is increasing impressively. For example, it rose from $7,400,000 in 2017 (The Aspen Times, 2018) to $12,600,000 in 2021 (Hager, 2021).

[2] (2.5% in February 2020) to a record high (23.1% in April 2020) (The Aspen Times, 2020; Wyrick, 2020).

gement (Schendler, 2020). In terms of social sustainability, the fact that crisis management was based on initiatives as basic as a food drive sadly illustrates the impossible math faced by Aspen workers.

Mont-Orford: accessibility to the territory and citizen mobilization

Canton d'Orford is a municipality in southern Quebec (Canada) founded in 1885. Together with some of its neighbouring communities (Magog, Eastman, Austin, Ayer's Cliff, North Hatley), it forms a tourist destination to which we refer as the Mount Orford region. Mainly forest environment, 43% of the territory is under public administration, mainly due to the presence of Parc national du Mont-Orford (PNMO). The economic activity of the region is almost exclusively related to tourism and recreational activities.

Mountain accessibility and citizen mobilization are intrinsically linked to this territory. "Between the Orford and the inhabitants of the region has developed, over the generations an admiring, poetic, picturesque bond, both physical and mythical, even fantastical" (author's translation from Kesteman, 2006). It was thanks to the dream of Dr. George Austin Bowen that the idea of conserving the territory of Mount Orford was born (Brunelle-Lavoie, 1989) accompanied by a regional mobilization. Political support, popular pressure, fundraising from 27 surrounding municipalities and donations, allowed the land to be bought out from logging companies to create the park in 1938 (Kesteman in Meunier, 2015). As such, it represents a legacy for and by the community, born from the desire to conserve nature while offering a place of recreation for all.

Due to its smaller size (15 km2) and the absence of major lakes on its territory, it was not well suited to become a hunting and fishing reserve (Brunelle-Lavoie, 1989). But the quality of the natural environment and the strategic location of Mount Orford inspired Dr. Bowen. He justified the project by the idea that the park would attract a large number of visitors and thus procure economic vitality for the region, like the pioneering national parks of the American Northeast did (Brunelle-Lavoie, 1989; Lahaye, 2007). Outdoor activities, arts and resorts were present in PNMO, along with the associated facilities and infrastructure since its creation. This has included intensive uses (alpine ski resort, golf course), markers of both its identity and its attractiveness (Lahaye, 2007). Today, this manifestation of the duality between conservation and recreation persists (Lalande, 2001).

The PNMO's governance also differs in that the government partnered with local actors, first to acquire and then to develop it. In the tradition of the community mobilization that instituted the park, local sports associations, private or voluntary, have taken on the

recreational and tourism activities (Brunelle-Lavoie, 1989; Lalande, 2001). Four distinct organizations continue to offer activities within the boundaries of PNMO. The *Société des établissements de plein air du Québec* (Sépaq), is delegated by the Government of Quebec to operate Quebec's national parks. Three other organizations operate under lease with the government (*Ministère des Forêts, de la Faune et des Parcs*, 2016-2022): *Corporation Ski & Golf du Mont-Orford*, *Orford Musique* and *Jouvence* (an all-inclusive resort). This governance makes PNMO a pioneer (Brunelle-Lavoie, 1989).

Accessibility to this territory, acquired by community mobilization, has been the subject of many socio-territorial conflicts. Since the 2000s, tensions regarding the development of the PNMO have come to light. A controversy escalated in the Mont Orford region following the announcement of a real estate development project. Mont-Orford Inc., the private company that was managing the ski resort, asked for zoning and legislations modifications in order to "ensure" its (financial) success. Privatization projects, zoning changes, expansion, pricing, and various decisions concerning the park and its region have not obtained social acceptability. Going against public consultation processes and several stakeholders' recommendations, the provincial government allowed the modification of the boundaries of the PNMO.

