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Making Sense of Inclusive Innovation:
An Agency perspective on Knowledge Production and Organisational Change in Developmental Universities

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Declaration

I hereby declare that this thesis has not been and will not be submitted in whole or in part to another University for the award of any other degree.

Signature:

Melina A. Galdos Frisancho

I lift up my eyes to the mountains
Psalm 121:1

Summary

Making Sense of Inclusive Innovation:
An Agency perspective on Knowledge Production and Organisational Change in Developmental Universities

This thesis investigates how agency unfolds to create enabling environments for inclusive innovation in developmental universities. Growing concerns over social inclusion in innovation have given way to the emergence of inclusive innovation as an important overarching concept guiding funding programs of multilateral agencies to direct innovation towards specific aims such as poverty alleviation and welfare improvement for low-income groups. These concerns render the question of how inclusion can become a central feature of innovation systems.

Extant approaches in the literature have emphasised functionalist explanations and overstressed the role of structures in enabling change, particularly by suggesting the incorporation of innovation systems' excluded components and the stimulation of neglected functions (Arocena et al., 2018, 2015; Foster and Heeks, 2013; Grobbelaar et al., 2016; Grobbelaar and van der Merwe, 2016). Whilst these approaches have yielded valuable insights to chart routes towards inclusive systems of innovation, the thesis argues that it is also necessary to consider the interplay between agency and structure as mutual dependencies with ongoing interaction influencing how and in what contexts inclusive practices emerge. This requires an approach that goes beyond a narrow study of structure. Therefore, this PhD bridges this divide by bringing to the fore the complex relationship between institutional set-ups, organisations' missions, structures, and agency to expound how actors chose to produce knowledge to cater to societal needs and triggered changes in organisational interpretive schemes to create more

enabling environments for inclusive innovation. This is done through a case study in three Peruvian universities.

The literature review discusses the limits of functionalist arguments for explaining systems change and introduces a novel conceptual framework for the study of agency in two domains: knowledge production and organisational learning. The thesis offers a normative and evaluative framework to assess innovation in terms of inclusiveness. In the empirical chapters, it unpacks the importance of values, beliefs, and role expectations in researchers' choices to produce knowledge for inclusive innovation projects and explains how these researchers repurposed policy instruments to match their self-perceived roles as university workers. It also explains how researchers' agency triggered changes in organisational interpretive schemes and how these changes are reflected on reconfigurations in the governance structures of these universities. The thesis's insights are brought together in a reflective chapter that summarises the contribution of the thesis to the understanding of inclusive innovation from a systems' perspective and the implications for policy.

Agradecimientos

Este proceso ha sido más bonito porque los encontré en este camino. También quiero agradecer a Jorge, quien ha sido un gran apoyo durante desde que lo conocí. Gracias por las pláticas, nuestros intercambios y por ayudarme a creer un poquito más en mi. A Ana Paula, una amiga entrañable que tuve la dicha de (re)encontrar en mi paso por Brighton. Esa amistad que venimos cultivando desde el 2015 fue una fuente de luz, ánimos y apapachos durante este último año. Gracias por las largas noches de conversación bonita, de esa que toca el alma. En ese paso por Brighton, también quiero agradecer a Louise, una mujer fantástica de corazón gigante, quien me dio un hogar, me preparó de comer en las semanas más álgidas del doctorado y, además, asumió el reto de leer muchas de estas páginas para hacer que este trabajo sea más legible para quienes generosamente decidan dar de su tiempo para leer estas páginas.

Finalmente, quiero agradecer a mi familia. A mi mamá, mi eterno referente. He aprendido tanto de ella, de sus luchas, de su fortaleza, de su fe, de su conexión con la vida, y es uno de los placeres más grandes del mundo el ser su hija. Gracias por haber apoyado mis sueños desde que, aún chiquita, te dije lo que quería hacer y me dijiste, "hazlo y nunca dejes de soñar grande". Te amo. A mi papá, quien a pesar de la distancia, no dejó pasar un día en el que me mandara un mensaje de aliento "tú puedes, hijita, tú puedes mi campeona". Su inmutable amor viene siendo uno de los factores que hace el haber dejado mi hogar una carga más llevadera. Gracias por tu amor, por tu apoyo incondicional. Te amo. A mis hermanos, Joaquín y Sebastián, de quienes aprendo más cada día. Su nobleza, inteligencia y cautela me han enseñado tanto a lo largo de estos años. Gracias por sus abrazos, por sus palabras amables, por las risas y la complicidad. Los amo. Finalmente, quiero agradecer a Chris, quien llegó a mi vida en la última etapa de este proceso para sostener mi mano con su dulce calidez, inmensa generosidad y cariño inagotable.

Gracias a todos y todas por tanto y por todo lo que el corazón atesora y no puede ponerse en palabras.

Brighton, 30 de noviembre del 2021

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List of Acronyms

BoP – Bottom of the pyramid innovations

BRI – Below the radar innovations

CEPS – Centre for Cultural Extension and Social Projection

CR – Critical Realism

DARS – Academic Directorate of Social Responsibility

DURS – University Directorate for Social Responsibility

FINCyT – Innovation, Science and Technology Fund

FIDECOM – Competitiveness Research and Development Fund

IADB – Interamerican Development Bank

ISP – Institutional Strategic Plan

Innóvate Perú – National Innovation Programme for Competitiveness

NSI – National System of Innovation

PIMEN – Call for innovation projects for micro-enterprises

PIPEI – Call for individual enterprises' productive innovation projects

PIAP – Call for applied research projects

PITEI – Call for innovation projects for individual enterprises

Produce – Peruvian Ministry of Production

R&D – Research and development

UNDP – United Nations Development Programme

UDUAL – Latin American Universities Union

URM – University Reform Movement

Chapter 1

Introduction

1. Research context

1.1.   The decoupling of innovation, economic growth, and social inclusion

In the last decade, scholarly efforts devoted to bridging the fields of innovation and development studies have argued that one of the primary factors explaining why enhanced growth coexists and, in some cases, causes an increase in both absolute and relative poverty (and, consequently, inequality) is the dominant trajectory of innovation: capital-intensive in nature, large in scale, and destructive of the environment (Chataway, Hanlin and Kaplisnky, 2014). This stern critique of the decoupling of two parallel trajectories, economic growth and social development, has triggered the emergence of a vast body of literature dedicated to probe and ask questions about the role that innovation plays in this decoupling. In particular, these scholarly efforts have been directed to question the purposes of specific framings of 'development' over others, how technologies are harnessed to cater to *some* ideals of prosperity, and how innovation is instrumentalised to favour a particular agenda of growth. Against the backdrop of grand challenges such as increasing inequality, climate change, the Covid-19 *crises* – and their yet unknown social, political, and economic implications – these longstanding academic efforts have become more relevant.

In this connection, demands to move beyond the usual emphasis on the *scale* and *rate* of innovation are being voiced more vigorously, calling *scholars* and *practitioners* to reflect on questions such as 'which kind of innovations are

required to recouple innovation and inclusive and sustainable development?', 'whose innovation counts in these processes?' and 'who benefits from innovation's positive spillovers and who bear the costs of the negative ones?'[1]. Moreover, as the ecological, economic, social, and cultural needs that shape innovation signify different priorities, these demands also advocate for creating the conditions to enable alternative pathways for innovation. In particular, pathways that make inclusive and locally relevant technological options resilient to the processes of concentration and lock-in that facilitated the entrenchment of socially exclusionary and environmentally damaging innovation trajectories.

