

Institution: University of Sussex		
Unit of Assessment: 17 – Business and Management Studies		
Title of case study: Implementing Transformative Innovation Policy in Colombia to meet the Sustainable Development Goals		
Period when the underpinning research was undertaken: 2016 – 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Matias Ramirez	Senior Lecturer, Science Policy Research Unit (SPRU)	2007 – present
Johan Schot	Professor in History of Technology and Sustainability Transitions Studies, SPRU	2014 – 2018
Ed Steinmueller	Professor in Information & Communication Technology Policy, SPRU	1997 – present
Period when the claimed impact occurred: 2016 – 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact <p>Pioneering research in the field of transformative innovation policy by Sussex researchers has been adopted by the Colombian government as a way to meet the United Nations Sustainable Development Goals (SDGs). The researchers advised the government and co-authored a new national science, technology and innovation policy, based on the principles of transformative innovation. As a result, policy instruments have been established in a science and technology law 2021-2030 to support transformative innovation. The impact of the research has extended beyond policymaking to practitioner and community level; it has led to funding for significant transformative innovation projects, such as the establishment in 2020 of a Latin American Hub. The Hub exemplifies the new policy in action, leading projects worth over £1 million that use transformative innovation principles to address complex social and environmental needs. Projects include establishing circular economy practices in urban waste disposal and bringing clean water to marginalised communities.</p>		
2. Underpinning research <p>In R1, Professors Schot and Steinmueller critique the fact that science, technology and innovation (STI) policy has so far failed to address the twin challenges of environmental and social sustainability. In the last 60 years, two conceptual frameworks have dominated STI policymaking. The first frame, which was prevalent in the post-war period, focused on how state investment in science could provide 'spillovers' for the market to produce the desired levels of R&D. The second frame, which has dominated since the 1990s, emphasises a systems view of innovation and commercialisation of technologies and tries to bridge the gap between discovery and application. Both frames assume economic growth always has positive effects, and ignore unintended negative consequences on society and the environment.</p> <p>R1 calls for the development of a new, 'third frame' of innovation policy, known as transformative innovation policy (TIP), which places social and environmental problems at its core and aims to address global societal challenges. Transformative innovation requires the radical change of socio-technical systems towards more environmentally and socially sustainable societies. It involves consciously establishing <i>directionality</i> in innovation policy – that is, envisaging alternative sustainable pathways beyond those that focus solely on promoting science and achieving economic growth. It aims to broaden the actors involved in STI policymaking by, for example, incorporating civil society actors and users of technology. TIP also focuses on policy learning through <i>formative evaluation</i>, and encourages policymakers to avoid</p>		

top-down policies and to support *bottom-up*, transformative *niches* – *networks* of actors that provide alternatives to unsustainable socio-technical regimes in sectors such as energy, mobility and food.

R1 led directly to the formation of the **Transformative Innovation Policy Consortium (TIPC)** in 2015 at Sussex. TIPC is a global knowledge platform which promotes TIP among policymakers. It is coordinated by the Science Policy Research Unit (SPRU) at the University of Sussex, the Centre for Global Challenges at Utrecht University, and the Spanish research centre Ingenio. TIPC's methodology is underpinned by both **R2** and **R3**. **R2** argues that *experimental policy engagements* are necessary to achieve specific transformative outcomes. **R3** proposes a methodology of monitoring, formative evaluation and learning for policy experiments, and invites practitioners to build a theory of change that relies on the 'multi-level perspective' – a well-established framework from transitions theory that envisages transformative processes as emerging from the construction of *niches* [**R1**].

R4 describes a practical application of third-frame TIP in Latin America. It highlights the participative nature of transformation processes in the defence of urban wetlands in Bogota, Colombia – a project which involved mobilised citizens in social movements as enablers of change. The paper explains how transformation can be tailored to local needs and provides evidence of how the TIP methodology helps to link STI to societal challenges.