The conflict that ensued involved several protagonists revealing of the local governance: a private promoter supported by the government, regional economic actors who anticipated the benefits, territorial actors (*municipalité régionale de comté* [MRC], municipalities, associations) and users of the territory. The local community was itself divided around conflicting uses and values (Gagnon & Lahaye, 2010). Opponents questioned the potential reduction in accessibility due to the privatization of part of the territory (Gagnon & Lahaye, 2010). "Saving" the integrity of the park meant being faithful to the founding governance and agreement between the Quebec state and population (Kesteman, 2006). Coalition SOS Parc Orford was formed in 2006 to protest and influence the government's decision (SOS Parc Orford, n.d.). Following a strong mobilization that spread across the province, the government backed down and entrusted the MRC *de Memphrémagog* with the responsibility of finding a reconciling project. This is how a non-profit organization, funded by cities of the MRC, was created in 2011 to manage the mountain and golf course: Corporation Ski & Golf Mont-Orford.

The issue of accessibility rose again at the heart of COVID-19 when the Corporation Ski & Golf Mont-Orford announced the implementation of a fee for non-resident hikers to increase the summer revenues (Jacques, 2020a). Once again, profitability justified decision-

making concerning access to the protected area. Opposed citizens made themselves heard, notably through a petition titled "Mont Orford is not private property!" (author's translation). The Coalition SOS Parc Orford was brought back to life demanding the suspension of the fee (Dallaire, 2020). Other organizations (e.g. Sentiers de l'Estrie) also took position "for the maintenance of free access" to public land as "a society choice" (Gagnon, 2020). In a spirit of collaboration, opponents suggested the establishment of a work group dedicated to finding a solution respectful of the vision of Dr. Bowen that favoured accessibility to public land (Dallaire, 2020), an informal governance body.

Their demand was heard and a committee was created regrouping elected officials from different government levels, Corporation Ski & Golf Mont-Orford, citizen groups and economic organizations (Jacques, 2020b). Short after, in accordance with the committee's recommendations, the access fee was replaced by a pilot project for paid parking during events (Radio-Canada, 2020). A permanent advisory committee responsible for resolving issues regarding the accessibility of the mountain was also created. For opposition groups, this outcome "shows that citizen power is important" (…) "For us, it is good governance practice to be able to participate in the good decisions that will take place" (author's translation from Radio-Canada, 2020). The conflict demonstrated the relevance of citizens' voices and their influence on the governance of the territory.

The issues of accessibility and citizen mobilization are rooted in the history and territory of PNMO. The governance of this public territory has integrated local actors through various sports and community associations. Criticism towards the park's accessibility has also being present, almost from the beginning (Brunelle-Lavoie, 1989), which has brought its share of conflicts. Will the PNMO be able to meet the challenges of the years to come and remain faithful to its founding intentions by ensuring the conservation and universal accessibility of a territory "where nature and pleasure merge" (author's translation, Brunelle-Lavoie 1989)?

Tourism and National Parks: Urban Type Issues in Banff National Park

In Europe and North America, it is often under the influence of railway companies that tourism was integrated into the creation and development of national parks. In Western Canada, the Canadian Pacific Railway was inaugurated in 1886, the year following the inauguration of Banff, the first Canadian national park around the thermal springs of Sulfur Mountain (Wynn, 2011; Parcs Canada, 2021a). The tourist destination was created to fuel the use and profitability of the railroad. A population settled in the visitor centre, a community created within the park to provide services to visitors (Héritier, 2006). This led to a permanent occupation incorporated as a town in 1990 (Draper, 2000). In addition to issues typical of protected areas (high frequentation, conflict uses, etc.), urban issues developed (pedestrian and road congestion, accessibility to housing) (Héritier & Moumaneix, 2007; MacEachern, 2016).