1.2. Bridging the divide between inclusiveness, systems of innovation and development

One of the ways in which the innovation literature has approached these issues is deeply rooted in the notion of mobilising actors, institutions, and their relationships to cater to the demands of disenfranchised groups in society. In this regard, emerging perspectives from Latin America have foregrounded the complex relations between three intricately bounded issues: inclusiveness, systems of innovation and development. For example, one strand of this literature has shed light on the opportunities and challenges for policies committed to inclusive development under prevailing economic policies (Torres et al., 2014). Other studies have assessed the extent to which National Innovation Systems features can address socio-environmental and developmental challenges (Cassiolato et al., 2014) and, conversely, how their lack of coherence and comprehensive approaches hinder the promotion of inclusive development (Bazán et al., 2014). Additional studies have focused on the role of knowledge in supporting inclusive development beyond contributions that generate economic growth (Alzugaray et al., 2014, 2012); and on how redressing power imbalances in systems through knowledge

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[1] See, for example, Alzugaray et al., 2012; Arocena et al., 2018; Arocena and Sutz, 2003; Arond et al., 2010; Cozzens and Sutz, 2014, among others.

democratisation can create favourable conditions for inclusive development (Arocena and Sutz, 2014).

Another share of this literature has focused more deliberately on understanding how innovation can benefit excluded communities, and how the transformation of supporting structures behind innovative efforts can promote social inclusion (Arocena et al., 2018, 2015; Foster and Heeks, 2013; Grobbelaar et al., 2017). This renewed interest in exploring how innovation can be made socially accountable for disenfranchised groups in society has prompted the confluence of theories, empirical cases, and policy perspectives, forming the basis to challenge assumptions that neglect the intricate aspects of linking innovation and economic growth to development.

Against this backdrop, *inclusive innovation* has emerged as an orientating goal for research and innovation agendas (Sutz and Tommassini, 2013), working as an umbrella term covering a panoply of market and non-market, planned and non-planned initiatives that incorporate the experiences of working with technology in developmental backgrounds. One promising strand in the inclusive innovation literature has focused on the relationship between inclusive innovation and the broader setting in which it takes place. Two lines of enquiry have been identified within this strand.

One set of arguments propose to modify the conventional framework of systems of innovation to allow for particular features of inclusive innovation (Foster and Heeks, 2013). These arguments put forward a *new* 'systems of innovation' framework that caters for inclusive innovation by introducing informal actors, practices, and understandings in the diffusion of innovation in low-income countries. Based upon this central idea of modifying systems' core structures and process components, other scholars argue that nation-states can direct systemic change towards the overarching goal of social inclusion by stimulating neglected functions and including previously excluded components (Grobbelaar and van der Merwe, 2016).

The second set of arguments addresses more emphatically the need for 'inclusion' to become a feature of innovation systems by introducing the *inclusive systems of innovation* framework (Arocena et al., 2018). This system makes visible and promotes the social demand for knowledge and innovation stemming from social groups with low purchasing power in contexts where the market is not the primary institution inducing or diffusing innovation. Here, the developmental university (i.e., universities committed to development and knowledge democratisation) holds an articulating role that can be leveraged to, first, respond to social demands for knowledge and innovation stemming from neglected groups in society and, second, expand advanced knowledge capabilities and solve relevant collective problems.

Both sets of arguments have yielded many valuable insights to advance our understanding of how routes towards *inclusive systems of innovation* can be charted, particularly in settings where segmented and complex expressions of demand (resulting from the unequal distribution of income) cannot be channelled through conventional market structures. These proposed routes, however, are built upon the *normative* and *evaluative* content of the national systems of innovation framework. This means that these approaches do not use the NSI as an *ex-post* framework that builds on deductive reasoning to explain the stylised facts observed in empirical studies. Instead, the NSI framework is used as a roadmap to create and modify organisations and institutions, reallocate resources and prioritise certain activities over others to bring about inclusion in innovation systems.

While the contribution of these approaches is undeniable, this thesis argues that an *ex-ante* view of change in systems glosses over important dynamic processes that enable inclusive elements to emerge, get taken up and coexist with other features of innovations systems. Moreover, a prospective view of change in systems, predicated on modifying core structures and process components, reinforces what could be considered a 'mechanistic' view of systems as a whole that can be modified, governed, and manipulated. Hence, as functionalist

explanations tend to pay more attention to the different ways in which structures facilitate or hamper systemic change, they reproduce the divide between agency and structure in the analysis of change in innovation systems. This divide – highlighted previously by Lundvall (2007) as a risk that 'system' brings with it in terms of structuralist explanations that neglect the critical role of agency – has encumbered the development of accounts that take into consideration the interplay between agency and structure as mutual dependencies with ongoing interaction shaping *why* and *how* inclusive innovations emerge in existing systems.

This attention to the *ex-ante* and *prospective* dimensions of the NSI framework has thus left room for alternative explanations of inclusive innovation and change in existing systems. These explanations hold the potential to bridge the divide between *agency* and *structure* (i.e., to explain whether change is constrained or enabled by structures and what role agents' purposive actions play in bringing about change), but also advance our understanding of the processes that unfold as part of a *de facto* articulation of social demand for knowledge in existing systems. Here is where this thesis's proposition fits.

2. The proposition of this thesis

In light of the arguments presented above, this research adopts a complementary approximation to the study of inclusion in national systems of innovation by using *agency* as a conceptual vehicle to shed light on the dynamics underpinning the emergence of inclusive innovations in existing systems. More specifically, by using the NSI framework as an *ex-post* analytical device, the thesis explains how actors *make sense* of and *act* to challenge existing and create new organisational structures that enable the development of inclusive innovations.

2.1. Research questions

To understand how agentic behaviour initiates processes of change that affect organisational configurations, agency is conceptualised using 'sensemaking' as a

form of institutional work in two domains: knowledge production and organisational learning. In particular, the focus is placed on how actors within an emerging system of innovation exercise their agency by choosing to produce knowledge to cater to societal needs and changing organisational structures to fit that purpose. As derived from the considerations outlined above, the overarching question that will be answered in this PhD is:

> How does agency in universities unfold to create favourable environments for inclusive innovation in existing systems of innovation?

Three subsidiary questions have been proposed to answer this PhD's overarching question:

- What is inclusive innovation and what are the characteristics of innovations that cater to developmental aims?
- What elements explain researchers' choices for knowledge production in inclusive innovation projects? How do researchers mobilise their agency to develop such projects?
- How does collective agency trigger endogenous processes of organisational change within these universities, and to what extent do these changes create more enabling environments for inclusive innovation?