3. References to the research

R1 Schot, J, and Steinmueller, W E (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. *Research Policy*. 47 (9), 1554-1567. <https://doi.org/10.1016/j.respol.2018.08.011>.

R2 Schot, J, Kivimaa, P, and Torrens, J (2019) Transforming experimentation: Experimental policy engagements and their transformative outcomes, TIPC Policy, March 2019. Available on request.

R3 Molas, J, Boni, A, Schot, J, and Giachi, S (2020), A Formative Approach to the Evaluation of TIPC Working Paper, 2020-01. Available on request.

R4 Ramirez, M, Estevez, J H G, Goyeneche, O Y R, Rodriguez, C E O (2020) Fostering place-based coalitions between social movements and science for sustainable urban environments: A case of embedded agency. *Environment and Planning C: Politics and Space*. 38 (7-8): 1386-1411. <https://doi.org/10.1177/2399654420929355>

4. Details of the impact

Transformative innovation policy (TIP) and its associated methodology [**R1**, **R2** and **R3**] has influenced policy and practitioner networks in Colombia, where it has been adopted as a way to meet the UN SDGs. Three national policy documents [**S1**, **S2** and **S3**], produced under two different Presidential administrations, draw directly on **R1**, **R2** and **R3**. These documents have not only introduced TIP into the Colombian national approach to innovation, but have also had significant impact at three levels: within the Ministry of Science and Technology itself; through the Latin American Hub community of practice; and in local projects that have used transformative innovation principles to address complex social and environmental needs.

4.1 Colombian government applies transformative innovation principles

Between 2015 and 2018, Sussex researchers built a close relationship with leading officials in the Colombian government's Department of Science, Technology and Innovation (Colciencias), providing a detailed programme of training and capacity building on TIP for 40 Colciencias national and regional officials, followed by further training with 25 Colombian academics. The training and mentorship were led by Schot and Ramirez.

This enabled the development of a joint Sussex-Colciencias policy report [**S4**], published in 2018, which outlined how transformative innovation can be used as a regional strategy for sustainable development in Colombia. It emphasised the importance of local alliances and place-based innovations for bottom-up transformations and reflected on seven cases where transformative innovation initiatives were introduced by local policymakers.

4.2 Developing Colombia's new national science and innovation policy

In 2018, Colombia's President Santos instructed all ministries and government agencies to provide detailed plans for meeting the UN SDGs. Colciencias approached Sussex researchers to help formulate an approach using STI. Schot and Ramirez co-authored the department's strategic policy document – the Green Book: National Science and Innovation Policy for Sustainable Development [S1]. In the document's introduction, Colciencias General Director Alejandro Olaya Dávila states:

“This policy is being developed around what we have termed a “transformative focus”, the central aim of which is to contribute to the solution of the major social, economic and environmental challenges our country is facing, as they are set forth in the Sustainable Development Goals... The Green Book 2030 is the result of a process initiated nearly two years ago, when we created together with the Science Policy Research Unit (SPRU) and science and innovation agencies in Sweden, Norway, Finland and South Africa, the International Transformative Innovation Policy Consortium, in which we analyzed new possibilities to guide public science and innovation policy in a way that would better respond to major global and national challenges.”

The document outlined the need to adopt a transformative innovation strategy and laid out a detailed plan for transition innovation management strategies in the regions. It was adopted into law as the Sustainable Development STI Policy for Colombia in July 2018 [S1]. This new policy incorporated the concepts and tools of TIP, outlined in R1. It specifically advocated:

- opening up the policy process to fund programmes and projects that address the challenges of sustainability through STI (*directionality*)
- supporting alliances of researchers, firms and civil society actors (*networks*) to develop sustainable pathways
- greater *reflexivity* and learning
- paying special attention to users in the formulation of projects and programmes, and focusing on marginalised communities, through a *bottom-up process of participation*
- encouraging open-ended outcomes through *policy experimentation*.