While North American protected areas generally include few intensely developed spaces, Banff represents a case in point since it encompasses highly developed zones, even urbanized spaces (Héritier, 2006). One of the main contemporary issues of national parks is linked to the intensity of tourist activity (Héritier & Moumaneix, 2007). Banff is Canada's most visited national park and has always received high notoriety (MacEachern, 2016). Banff is often evaluated as "crowded" by visitors (Parcs Canada, 2019). Concerns are also raised by residents about the use of the park and the city (Pavelka in Kemna, 2020). Yearly visitation grew from half a million visitors in 1950 to 4 121 062 visitors in 2019-2020 (Statistique Canada, 2020). At the time of this writing, 2020-2021 is expected to have been even busier (Town of Banff, 2021).

Continuous pressures associated with development have resulted in the presence of major infrastructure within the park itself: early elite tourism (railway, train station, luxury hotel in the 1800s, golf course in the 1930s), the ski craze in the 1960s (road and air transport networks, ski resorts), democratization and development of mass tourism (services, businesses and city population growth) (Draper, 2020). Some of these are unexpected considering the conservation mission of a national park (Héritier & Moumaneix, 2007). By the end of the 1980s, acute tensions were present between development and environmental protection (Draper, 2000), even becoming recurring elements of concern for the IUCN (Draper, 2000; UICN, 2020).

The demographics of the Town of Banff are eloquent. From its foundation in 1886 to 1901, Banff gained 211 residents, and reached 7125 in 2001 (Héritier, 2006). The population is now over 8000, reaching the "ceiling" set between 8,000 and 10,000 under existing planning documents (Town of Banff, 2007; Rocky Mountain Outlook, 2019). As a town within a national park, Banff has its own municipal government on top of being subject to federal national parks legislation (Draper, 2000; Héritier, 2006). Eligibility for residency in Banff is governed by the National Parks of Canada Leases and Licenses of Occupation Regulations which limit residential leases to people who "live and work in the community", in order to meet the "needs of the community, rather than for recreation or the construction of secondary residences" (Parc national Banff, 2021). This is distinct from comparable tourist destinations' governance.

Despite facing significant pressures associated with geographically concentrating issues (Héritier, 2006), recreational practices, tourism development and population growth, the city limits cannot be expanded (Draper, 2000; Town of Banff, 2007). In Banff, issues usually encountered in urban areas are experienced within the confines of a national park. The Town of Banff creates a "honeypot" attracting the vast majority of the visitors to the national park (Héritier & Moumaneix, 2007). To accommodate the millions of annual visitors, the town operates infrastructures (e.g. wastewater management) large enough to support tens of thousands of people daily while its permanent population is much smaller (Draper, 2000; Svatek, 2004 in Héritier, 2006).

Furthermore, the desired lifestyle based on mountain recreational activities and the possibility of working in tourism or national parks contribute to a significant amenity migration in Banff and the surroundings (Pavelka, 2008). This creates challenges and socio-economic disparities, exacerbated by the fact that the town cannot geographically expand. For example, the housing vacancy rate oscillates between 0 and 1.2%, and the ratio of the median price of a house in relation to the average family income is "severely unaffordable" (Town of Banff, 2019). Many community members live in precarious conditions (Town of Banff, 2019), choose or are forced to live elsewhere (e.g. Canmore) or leave the area (Pavelka, 2008).

The challenges encountered led the community to act in order to strive for a balance between tourism development and environmental protection (Draper, 2000). In a citizen participatory approach, a consultation process led to the adoption of the 1998 Banff Community Plan, which was revisited in 2007 (Banff Community Plan 2007). The community mobilized innovative "made in Banff" initiatives (Draper, 2000) to influence its development trajectory. For example, in order to reduce the commercial growth and promote lower resi-

dential density, the innovative principles of "no net negative environmental impact" (3NEI) and "appropriate development and use" have been incorporated into community planning (Draper, 2000).