2.3. Conceptual approach and the case

To answer these research questions, the thesis develops a novel conceptual framework that brings together the notions of agency and structure by drawing on institutional and organisational theory, particularly on the concepts of *sensemaking* (Weick, 1995) and *institutional work* (Lawrence and Suddaby, 2006), and combines them with the concept of *free spaces* (Polletta, 1999) from social movements theory. These conceptual tools are weaved together to explain how

normative and cultural-cognitive institutional elements shape researchers' choices and actions in the knowledge production domain. Additionally, this framework would enable us to grasp how collective processes, purposively directed towards creating new and altering existing values systems and organisational interpretive schemes, trigger changes in universities' governance structures.

To understand how agentic behaviour initiates processes of change in existing systems, the research builds on empirical observations emerging from twelve innovation projects in three universities in Peru (please, see Chapter 3 for more details). The choice of the university as the empirical domain to observe how agency unfolds to create more enabling environments for inclusive innovation is informed by the work of Arocena et al. (2018). These authors argue that in the Global South, innovation systems are often more virtual than real and, hence, less 'systemic' than in the North. Nonetheless, in these contexts, universities are often the more connected actors. This feature makes them active contributors to productive and social policies, which grants them the role of 'system builders'.

Furthermore, universities tend to be more perceptive to the demands of society as a whole. This is a particularly relevant feature in Global South countries, where the population's segments that can articulate and channel their demands through conventional market structures are the ones that benefit most from innovation (Arocena et al., 2018). Thus, the relevance of choosing the university as the empirical ground for this research lies in its capacity to act as an articulating organisation that channels and meets the demands for knowledge and innovation of marginalised groups, and leverage its connectedness to prompt broader changes in the system level.

The Peruvian system of innovation stands as a rich and multifaceted backdrop to the study of agency in developmental universities when the issue of social inclusion is at stake. Previous studies have argued that Peru's national system of innovation lacks the necessary conditions for having a significant impact on inclusive development, despite the government's rhetoric statements to put science, technology and innovation at the service of social equity, economic growth

and environmental sustainability (Bazán et al., 2014). The system's elements are dispersed, and the low priority given to innovation, science and technology policies has relegated STI efforts from the national priorities. This low priority is reflected in the issue that, despite the strong economic growth experienced by the country in the last decade, public investment in science, technology, and innovation still lags behind other countries in the region. Moreover, by the time this introduction was written (November 2021), the National Council for Science, Technology and Technological Innovation was given the lowest annual budget (for 2022) in the last five years. This scarce funding, coupled with a few interrelated elements, feedback procedures and visible systemic properties, has prompted to some scholars talk about the 'incipient' Peruvian system of innovation (Bazán et al., 2014; Kuramoto, 2016).

Peru's 'incipient' national system of innovation also lacks explicit incentives to promote *social inclusion* through innovation. At the time the cases analysed in this research were selected, there was not a single innovation policy instrument that contemplated redistributive aims, except for a fund launched by the Ministry of Social Inclusion and the Ministry of Production in 2017[2]. This fund was created with a financial surplus to fund seven innovation projects along three axes: anaemia reduction in children, water access and water management in the Amazon, and mobile banking in rural areas, and discontinued after the development of these projects.

The functional concentration of the regulatory elements underpinning the functioning of the system and their explicit aim to finance R&D and innovation efforts to improve the country's innovation climate and leverage private investment in innovation presents a puzzling scenario for studying the role of agency in the creation of more enabling environments for inclusive innovation in existing systems. Despite the lack of explicit policy incentives to develop R&D

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[2] This thesis's proposal was developed during the academic year of 2017-2018. When the proposal was approved, the seven projects financed by this co-jointed fund were not developed. For this reason, the research design did not contemplate including them in the analysis.

projects that would lead to innovative outcomes directed to addressing excluded populations needs, the twelve projects analysed in this research managed to use policy instruments that did not contemplate redistributive aims to finance inclusive innovation endeavours. Thus, this case does not portray top-down processes in which government efforts are directed towards harnessing the power of technology and innovation to cater to societal needs. Instead, it carries with it a story where bottom-up and collective efforts were mobilised to enable alternative directions for innovation in a system where public support for innovation is strongly guided by a market and commercial logic that is often at odds with the overarching aim of social inclusion.

3. Contributions

This thesis makes three contributions to the literature on inclusive systems of innovation. First, this thesis develops a framework to navigate the complexity of bridging the concept of inclusion with that of innovation that can be applied to different empirical contexts, and a redefinition of the concept of inclusive innovation that foregrounds the interests and agency of innovation beneficiaries as steering elements in the innovation process.

Second, this thesis extends the ex-ante view (predicated on the evaluative and normative content of the NSI framework) offered by the extant literature on inclusive systems of innovation by demonstrating that bottom-up collective processes directed towards changing interpretive schemes and organisational values systems play a pivotal role in enabling inclusive practices to recur in system-builder organisations such as universities.

Third, this thesis contributes to overcoming the structuralist problem of insufficient agency within the national systems of innovation framework by proposing a novel conceptual framework that foregrounds network and organisational dynamics to understand different pathways for knowledge production and organisational learning in existing systems. This framework would

allow producing more nuanced explanations of how institutions influence and shape organisations and the different ways in which organisations embed and develop institutions when social inclusion is at stake.

4. Outline of the thesis

This thesis proceeds with Chapter 2, which discusses the question of inclusive innovation from an innovation systems perspective and develops a conceptual framework to explain the role of agency in creating enabling environments for inclusive innovation in existing systems. The chapter starts by revisiting the innovation systems literature and underscores the current debates linking the issue of social inclusion and innovation in the Global South. Then, the chapter unpacks the arguments advocating for making inclusion a central feature of the national systems framework, and builds upon these discussions to introduce the research question guiding this PhD. Subsequently, the chapter develops a novel conceptual framework that draws on institutional and organisational theory, particularly on the concepts of sensemaking (Weick, 1995) and institutional work (Lawrence and Suddaby, 2006), and combines them with the concept of free spaces (Polletta, 1999) from social movements theory to explain the unfolding of agency in two domains: knowledge production and organisational learning.

Chapter 3 details the research design underpinning this work. It begins by outlining the ontological commitments and epistemological assumptions guiding this research endeavour. After restating the main and subsidiary questions addressed in this thesis, the chapter moves on to detailing the research strategy and approach. Here, the methodology and methods are explained, the case is introduced, and the sampling methods justified. Subsequently, the chapter explains how the data collected was analysed and the techniques used to ensure the validity and reliability of the research results.

Chapter 4 addresses the first subsidiary question of this study, namely, 'what is inclusive innovation and what are the characteristics of innovations that cater

to developmental aims?'. The chapter discusses and problematises the extant definitions of inclusive innovation in the literature to then propose a reformulation of this concept based on three key constructs: equity, participation and perceived basic needs. Subsequently, the chapter builds on this redefinition to propose a normative and evaluative framework to assess innovation in terms of inclusiveness. This framework is used to discuss the 'inclusive innovation models' put forward by the extant inclusive innovation literature, and then is applied to the twelve projects analysed in this research as a means to empirically substantiate this proposition.