The policy called for new actors to be involved in the policy process by: targeting particular areas and groups, experimenting with pilots, supporting transitions networks, and encouraging business sectors to engage in sustainable development. It also emphasised the importance, as outlined in R3, of regional agencies to determine public funding priorities.

4.3 Shaping the first Colombian Science and Technology Ministry's strategy

The research has further directly shaped the policies and strategy of Minciencias – Colombia's newly established Ministry of Science and Technology, which replaced Colciencias in January 2020. After Colombia's 2019 presidential election, Professor Schot was invited to join the Mision de Sabios – a panel of national and international experts set up by the new President, Ivan Duque, to develop policy and strategy for Minciencias [S5].

The Commission's final report [S2, pp156-160], cites Schot and Steinmueller's paper [R1] and – drawing on the recommendations in both R1 and R2 – it advocates a national strategy for transformative innovation, introducing *policy experimentation*, adopting the *formative evaluation* methodology and building *bottom-up* initiatives in the regions. This strategy was endorsed in the CONPES (equivalent of a Green Paper) that is in the process of being ratified into a new STI law for 2021-2030 [S3]. The CONPES recommends a national programme of policy experimentation to connect all missions working on sustainability.

Minciencias is applying the TIP methodology to its flagship Social Appropriation of Technology programme – A Ciencia Cierta (ACC). With the endorsement of Vice Minister Sonia Monroy, who remains a committed member of TIPC, Minciencias officials are working with Ramirez and other Sussex researchers on redesigning the ACC programme. The aim is to improve the resilience and longevity of ACC-funded projects by building *niches or networks of users* that are working to transform systems such as energy, water provision and transport systems, to make them more inclusive and environmentally sustainable as proposed in the research [R1]. The

Head of ACC in the Ministry states that mentoring from Sussex researchers in the principles of transformative innovation has enabled the organisation to:

“project improvements for its strengthening and escalation in terms of greater scope and impact, sustainability and identification of local processes for replicability in territories, consolidation of networks for the exchange of experiences, articulation with local and regional actors for sustainability, formation of a toolbox to facilitate its replicability and generation of learnings.” [S6]

The collaboration has also “contributed to the construction of knowledge within the participating ministry team... allowing us to integrate elements for the formulation and transformative implementation of STI public policy” [S6].

4.4 Building a community of practice for transformative innovation

In March 2020, the Latin American Hub of TIPC was launched with the objective of developing a platform for TIP in Colombia and the wider region and providing support for the Minciencias programme [S7]. The Hub, set up and led by Ramirez, is a community of practice funded by its ten member institutions, which include the National Cancer Institute of Colombia, the Centro Tecnológico de Medellín (a major Colombian organisation that coordinates technology projects for the city and surrounding areas of Medellín), and seven universities leading projects with a range of practitioners. The Hub’s projects include deploying a £1m World Bank investment to establish: circular economy practices for urban solid waste disposal incorporating urban street recyclers in Bogotá; an Oxfam-funded project on organic lemon value chains in Mexico; and community schemes bringing clean water to marginalised communities in Antioquia [S7].

All Hub members follow the TIPC methodology and, as the testimonies [S8, S9] explain, the concepts of *experimentation* and *niche building* (which are central to R1, R2 and R3) have had the most significant impact. One of the Hub’s participants is the Antioquia Science and Technology Centre Corporation (CTA) – a collaboration between universities, industry and the state, designed to improve society through science, technology and innovation. CTA’s Director states that key learnings from working with the Hub include “understanding experimentation methodologies that will help us continue to build niches” [S8]. He adds:

“We are adjusting the way we formulate our proposals to incorporate the transformative approach into projects ...[this] has allowed us to underline the importance of building, broadening and expanding the niches we have created over the years and encourage structural changes in the practices in sociotechnical systems.” [S8]