The 3NEI approach is an environmental management integrated into national park communities (Parks Canada Agency, 2000). It aims to ensure that ecosystems remain as they are or are improved as a result of development-related decisions made by national park or community authorities (Parks Canada Agency, 2000). Although it continues to be utilized, it has suffered criticisms and had to be improved over the years (Town of Banff, 2007; Parks Canada Agency, 2000). A low level of adherence by businesses (Francis, 2003; Orr, 2014) and the lack of clarity for its implementation and accountability are still noted (Parcs Canada, 2017).

The appropriate use and development is an allocation lottery for commercial development projects which was introduced in order to regulate the commercial growth rate (Draper, 2000). This innovative approach intended to shift decision-making from an emphasis on market economy principles to the inclusion of broader social and community goals (Draper, 2000). However, given that the Town of Banff is almost completely dependent on tourism, the balance between development and conservation remains elusive.

Considering the essential role of transport in the development of national parks, mobility induced by tourism is the most striking issue in Banff (Héritier & Moumaneix, 2007; MacEachern, 2016; Rocky Mountain Outlook, 2019). Banff's traffic is comparable to a larger urban centre[3] (Rocky Mountain Outlook, 2019). Several challenges are related to transport in Banff: automobile or pedestrian traffic, highway transit, congestion, parking, vehicle-wildlife conflicts, etc. (Héritier & Moumaneix, 2007; MacEachern, 2016; Pavelka, 2019b; Rocky Mountain Outlook, 2019).

Transport and congestion issues are frequent in national parks, calling for various mitigation measures: shuttle or public transport systems, encouragement to cycle, paid parking and dissuasive pricing measures for individual vehicles, dedicated vehicle zones, etc. (Héritier & Moumaneix, 2007). In Banff, these issues have given rise to local initiatives aimed at reducing dependence on the automobile (Pavelka, 2019a), for instance, improvements to public transport or subsidized transit passes based on income (Town of Banff, 2019).

[3] Approximately 93% of visitors travel in a personal vehicle (Town of Banff, 2016). Twenty-four thousand vehicles drive through Banff daily, up to 34000 on peak summer days well over the "threshold of congestion" set at 20,000 (Pavelka, 2019a).

In 2020, during the COVID-19 crisis, part of downtown Banff was made pedestrian, to alleviate transportation problems and promote sanitary measures (Mertz, 2020). Incentives, such as free off-centre parking, were instigated (Town of Banff, 2021). The vast majority of visitors were favourable (Liricon Capital, 2020). Residents also supported the pedestrianization of the city centre, although more moderately (Liricon Capital, 2020). This initiative results in the acceleration of a planned pilot project, part of a grassroots initiative to "re-imagine" Banff (Pavelka, 2019a; 2019b). The pedestrian zone was renewed and expanded in 2021 and 2022 (Pearson, 2021).

The issues discussed here have been observed and reflected on for a long time and by actors from various walks within and around the Banff community (Héritier & Moumaneix, 2007). They continue to be prominent and gain attention (Pavelka 2019a; 2019b). Another indicator of the importance of these issues: Parks Canada announced in 2021 the establishment of a panel of experts on visitor mobility, a governance innovation established in preparation for its next management plan (Parcs Canada, 2021b). Have the distancing and maximum capacity measures adopted during COVID-19 accelerated decision-making in the face of congestion and overcrowding in protected areas?

DISCUSSION

Faced with challenges, and with their own geographical, historical, cultural and economic contexts (Corneloup, 2009), the social actors presented through these cases have implemented solutions for the good of their community (Soubirou & Jacob, 2019). Attached to their territory and history, they innovate and deploy strategies to improve and renew the social functions of their community, sometimes they even resist (development, growth, tourism, etc.) (Crosetti & Joye, 2021), transform the framework for action and governance, or seize opportunities (Soubirou & Jacob, 2019). In this sense, it is possible to interpret these initiatives as the expression of social innovation at the local level (Corneloup, 2009).