Chapter 5 addresses the second subsidiary question of this study, namely, 'what elements explain researchers' choices for knowledge production in inclusive innovation projects? and how do researchers mobilise their agency to develop such projects?'. This chapter argues that normative and cultural-cognitive institutional elements (i.e., values, beliefs and role expectations) underpin researchers' choices for knowledge production. Using the lens of sensemaking, the first section shows how researchers responded to an *event* (the introduction of a new funding scheme for R&D projects) by framing it in terms of an opportunity to develop research projects that catered to the needs of excluded populations. This section details how researchers developed an initial meaning to the funding scheme and how it was later turned into a more coherent account aligned to researchers' values, beliefs, and role expectations. As the purpose of these interpretations is to guide action towards an outcome, the chapter moves on to explaining how these elements influenced researchers' actions. In particular, it shows that these frames for interpretation not only triggered the repurposing of a top-down introduced policy instrument, but also shaped researchers' knowledge production practices and the type of knowledge that was generated through their projects.

Chapter 6 addresses the third and final subsidiary question of this study, namely, 'how does collective agency trigger endogenous processes of organisational change within these universities, and to what extent do these changes create more enabling environments for inclusive innovation?'. This chapter starts by delving

into the historical construction, characteristics, and forms of governance of the Latin American university. By shedding light to these elements, the chapter explains how the three universities analysed in this research portray the characteristics of a developmental university, and argues that this feature makes them fertile grounds for the development of inclusive innovations. Nonetheless, the chapter shows that external pressures to make universities economically useful actors in society hinder their capacity to provide coherent organisational structures to support these endeavours. In this connexion, the chapter explains how the purposive action of researchers was mobilised in order to change organisational interpretive schemes and values systems that created more enabling environments for inclusive innovation efforts. In particular, the chapter expounds how a series of resources (i.e., oppositional frames, identities and a sense of efficacy) are bred in *free spaces* in these organisations and then mobilised to alter the governance structures only in two of these universities. The differences observed in these universities are then explained using an organisational learning perspective. That is to say, by explaining the extent to which the changes in the organisational interpretive schemes and values systems prompted by researchers were institutionalised outside their academic departments and research centres.

Chapter 7 brings together the findings of the three empirical chapters to answer this thesis' overarching question and reflects on the implications of this study. The chapter starts by restating the gap addressed in this research and proceeds to answer the three subsidiary questions. Subsequently, it builds on the discussion of these results and their contributions to the literature to state this thesis's empirical and methodological contributions to the literature on inclusive systems of innovation. The chapter then discusses the limitations of this research in light of its methodological architecture, reflects on the scope for generalisation of the research's results, and proposes avenues for future research. Lastly, the chapter leaves some 'take-away' messages for both academic and non-academic audiences, namely, practitioners, universities' management staff, communities and

community leaders and fellow Latin American scholars studying the issue of inclusion in innovation systems in our region.

Chapter 2

Literature Review and Conceptual Framework

1. Overview

The **introduction** explained the background to the study and outlined the central problem that concerns this research, the research strategy used to address this problem and the contributions that emerged from this work. **This chapter** discusses the question of inclusive innovation from a systems of innovation perspective and develops a conceptual framework to explain the role of agency in creating enabling environments for inclusive innovation in existing systems. Section 2 starts by revisiting the innovation systems literature and unpacks current discussions of the limitation and advantages of the framework when used to understand innovation dynamics in low and middle-income economies. In particular, it underscores the contributions of scholars working in the Global South and introduces the debates around innovation and inclusion in these settings.

Section 3 addresses more emphatically the arguments advocating for making inclusion a central feature of the national systems of innovation framework, and elaborates on these arguments to introduce this thesis's central critique of extant approaches advocating for change in systems from a functionalist perspective. The main and subsidiary questions guiding this study are then presented alongside a brief description of the case.

Section 4 introduces a novel conceptual framework to explain the role of agency in the creation of enabling environments for inclusive innovation. In this section, the concepts of structure and agency are defined, to then introduce

sensemaking as a conceptual vehicle to explain researchers' choices for knowledge production in three Peruvian universities. As the research considers agency and structure as mutual dependencies with ongoing interaction, this framework combines the sensemaking perspective with institutional approaches to elucidate how sensemaking processes accomplish organisational learning through change in values systems and organisational interpretative schemes in these universities. This section ends presenting an integrated framework that will conceptually substantiate the analyses to be presented in Chapters 4 to 6.

2. Revisiting innovation systems research for low and middle-income countries

2.1. The national systems of innovation framework

The seminal work of Freeman (1987), Lundvall (1992), and Nelson (1993) marked an inflexion point in the study of innovation. Their contributions critiqued the 'linear approach' to technological progress and exceeded the narrow confines of technology transfer as a driving force behind economic growth and global catching up. The international differences in the capacity to innovate observed by these scholars prompted a renewed focus on interactive learning, institutions, and the varying configurations of organisations concerned with the generation and use of scientific and technological knowledge for innovation (Joseph, 2006; Lundvall et al., 2009; Schot and Steinmueller, 2018). This renewed focus was systematised in the *national systems of innovation* framework.

Existing conceptualisations of national systems of innovation share a common emphasis on the systemic, interactive, and distributed nature of the production, use and diffusion of knowledge and learning in innovation. Here, the role of *national institutions* is brought to the fore to explain the creation, import, modification and diffusion of new technologies (Freeman, 1987), the production diffusion and use of new and economically useful knowledge (Lundvall, 1992); the

innovative rate and performance of national firms (Nelson and Rosenberg, 1993); the rate and direction of technological change (Edquist and Lundvall, 1993); and the volume and composition of change generating activities related to technological learning in a country (Patel and Pavitt, 1994).

The framework's geographic and political bounding follows the context-based dimension of institutions and policies. In this regard, it underlines states' ability to shape the competitiveness of a nation through science, technology, and innovation policy (Schot and Steinmueller, 2018), and frames the capabilities for learning (a central element of this framework) as a national characteristic that applies to country-based organisations[3] (Freeman, 1988, 1987). Hence, a system of innovation within the boundaries of a particular nation-state can be defined as an open, evolving, and complex system that encompasses relationships within and between *organisations, institutions,* and *socio-economic structures.* These elements and their interrelations determine the rate and direction of innovation and competence building that originate from science-based and experience-based learning processes (Lundvall et al., 2009).

The national systems of innovation (NSI) approach is not a formal and established theory. Rather, it is a 'focusing device' that helps to see, organise, and analyse stylised facts underpinning innovation processes (Lundvall, 2007). In this regard, determining which subsystems, structures, and social institutions should be included in the analysis (or not) depends on historical and theoretical considerations (Lundvall, 1992), and the examination of circumstances such as technological and market requirements, the capabilities and interdependence of various agents, among others (Carlsson and Stankiewicz, 1995).

Despite a widely held consensus in the literature about the limited advantages of developing a systems of innovation general theory, the framework has been

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[3] Beyond national characteristics, the systems of innovation approach has inspired scholarly work on regional (Asheim and Gertler, 2006), sectoral (Malerba, 2006), technological (Carlsson and Stankiewicz, 1995) and corporate levels (Granstrand, 2000). While this literature has yielded many useful insights for the study of localised processes of innovation, an analysis of their dynamics and characteristics exceeds the central aims of this study.

criticised for its ambiguity. This ambiguity derives from the vagueness of some of its conceptual foundations (i.e., variety of interpretations of institutions, science and technology infrastructure, technological regime, and organisations) and the lack of operational definitions of its limits (i.e., unspecific boundaries) (Edquist, 1997). While it has been argued that at its current stage of development, the conceptual ambiguity of the approach provides the openness and flexibility for competing perspectives, there have been attempts in the literature to move forward on its development, clarification, and specification (Edquist, 1997: 29-30).