Similarly, Dr Alvaro Quintero, Director of Innovation at the National Cancer Institute of Colombia, stated that participating in the Hub has led to “a very remarkable advance” [S9] in the way his organisation “identifies and characterizes new ways of thinking and developing innovations” [S9]. The organisation has developed – “with the sustained and robust support of the Hub” – a transformative experiment known as the Co-creation Laboratory for Innovation. The aim is to involve patients and carers more directly than previously, as Quintero explains:

“We have understood the enormous potential value of collaborative work with our patients, their relatives and their caregivers... their needs and expectations are often invisible in traditional systems of generating innovations in the health sector... We want to promote their active participation, attempting to trigger a kind of ‘community niche’.” [S9]

This model is now part of the Institute’s Operational Plan, with a dedicated manager and financial resources. [S9]

4.5 Transformative change filtering through to local level

In 2019, as a result of TIP training provided by Sussex researchers, the Royalty fund (the Colombian government’s main funding vehicle for STI investment in regions) provided £2.8m for a project designed to make Colombian primary education more relevant to the needs of local communities [S10]. This project was among the first to apply TIP in a local context.

Dr Diana Velasco, former Pro-Vice Chancellor of the University of Ibagué, which led the project, explained the influence of the Sussex research:

“The most important feature we took from the ‘third frame’ was to empower people to use science for something: directionality, inclusion, to reach consensus and alignment, to develop bottom-up thinking and make it relevant to the community, and to make all this visible in the curriculum... The principles of TIP have been beneficial in triggering learning on how to design projects that achieve transformative results.” [S11]

Mr Dayani Rojas Forero, the Programme Director, states that, as a result of the project, teachers “have begun to apply different research methodologies as a pedagogical strategy in their classes, for example through common class projects and using IT to support their teaching-learning processes” [S11].

The project, which worked with 166 primary and secondary schools in the Tolima region to introduce a sustainability focus to the curriculum, adopted several of the central features of TIP. Children and their families were helped to use STI to address local challenges, for example by learning how to test water quality and how to dispose of waste hygienically.

5. Sources to corroborate the impact

- S1** Green Book: National Science and Innovation Policy for Sustainable Development, adopted as the Sustainable Development STI policy for Colombia [(a) In Spanish; (b) English translation] <https://minciencias.gov.co/normatividad/resolucion-0674-2018>
- S2** Report of the International Sabios Commission for Education, Science, Technology and Innovation (December 2019) https://minciencias.gov.co/mision_sabios [In Spanish]
- S3** Consejo Nacional De Política Económica Y Social, Política Nacional De Ciencia, Tecnología E Innovación 2021 – 2030 https://minciencias.gov.co/sites/default/files/documento_conpes_ciencia_tecnologia_e_innovacion.pdf [In Spanish]
- S4** SPRU & Colciencias (2018). Orientations for policy making on regional transformative innovation policies in Colombia <http://www.tipconsortium.net/resource/orientaciones-para-la-formulacion-de-politicas-regionales-de-innovacion-transformativa-en-colombia/> [In Spanish]
- S5** Colombia Hacia una Sociedad del Conocimiento, Volume 1, p6 [In Spanish]
- S6** Statement from Ángela Patricia Bonilla Ramírez, Head of A Ciencia Cierta programme [(a) In Spanish; (b) English translation provided]
- S7** TIPIC Latin American Hub website <http://www.tipconsortium.net/latin-american-hub/>
- S8** Statement from Santiago José Echavarría Escobar, Director, CTA [(a) In Spanish; (b) English translation provided]
- S9** Statement from Dr Alvara Quintero, National Cancer Institute of Colombia [(a) In Spanish; (b) English translation provided]
- S10** Agreement No. 0456-2019 Social Appropriation between the Government of Tolima and the University of Ibagué [In Spanish]
- S11** Statements from Dr Diana Velasco and Dayani Rojas Forero, University of Ibagué [(a) In Spanish; (b) English translation provided]