Protected Tourist Territories in the Mountains: Comparable Challenges and Solutions

Aspen has been influenced by the gap between an influential elite and a modest community base, becoming emblematic of destinations where the cost of living amounts to an "impossible math" for the middle class (Stuber, 2020). Affordable housing measures for workers in Aspen, which the free market cannot provide, have a long history (City of Aspen, 2018) and could be characterized as pioneer and innovative. This community support for a social issue, here through an institutional arrangement, the APCHA, embodies social innovation (see Soubirou and Jacob, 2019 and CRISES, 2021) and governance innovation (Tremblay *et al.*, 2009) which contributed to modernizing public policies in response to social crisis (Fourny, 2018), through the agency of local actors of change (Tremblay *et al.*, 2009). The initiative could also be read as an innovation by withdrawal, that is to say a form of NOvation (see Goulet & Vinck, 2002 in Borgnet, 2019), accommodation units being withdrawn from the free real estate market for social purposes (Godin & Vinck, 2017; Borgnet, 2019).

Accessibility to housing and the high cost of living contribute to exclusions in various tourism areas (Peyrache-Gadeau, 2007). Banff has also adopted measures to address the scarcity and "severely unaffordable" housing (Town of Banff, 2019), for instance through Banff Housing Corporation, the local counterpart of APCHA. Aspen and Banff, both are attractive territories where geographic constraints and isolation in or near a protected area limit the availability of building land. In this regard, Mont-Orford differs, the mountain and the protected area mostly unconstrained. While the area has its share of luxury residences, there is no affordability crisis comparable to that of Aspen or Banff. There has nevertheless been a craze for secondary residences in the region since the COVID-19 pandemic (Arel, 2020), a phenomenon also observed in Aspen (Small & Small, 2021).

Inequalities remain despite the mitigation measures. In Aspen, APCHA's affordable housing programs were already deemed insufficient pre-pandemic (City of Aspen, 2018), became crucial in overcoming the impacts of COVID-19 and must "continue to innovate" (Belin, 2021). New manifestations of social innovation and governance innovation could be stimulated by the crisis in order to relieve "social needs not or poorly resolved by institutional bodies" (Klein *et al.*, 2016 in Fourny, 2018), or bring about cultural change (Biggs *et al.*, 2010; Hager, 2021). In some mountain communities, radical actions are even mobilized: declaring a state of emergency to benefit from government funding, strikes or demonstrations in the heart of the tourist season, etc. (Blevins, 2021).

In the Mont Orford region, accessibility to the territory is intrinsically linked to citizen mobilization. Throughout its history, local actors have reaffirmed their attachment to the territory through initiatives that can be interpreted as social innovation (Cloutier, 2009). For example, PNMO is a pioneer and stands out in the Quebec context with regards to the founding and funding by "public-spirited citizens" for the purchase of the land that formed the park (Sherbrooke Daily Record, 1937 in Brunelle-Lavoie, 1989). Social innovation here directly participates in governance and territorial dynamics (Fourny, 2018; Landel *et al.*, 2018). The more recent episodes of citizen mobilization also take on social-(inNOvation) character. The constitution and reactivation of the Coalition SOS Parc Orford citizen committee speak to this (Gagnon & Lahaye, 2010; Patsias, 2011). Some see in this type of issue a tug of war between innovation and traditions (Rech & Mounet, 2015), or even a missed opportunity in terms of innovation (Clarimont & Vlès, 2016). However, conflicts and resistance represent important sources of innovation in society (Godin & Vinck, 2017). In the case of PNMO, pushing back against a real estate development project that required downgrading a portion of a protected area, illustrates social innovation and NOvation put to contribution in a societal issue concerning a touristic protected area (Godin & Vinck, 2017; Borgnet, 2019). New forms of governance appeared through the different phases, for instance Coalition SOS Parc Orford and the more recent advisory committee (Gagnon & Lahaye, 2010; Mont-Orford, 2020).