Therefore, to address the relative absence of well-established empirical regularities and to overcome claims of under-theorisation, the NSI framework has been related to a general systems theory (Edquist, 2005). Following Ingelstam (2002), Edquist suggests that a system is constituted by a set of components and the relations between them. These should form a coherent whole that displays properties that are different from those of its constituents. A system also has a function; that is to say, it is performing or is set to achieve a particular goal. In this regard, it is possible to discriminate between the system and the wider context in which it is embedded (2005: 188).

Organisations – *as the formal structures that are consciously created and have an explicit purpose* – and institutions – *as the habits, norms, routines, established practices, rules or laws that regulate the relations and interactions between individuals, groups, and organisations* – are proposed as the main *components* of an innovation system (Edquist, 2005; Edquist and Johnson, 1997). In this respect, the differences observed between systems of innovation may respond to the diverging set-ups of institutions and organisations. For example, research institutes and company-based research departments may be crucial R&D performers in some countries like Japan, while universities tend to have a more prominent role in this respect in countries like Sweden or those of the Global South. Laws, rules, and norms also vary from country to country, and these differences influence the rate and direction of knowledge production and

innovation, as shown in the case of patent laws, ownership regimes, and the commercialisation of economically useful knowledge created in universities (Edquist, 2005: 188-189).

The activities related to the creation, diffusion and exploitation of technological innovation are proposed as the *functions* of a system (Edquist, 2005; Liu and White, 2001). However, as satisfactory explanations of innovation processes are often multicausal, there is no consensus in the literature as to which activities should be deemed as fundamental in the functioning of a system[4]. Edquist (2005) addresses this plurality by suggesting an *overall system's function*: to develop, diffuse and use innovation, and carries on in proposing ten activities that offset one another in innovation processes. These activities, described in Table 2.1, include R&D and knowledge creation, competence building, formation of markets, creating new – and fostering change in – organisations and institutions, supporting incubating activities, financing innovation-related activities and setting quality requirements.

Table 2.1 Systems of innovation's functions

Activities	Description
Provision of R&D and knowledge creation	These activities should take place primarily in engineering, medicine, and the natural sciences.
Competence building	Through the provision of education and training, creation of human capital, production and reproduction of skills, individual learning in the labour force so these competences can be used in innovation and R&D activities.
Formation of new product markets	--
Articulation of quality requirements	These requirements emanate from the demand side with regard to new products.

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[4] For instance, Liu and White (2001) and Bergek and Jacobsson (2003) have compiled five fundamental activities in innovation systems –namely, R&D, implementation, end-use, education, and linkage; and creating new knowledge, guiding the direction of the search process, supplying resources, creating positive external economies, facilitating the formation of markets respectively. Rickne (2000) provided a more comprehensive list of fundamental activities to be carried out to create, diffuse and exploit technological innovation. These are creating human capital, creating and diffusing technological opportunities, creating and diffusing products, incubating (provide facilities, equipment, and administrative support), facilitating regulation that may enlarge the market and enable market access, legitimising technology and firms, creating markets and diffusing market knowledge, enhancing networking, directing technology, market and partner search, facilitating financing, and creating labour markets that new technology-based firms can use.

Creating and changing organisations	The creation change should enable the development of new fields of innovation. For example, enhancing entrepreneurship to create new firms and intrapreneurship to diversify existing firms, creating new research organizations, policy agencies, etc.
Networking through markets and other mechanisms	These mechanisms should include interactive learning between different organisations involved in the innovation processes and should enable the integration of new knowledge elements (developed in different spheres of the SI and coming from outside) with elements already available in the innovating firms.
Creating and changing institutions	These are the laws, rules and norms that influence innovating organisations and innovation processes by providing incentives or obstacles to innovation. Among the most relevant for innovation processes are institutions like IPR laws, tax laws, environment and safety regulations, R&D investment routines, etc.
Incubating activities	Through the provision of access to facilities, administrative support, etc. for new innovative efforts.
Financing of innovation processes and other activities	These are activities that can facilitate commercialisation of knowledge and its adoption.
Provision of consultancy services	Among the most relevant innovation processes are consultancy services for technology transfer, commercial information, and legal advice.

Source: Adapted from Edquist (2005: 190-191).

Centralised control over systems of innovation is not possible, and innovation policy has only limited influence on the development of these activities. Hence, Edquist remarks that "just as innovation processes are evolutionary, [systems of innovation] evolve over time in a largely unplanned manner" (2005: 192). One of the implications of this evolutionary character is that the proposed list of activities can be subject to revision over time.

While Edquist (2005) makes a convincing argument about the unresolved nature of innovation systems' functions, it is worth questioning the extent to which some of the functions listed above can be in fact framed as particular activities carried out in a system-like fashion. For instance, *the formation of new product markets* and the *creation and change of institutions* entail processes in which multiple organisations with uneven power and diverging interests participate. However, a growing body of literature, particularly in the area of

socio-technical transitions, has documented how institutions evolve over time through alignments, realignments and transformations (Geels, 2014; Geels and Schot, 2007; Patterson et al., 2017; Smith et al., 2010). In this regard, the examples of the creation and change of institutions and organisations put forward by the author – i.e., organisations setting standards, or laws that lead to the creation of an organisation (Edquist, 2005: 198) – offer only a partial explanation of the power of institutions to influence and shape organisations, and the different ways in which organisations embed and develop institutions.

Furthermore, the proposed overall innovation systems function – i.e., to develop, diffuse, and use innovation – gloss over questions regarding the *direction* of innovation (i.e., what is innovation for? and which types of innovation, along which pathways?), the *distribution* of innovative activities within national boundaries (i.e., who is innovation for?), and the outcomes achieved for the poorest and marginal communities in their *diversity* of ecological, economic and cultural settings (Arond et al., 2010). In other words, such proposed function is embedded on the premise that scientific and technological innovations are routes to national economic growth in a highly competitive global economy; a premise that emphasises the *scale* and *rate* of innovative activity over social and political directions of change, the distribution of its benefits, and the plurality of contexts in which it can unfold.

The national systems of innovation approach originated from empirical work carried out in advanced industrialised countries such as Japan (Freeman, 1988, 1987), Sweden and Denmark (Edquist and Lundvall, 1993), and the United States (Nelson, 1988), but its applicability is not restricted to industrialised countries (Arocena and Sutz, 2000). The geographical and political bounding of the framework, as well as its context-sensitive nature, has allowed the consolidation of a body of work that applies the national systems of innovation lens to developing economies. Here, the limitations identified above regarding a conceptualisation of the NSI in terms of *functions* and *components* (i.e., the

framework's emphasis on the rate and scale of innovation and a partial view of change in institutions and organisations) become more salient due to these countries' changing economic and social conditions. The next section revisits the arguments in the literature that calls for a new conceptualisation of the national systems of innovation based on the experiences of the Global South.

2.2. National systems of innovation as seen from the South

Well-established claims for thinking about systems of innovation from a Southern perspective (see, for example, Altenburg, 2009; Arocena and Sutz, 2020, 2002, 2000; Cassiolato and Lastres, 2008; Dutrénit and Sutz, 2013; Lundvall et al., 2009) argue for a re-examination of the determinants of innovation in Global South countries, particularly in regard to the *demand for innovation*, the *links and interactions among actors*, and the *countries' development priorities* and *opportunity costs* of investing in science, technology and innovation.

First, regarding the type of demand for innovation, the first Sussex Manifesto[5] pointed out in the 1970s that "the need for science and technology in developing countries seems unlikely to take the form of a commercial demand coming from individual producers" (Singer et al., 1970: 20). The situation has not changed considerably since then. Despite the pivotal efforts displayed in Global South countries to transit towards a knowledge-based and innovation-driven economy, knowledge demand stemming from firm-based economic dynamics is on average scarce in peripheral countries (Arocena et al., 2018).

Firm-centred approaches, extensively used in the extant innovation literature, focus on understanding how innovation is catalysed by an effective demand

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[5] In 1969, the United Nations commissioned a study which became known as the 'Sussex Manifesto' (1970). This study argued that science and technology were overwhelmingly steered by the interests of global rich. In this regard, the Manifesto argues that research agendas needed to focus on the world's 'developing countries' and urged 'advanced' nations to devote 5% of their expenditure on research and development to problems in developing countries. While the impacts and implications of this study are diverse and contested, it place in the centre of the debate issues regarding scale and location of technological activity and their implications for developing nations (Arond et al., 2010).

channelled through market structures (i.e., the *demand-pull* approach) (Galdos and Haneef, 2021). However, market-centred conceptualisations of demand are often discriminatory of income groups, neglect the impact inequality has in skewing innovation processes, and overlook the segmented and complex expressions of demand prompted by the unequal distribution of income (Srinivas, 2014). Accordingly, growing recognition of the less prevalent role of the market, as a central institution inducing and diffusing innovation, has motivated a shift of focus in this literature towards a latent demand stemming from social groups without purchasing power (Arocena et al., 2018).

Second, innovation cannot thrive in an economy with 'pure markets' characterised by anonymous relationships between innovation producers and final users (Christensen and Lundvall, 2004; Lundvall, 1985; Vinding, 2006). Rather, innovation thrives in organised contexts where codes and information channels are in place (Lundvall, 2016: 236). Most industrialised economies display these channels, and "[w]here past policies largely focused on building strong actors [...], now the emphasis has shifted to nurturing and strengthening the links between those actors so the national (or regional) innovation system as a whole works effectively as possible" (Martin, 2010: 44).

In Global South countries, the socio-economic behaviour regarding innovation does not reflect configurations that point to a system-like articulation at the national level. On the contrary, micro-innovative strengths remain isolated and encapsulated due to the weak or inexistent links among sectors and organisations (Arocena et al., 2018; Arocena and Sutz, 2000) and the lack of interface units (Chaminade et al., 2009; Galli and Teubal, 1997). Thus, systems where only a few organisations and institutions are in place, and the interactions among these elements are still in formation, can be better conceptualised from an evolutionary perspective; that is to say, as *emerging systems* where only some of the building blocks are in place and where the interactions among them are still in a nascent stage (Chaminade et al., 2009; Chaminade and Vang, 2008).

Third, the opportunity costs associated with investing in science, technology, and innovation (STI) and countries' national priorities are different in the South. Technologically advanced projects often have negative distributional effects, and the value chains of technologically sophisticated products usually imply high entry barriers at all stages (from the R&D to the production and marketing), benefitting only small segments of the urban highly skilled workforce and wealthy enterprises. Moreover, Global South countries have less developed formal rules and laws, and their enforcement is subject to be unreliable and arbitrary (Altenburg, 2009). Less formal rules create an uncertain environment that increases the risk of return of firms' investments in R&D, which in Latin America and the Caribbean account for 0.5% of the annual sales of only 8% of firms[6].

The lack of formal rules is coupled with less diversified and integrated firm structures, which affect firms' predisposition to engage in R&D and innovation activities and limit their efforts to the purchase of technology developed overseas (Bell, 2007: 25). These factors increase the opportunity costs for long-term investment in science, technology, and innovation. This means that in countries affected by acute socio-economic problems such as extreme poverty, famine, macroeconomic instability and external debt, it is less likely that governments would mobilise resources to address market and system failures through innovation policy (Chaminade et al., 2009; UNCTAD, 2007).

The distinct patterns observed in the type of demand for innovation, the linkages among actors, and countries' priorities and opportunity costs to investing in STI brought about important reflections regarding the framework's nature and characteristics when used as a focusing device to explain innovation dynamics in the Global South. A first reflection is that the NSI no longer describes an existing situation; that is to say, it no longer acts as an *ex-post* framework that builds on

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[6] According to the Interamerican Development Bank (2021), micro, small and medium-sized enterprises (MSMEs) represent 99% of business and 67% of the employment in Latin America and the Caribbean, and yet they account for only a third of the region's GDP. In 2014, only 8% of Latin American and Caribbean firms invested in R&D, with a spending estimate of 0.5% of their annual sales in these activities (Islam, 2021).

deductive reasoning to explain the stylised facts observed in empirical studies. Instead, when the reality of the Global South is studied, the framework becomes *ex-ante* in the sense that it does not describe an actual situation but acts as a roadmap to create and modify organisations and institutions, reallocate resources and prioritise certain activities over others (Arocena et al., 2018: 67).

Closely linked to the *ex-ante* nature of the approach is the function it fulfils as a guide for policies. The framework was elaborated as a theoretical and factual approach with some propositional elements. This means that it has acted as a framework to widen and improve science and technology policies in industrialised countries, which have occupied a decisive place in their political agendas since the 1940s (Arocena et al., 2018). These characteristics facilitated the adoption of the NSI framework by policymakers at the national level and experts in international organisations, including the Organisation for Economic Cooperation and Development (OECD), United Nations Conference on Trade and Development (UNCTAD), the World Bank and European Union Commission (Lundvall, 2007: 96).

The diffusion rate of the framework in policy circles has yielded useful insights to move from a linear model based on public support for R&D to a more nuanced understanding of the dynamic and systemic aspects of innovation. Nevertheless, it has also led to misunderstandings and crude interpretations of the framework that have resulted in oversimplified policy interventions, and limited considerations of the wider implications of a learning-based perspective for innovation in economic policy (Lundvall, 2007). Such oversimplifications are prevalent in Global South countries and, in some instances, have taken the form of laws or presidential resolutions aiming to enforce the *creation* of a national system of innovation (Arocena and Sutz, 2020: 6).

The last reflection is that the NSI, as a policy subject, aims to improve a particular situation. In this regard, it holds a normative imprint and evaluative content. Being a prescriptive approach, the NSI highlights the interactive,

distributed and potentially systemic traits of innovation as criteria to assess how satisfactory innovation processes are (Arocena et al., 2018). Nonetheless, stressing the evaluative content of the NSI framework does not entail asserting that optimal or ideal systems exist. Rather, a distinctive aspect of the approach is its acknowledgement of different pathways that lead to innovation. Such acknowledgement is predicated on its recognition of diverse societal stakeholders in innovation processes (i.e., going beyond the schematic opposition between state and market); its focus on political, institutional and cultural issues, as well as on economic matters; its emphasis on the accumulative and evolutionary nature of interactions; and its acknowledgement of power relations among its constituents (Arocena et al., 2018; Arocena and Sutz, 2002).