The issue of accessibility to a protected and touristic territory is highlighted in the crisis-ridden history of Mont-Orford but is also experienced in other destinations, including Aspen and Banff. All three cases share the contiguity of protected areas with territories endowed with intensive tourism functions. This proximity leads to porosity and confusion in practices and between users, even conflicts of use, or with the type of property (public or private) (Urquhart, 2004; Auslander, 2019). In Aspen, the tradition of hiking and skiing to the top of the ski mountains, well anchored among residents, illustrates the issues of accessibility and appropriation. Arrangements and mitigation measures are required to allow safe cohabitation between hikers, other users (downhill skiers and snowboarders), operations of the ski and the requirements of the White River National Forest (Urquhart, 2004). For example, in altercations between operators of snow groomers and night hikers, the right to practice taken for granted on public land is often mobilized (Urquhart, 2004). From this issue arises innovation which, despite a social intention: "Yeah, we could deny access, but that's not what we want to do" (Hans Hohl, director of the Buttermilk mountain in Aspen, in Urquhart, 2004), sometimes takes more Schumpeterian forms (e.g. new services to hikers [Aspen Snowmass, n.d.]).

Duality between visitation and conservation in national parks gives rise to contradictions and issues. While national parks are among the most frequented tourism icons, in the case of Banff, tourist frequentation induces certain issues concentrated in and around the downtown area. The search for solutions to these issues often occurs by and for community members, thus can be understood through social innovation (e.g. the Banff Community Plan or traffic relief initiatives). In Aspen, where the municipal borders are constrained by the neighbourhood of the protected area and physiography, urban-type issues are also experienced, including traffic and congestion. Unlike in Banff and elsewhere in Colorado, in Aspen the cumulative effect of municipal initiatives, the public transportation system and community members participation have allowed traffic statistics to gradually decline (Bektesh, 2020). The (social) in-NOvation lies both in the social value of solving congestion issues and in the role of the community in their implantation and adoption. This highlights the links between innovation and governance.

More broadly, COVID-19 has created a "perfect storm" where socio-sanitary restrictions exacerbated an already growing enthusiasm for protected areas (Falardeau & Hersberger, 2020; Pavelka in Kemna, 2020). During the initial lockdown and subsequent phases of reopening, jurisdictions and communities have mobilized forms of NOvation and social innovation to address the crisis. Contrary to the usual approaches of seduction aimed at stimulating attendance, they urged visitors to stay home (Karen Sorensen, Mayor of Banff, in Kemna, 2020). Coming out of the crisis, efforts seem focused on a safe economic and health recovery, as embodied at the governance level by the creation of a special economic squad, the Banff & Lake Louise Economic Task Force (Karen Sorensen, Mayor of Banff, in Kemna, 2020). However, residents' sensitivity to the level of visitation was already affirmed pre-COVID (Town of Banff, 2007; Pavelka in Kemna, 2020). (Social) innovation, NOvation and governance innovation surely will be mobilized by communities as a "springboard" (Karen Sorensen, Mayor of Banff, in Kemna, 2020) towards opportunities in the future.

(Social) in-NOvation

The comparison between these cases makes it possible to generalize certain findings by forging links with theory (Yin, 2003). The following paragraphs will summarize the three cases. Here, the double valuation of mountain touristic territories where protected areas are located create issues shared to varying degrees by the three cases. Communities are finding solutions by mobilizing forms of innovation, social innovation and even NOvation, a broad understanding of innovation which we refer to under the term (social)

in-NOvation. These comparisons are also summarized in Table 1 which follows these few discussion paragraphs.

The socio-geohistorical anchoring of the issues experienced in these tourist and protected mountain territories illustrates the diverse manifestations of innovation. Creating the first protected areas has historically been the result of (social) in-NOvation. Banff is the first Canadian national park, created 7 years after its American precursor, Yellowstone National Park in 1872. Despite the imaginary of wilderness surrounding protected areas, these territories have been the object of utilitarian aims since their creation (Cronon, 2011; Wynn, 2011). In the sense of aiming to meet human needs, they were a social innovation (CRISES, 2021). This becomes obvious in the case of Mont-Orford an innovation by and for its community. Moreover, considering that protection of these territories results from numerous restrictions, they are an expression of NOvation (Godin & Vinck, 2017).

We have presented the territories under study as dually valued by conservation and tourism. This dichotomy creates or exacerbates issues for communities bordering or living in communities within protected areas (Lapointe & Gagnon, 2011). In this multiple case study, different types of protected areas highlighted the influence of more or less strict conservation and governance. National parks restrict more uses than other types of protected areas such as national forests. But by choosing national parks like Banff and Mont-Orford, with infrastructure and intensive uses, the weight of tourism is brought to the forefront revealing territorial dynamics contributing to (social) in-NOvation and governance innovation. Banff is exemplary, the town's *raison d'être* being to serve visitors of the national park, but also subject to federal and national park regulations. In Mont-Orford, conservation and development arguments sometimes serve alternately, and concomitantly, citizen movements. These cases illustrate that communities must conciliate interests of residents, tourism businesses, tourists and nature. They attempt to find a fragile balance between the constituent functions of protected areas, they construct and renew their territory, its social functions and governance (Crosetti & Joye, 2021).

In innovation studies, mountain territories are characterized as marginal or remote (Fourny, 2018). However, the three cases studied through the lens of (social) in-NOvation invite a more nuanced view. Their rugged relief and relative marginality have historically both represented a challenge in terms of accessibility and contributed to the fascination they have generated (Kesteman, 2006; Sandlos, 2011; Sieg, 2019). Nowadays, although constraints associated with the mountain remain (e.g. for transport or constructability), marginality or remoteness seems relative (Browning Wilson, 2008). As popular destinations,

they even acquire similarities to urban areas. These territories are not "on the fringes" of innovation (Fourny, 2018) as demonstrated by the cases of Aspen, Banff and Mont-Orford, when innovation is considered broadly (Gaglio *et al.*, 2019). In the examples presented, communities do not retreat into denial or surrender to the force of inertia. Although some authors see missed opportunities (Clarimont & Vlès, 2016) or archaism (Fourny, 2018), in these territories which depend heavily on tourism, communities seek not to abandon the tourist function, but to mitigate its weight and the associated issues.

Another criterion of comparison resides in the initiators of innovation identified, found on a spectrum comprised of individuals, social groups and organizations. Many innovations come from local governments or other intermediate levels of governance. The founding intergovernmental agreement of the APCHA in Aspen is a good example. And while the impulsion for innovation sometimes comes from higher levels of government, citizens or more or less empowered or marginalized groups can also be found among the instigators of innovation. The cases therefore do not allow favouring institutionalization or marginalization of the process (e.g. CRISES, 2021 versus Godin, 2017). The study, however, shows that the processes of (social) in-NOvation seem to bring together actors from various backgrounds, which is in line with the work that depicts social innovation as a mediation between bottom-up initiatives and higher-level bodies (Pradel-Miquel *et al.*, 2013; Spijker & Parra 2018 in Castro-Arce *et al.*, 2019). For example, the Banff Community Plan and its innovative initiatives are the municipal government responsibility, but the approach is required by the federal law on national parks, and it involves citizen participation at all stages (Draper, 2000). In Mont-Orford, Dr. Bowen's sparking role was complemented by the involvement of economic players, local and provincial levels of government and socially involved community members. The action of the Coalition SOS Parc Orford in terms of governance innovation must also be linked to that of its counterparts at different levels, particularly when crisis resolution has gone through the establishment of multi-party working groups.

Table 1. Summary and comparison between cases.