The *ex-ante* nature and the *normative* and *evaluative* content of the national systems of innovation framework, as seen from the South, provide a fertile ground to link systems of innovation research with the issue of social inclusion, a central problem in Latin America (Dutrénit and Sutz, 2013). While Latin American scholars have positioned the link between knowledge, innovation and development at the centre of the academic debate (see Cassiolato et al., 2003; Cimoli, 2000; Dutrénit and Sutz, 2013; Lemarchand, 2010; Llisterri and Pietrobelli, 2011; López, 2007; Sagasti, 2005), social inclusion as an explicit objective of the NIS has entered the research agenda only recently (Arocena et al., 2018; Arocena and Sutz, 2012; Cozzens and Sutz, 2014; Cuoto Soares et al., 2013; Dutrénit and Sutz, 2013; Johnson and Andersen, 2012).

In this body of work, considerations regarding the social demand for innovation stemming from social groups with low purchasing power, the emerging status of innovation systems, and countries' priorities regarding development have been pondered using *inclusive innovation* as a conceptual vehicle for the analysis of innovation dynamics. The next section revisits the concept of inclusive innovation and its links to the systems of innovation research. Here, particular attention is placed on the use of national systems of innovation as a broad and

multifaceted approach to address matters of innovation's direction, the distribution of its costs and benefits, and the diversity of contexts in which it takes place in Global South countries.

2.3. Social inclusion through innovation: A pressing demand in the Global South

The double challenge of achieving a sustainable and inclusive development has intensified scholars' concerns to refine the NSI framework to address the negative externalities of innovation-related activities (Johnson and Andersen, 2012). In this regard, much of the current innovation literature focusing on the South underlines the role of social relations and institutions in enabling innovation practices that benefit excluded communities, while granting them an active role in the research, invention, development, and application of innovations. These observations have been systematised under the concept of *inclusive innovation*[7].

Inclusive innovation stands as an important overarching concept guiding funding programmes of multilateral agencies to direct innovation towards specific aims such as poverty alleviation and welfare improvement for low-income groups. A feature of inclusive innovation is its broad definition as an orientating goal for research and innovation agendas (Sutz and Tommassini, 2013), which works as an umbrella term covering a panoply of market and non-market, planned and non-planned initiatives that incorporate experiences of working with technology in developmental backgrounds.

This construct builds on the idea that innovation should not concern technology only, but also pay attention to institutions, practices, knowledge generation, and social relations in the quest for providing solutions to global problems of poverty, increasing inequality and social exclusion (Bryden et al., 2017; George et al., 2012). Thus, contrary to Schumpeterian or new growth theory

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[7] See Arocena and Sutz (2012); Chataway et al. (2014); Cozzens and Sutz (2014); Cuoto Soares et al. (2013); Foster and Heeks (2014); Heeks et al. (2014); Johnson and Andersen (2012); Kaplinsky (2011); Papaioannou (2014); Paunov (2013); Srinivas and Sutz (2008).

definitions of innovation[8], innovation is defined in this context as "[the] new ways of doing things. This includes not only science and technology but – crucially – the related array of new ideas, institutions, practices, behaviours and social relations that shape scientific and technological patterns, purposes, applications and outcomes." (Arond et al., 2010: 1).

This conceptualisation moves away from definitions of progress through innovation framed in terms of the scale and rate of change to those that encompass alternative directions for scientific, technological, and associated institutional change. In other words, it shifts the focus from one-track race approximations where some countries are ahead or behind in their quest for progress and prosperity to progress through a multiplicity of pathways (Arond et al., 2010), placing the question of whose knowledge and interests count as significant at the centre of the debate (Bryden et al., 2017).

While there is a widely held consensus in the Global South literature about the meaning of *innovation* in *inclusive innovation*, the concept has been attributed manifold definitions depending on the different aspects of 'inclusiveness' that have been attended. For example, some studies regard inclusiveness as a specific result of innovation, like the reduction of income inequality (George et al., 2012; Guth, 2005). Other definitions emphasise the intentions behind innovation and the nature of the actors involved in innovation processes (Foster and Heeks, 2014, 2013), while other studies pay more attention to the process of developing innovations without losing sight of innovation outcomes (Bryden et al., 2017; Chataway et al., 2014; Cozzens and Sutz, 2014; Onsongo and Schot, 2017).

Despite the scholarly efforts to develop its conceptual strength, inclusive innovation remains a theoretically underdeveloped construct often used as a catch-all conceptual tool to explain innovation's positive spillovers in

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[8] New growth theory, according to Lundvall (2007), emphasises basic assumptions regarding the role of innovation in rational profit maximising in firms. His definition of innovation in national systems of innovation is closer to that of Schumpeter in the sense that innovation can be seen as new combinations that can be separated from an invention, which "become an innovation only when the entrepreneur brings it to the market" (Lundvall, 2007: 101).

developmental backgrounds (Bryden et al., 2017; Jiménez, 2019). Therefore, although it is widely recognised that inclusive innovation reflects a concern about how innovation affects or may be affected by underprivileged people, it remains "a weakly defined area of enquiry with multiple roots and little synthetic analysis" (Chataway et al., 2014: 39).

Johnson and Andersen (2012) argue that approaches to innovation for inclusive development – that is, inclusion as an outcome or as a process – can be seen, to some extent, as competitive. The process of 'taking part in' can jeopardise the outcome of 'being benefited from' innovation processes if structural preconditions are not in place. This means that fostering inclusion in exclusionary structures can represent little benefits if more radical changes do not take place to deliver distributed and extensive benefits for marginalised communities[9] (Johnson and Andersen, 2012).

Therefore, achieving inclusive development would entail a structural change that gives voice and power to the concerns and aspirations of otherwise excluded groups. Such change cannot be separated from an analysis of institutions as these shape how social relations take place and who is included and excluded from the interactions (Johnson and Andersen, 2012). It follows that inclusion through innovation cannot only be approached from an outcome/process perspective; rather, it also requires thinking about the institutional setup shaping these processes and outcomes, and the role organisations play in enabling such change.

The systemic aspects of innovation discussed in the previous sections invite us to reflect on inclusive innovation – either as a process, outcome, or both – in relation to the system in which it is embedded. To advance our understanding of the relationship between inclusion and innovation systems, scholars have moved away from *narrow* conceptualisations that focus on research-based innovation in

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[9] For instance, Joske Bunders highlights in relation to the co-production of agricultural knowledge, that the improvements brought about through informal research and development were too small to deal with the immense problems afflicting some low external-input agricultural systems, which needed more substantial changes in order to increase the benefits of the informal inputs (Bunders et al., 1997; Johnson and Andersen, 2012).

high-tech activities, and have adopted instead a *broader* appraisal of innovation that encompasses social institutions, macroeconomic regulations, financial and education systems, and market conditions[10] (Gu and Lundvall, 2006). This shift enabled a more nuanced discussion of the performance of innovation systems regarding innovation's direction, creating fertile soil for the emergence of the *inclusive systems of innovation* framework.