	Aspen – high cost of living	Banff – (over) frequentation	Mont-Oxford – citizen accessibility
Historical rooting of contemporary issue	• Revitalized mining town through ski, culture and tourism; • Influence intellectual and business classes.	• 1st national park, emblem; • Economic development aim from the start (increase rail traffic); • Evolving perception of park's usage; constant duality in conservation and development.	• Evolving perception of park's usage: from productive space to space invested by the community for recreation and relaxation; • Exclusions and restricted uses (e.g. expropriations).
Remoteness and urban/protected interface	• Relative distance for regional population center and tourism connecting hub (Denver); • Urban enclave restricted by valley physiography and surrounding protected area.	• Connectivity to nearby urban centers (Calgary and Vancouver); • Town of Banff enclaved in national park; • Nearby towns absorb economic and amenity migration restricted in Banff.	• Gateway community surrounding the national park; • Proximity and accessibility from Montréal; • Disputed modification to park's boundaries (reduction and enlargement).
Tourism versus conservation balance	• *National forests* allow for intensive uses; • Ski areas and *national forests* historically associated.	• Tourism development integrated from the creation of the park; • Most visited park in Canada; • Town's founding mission towards visitors' services; • Subject to federal national park regulations.	• Intensive recreation uses intrinsic to the park (alpine ski, golf); • Conservation mission has prevailed on private development projects.
Innovation actors	• Non-profit organizations; • Various government levels; • Businesses (tourism related).	• Parks Canada, federal agency; • Municipal government; • Important citizen mobilization; • University researchers; • Public sector.	• Community at impulse of the park's creation; • Citizen mobilization renewed through several crisis.

CONCLUSION

This study adopted a longitudinal approach to the issues experienced by the communities of touristic territories where protected areas are located in order to put into perspective the contemporary dynamics (Landel *et al.*, 2018). The solutions imagined and implemented by the communities have been addressed through (social) in-NOvation and governance innovation. This represents a contribution to scientific knowledge since literature about innovation is mainly interested in examples of success, contributing to a pro-innovation bias whereas innovation is always good, even a panacea (Boutroy *et al.*, 2015; Godin & Vinck, 2017). By considering recurring or acute issues in each of the cases, this study contributes to scientific work on innovation which neglects the influence of conflicts, resistance and social interests (Godin & Vinck, 2017). Social in-NOvation is not aimed to be a new type of innovation, nor the reject innovation and social innovation. It is rather a reminder that innovation comes in various shapes and contexts, and that technological innovation isn't a panacea.

More specifically, the contributions of the article can be highlighted by coming back to the three objectives. First, the article contributes to circumscribing, through studying (social) in-NOvation, the influence of a somewhat «insoluble paradox» (Héritier & Moumaneix, 2007) between conservation and development in protected areas. These territories are coveted by competing missions, activities and actors, creating dynamics that foster (social) in-NOvation from their communities. Second, the article explored how the territories' characteristics contribute to and/or constrain (social) in-NOvation and illustrated how (social) in-NOvation contributes to territorial dynamics. Rugged mountainous territories that simultaneously face a range of restrictions and regulations from different protected areas and enhanced attractiveness. Third, the article determined that different social actors and groups coexist and collaborate in the (social) in-NOvation and governance of the cases studied, though at various degrees and through motivations more or less volunteer.

The main limitation of this study is that data collection mostly relies on secondary data. The pandemic context having hampered scientific mobility, it was not possible to travel to some of the sites studied. However, the quantity, quality and variety of sources partially compensated (Yin, 2003).

To conclude, the specificity of touristic and protected territories highlights how (social) in-NOvation represents a contribution for communities that must adapt. Although not a panacea but rather a process, the element of "responding to a social need", central to definitions of social innovation, is shared. The urgency created by crisis situations or recurring issues in the trajectories of communities and territories, as well as the citizen impulse motivated by the context, also stand out. These dynamics go beyond the local level and relevant to society as a whole (Crosetti & Joye, 2021). The emblematic figure of protected and touristic territories in the mountains offers a reading lens for (social) in-NOvation and governance innovation as society faces unprecedented challenges such as COVID-19 and climate change.

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