The inclusive systems of innovation framework highlights alternative pathways to prosperity based on the democratisation of knowledge, the widening of participation, and the redistribution of innovation benefits. In this regard, it has normative implications concerning whose knowledge, learning, and interests count as significant in innovation processes, and who benefits from their outcomes. This means that advancing a more encompassing inclusion of excluded groups in learning and innovation activities would require organisational and institutional change (Johnson and Andersen, 2012). In the next section, we revisit the arguments in the academic literature that advocate for such changes by extending the national systems of innovation framework to accommodate *inclusion* as a central feature.

3. Embedding 'inclusion' in the national systems of innovation framework

Two arguments have been identified in the inclusive innovation literature that point towards embedding 'inclusion' in the national systems framework. First, Foster and Heeks propose that the conventional framework of systems of

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[10] According to Lundvall et al., (2009), almost from its beginning, innovation system research has taken two perspectives: a narrow and a broader one. In contrast to the broad perspective, the narrow perspective equals innovation to science and technology, and aims at mapping indicators of national specialisation and performance in research and development efforts, and science and technology organisations (Lundvall, 2007; Lundvall et al., 2009). In addition to the narrow and broad approaches to the study of innovation, changes observed at the system level have also been explained through the 'science, technology, and innovation' (STI) and 'doing, using, and interacting' (DUI) modes of innovation (Jensen et al., 2007). While the first mode emphasises experimentation, formalisation, and codification of knowledge primarily through R&D activities, the second one highlights the localised and tacit nature of knowledge building by focusing on the structures and relationships that enable interactive learning (Lundvall et al., 2009).

innovation "must be modified to allow for particular features of inclusive innovation" (2013: 333). In doing so, they focus on five core structure and process components: innovation, actors, learning, relations and institutions, and suggest a new systems of innovation framework that caters for inclusive innovation by introducing informal actors, practices and understandings in the diffusion of innovation in low-income countries.

Grobbelaar, Tijseen and Dijksterhuis (2017) draw on this argument to suggest that paying attention to system components' dynamic interactions may help to identify missing actors or institutions, and in consequence, to "provide recommendations for systemic instruments through which the operation of the system, as a whole, can be modified and improved" (Grobbelaar et al., 2017: 9). The authors elaborate further and suggest that nation-states can direct change towards an inclusive system of innovation by stimulating certain functions and including previously excluded components.

A second approach by Arocena, Göransson and Sutz (2018) addresses more emphatically the need for 'inclusion' to be a feature of an innovation system, and defines this type of system as one that makes visible and promotes social demand for knowledge that comes from social groups with low purchasing power. This demand is used to expand advanced knowledge capabilities and solve relevant collective problems by integrating the role of users through the inclusion of neglected groups in contexts where the market is not the main institution inducing or diffusing innovation. Here, the developmental university (defined as the one that has a commitment to development through the democratisation of knowledge) is central in responding to the social demand for knowledge and innovation.

Both arguments propose coherent avenues to accommodate inclusive innovation within the system of innovation framework and emphasise systemic change as a catalytic force to achieve this aim. This PhD probes and asks questions concerning these systemic approaches as a means of taking our

understanding of inclusive innovation forward. In the first place, the approach proposed by Foster and Heeks (2013) stands on the premise that systems of innovation is a "framework that can be resolved to a few core system components" (2013: 339), a rationale that is reproduced by Grobbelaar et al.'s (2017) proposal in regard to system's functions.

These propositions are useful to analyse systemic interactions mediated by the market at the micro-level. Nevertheless, the longstanding debate in the literature about where to draw the boundaries of an innovation system (i.e., what components to include and what functions to promote) presented in section 2.1. leads us to question to what extent *change* to bring about inclusive structures can be achieved by intervening on a resolved list of components and functions. In practical terms, systems of innovation have diffused boundaries, which make the identification of its components challenging and the agreement on common goals, conflictive. Thus, the type of interactions and learning processes to be promoted will depend on which actors are analysed, their capabilities and interests, as well as on the formal and informal institutions mediating such interactions.

Similarly, system functions are not exhaustive (Lundvall, 2007), and their performance depends primarily on the institutional settings and resources of the country or region subject to the analysis. Particularly, in contexts such as those of Global South countries, determining what functions to promote requires considering matters related to the direction of innovation, the distribution of its costs and benefits, and the plurality of contexts in which it takes place. Hence, approaching inclusive innovation from a systemic perspective with a focus on *resolved* components and functions may entail a danger of losing the context-sensitivity property of the framework, encumbering the possibility to fully grasp the dynamic nature of the interplay between actors and institutions. Moreover, an emphasis on a fixed set of components and functions, that draw on the centrality of markets as coordinating entities, may limit the framework's

explanatory power in low and middle-income countries, where inclusive innovation is not primarily induced or diffused by the market.

The second contribution towards inclusive innovation from a system's perspective is based on highlighting the social demand for knowledge and innovation. In a similar fashion to the components and functions proposal, Arocena et al.'s (2018) argumentation follow an *ex-ante* logic. In other words, despite the explicit acknowledgement of the factual dimension of the systems of innovation framework in their ground-breaking work, the argument that systemic change can be advanced if the social demand for knowledge and innovation is articulated and promoted through the 'developmental university' places a greater emphasis on the propositional dimension of the framework. Particularly, on the role of the university as an articulating actor, that can help overcome inequality and underdevelopment by democratising knowledge production and diffusion.

Arocena et al.'s (2018) approach has yielded many useful insights for low and middle-income countries, where more sophisticated market signals do not reach large segments of the population. However, a great deal of work, particularly in the form of empirical research, remains to be done to understand the processes that unfold as part of a *de facto* articulation of social demand for knowledge in existing systems, and the changes that need to take place in organisations and institutions for inclusion to become a feature of innovation systems.

In summary, the arguments identified suggest, on the one hand, that the more inclusive the components of the system (i.e., goals, actors, knowledge and learning, institutions, and interactions), the more inclusive the outputs will be. In this connection, change in systems can be advanced by incorporating previously excluded components and stimulating previously neglected functions. However, the argument will be made that an *ex-ante* view of system's change pivoting on components and functions not only overlooks the processes by which inclusive innovation emerges within existing systems, but also reinforces a mechanistic view of such systems as something that can be modified, governed, and manipulated,

risking further oversimplifications in policy interventions in Global South countries.

On the other hand, there is not enough evidence about the different ways universities' developmental inclinations materialise[11]. Whilst we agree with Arocena et al. (2018: 160) that universities in the Global South are, in relative terms, more important producers of knowledge, and hold a more prominent position as system articulators, they are polyvocal organisations where meanings around inclusion, innovation and knowledge democratisation are in constant flux. In this regard, a great deal of empirical work remains to be done to advance our understanding of how the social demands for knowledge and innovation are interpreted and met by universities; how are these demands expressed outside market structures; what type of changes in organisations need to take place to enable such articulation; and how existing institutions facilitate or hamper such changes.

Therefore, our central critique of the above discussed approaches is that the particular emphasis placed on functionalist explanations, that bring to the fore conceptualisations of systems based on resolved components and functions, has reproduced the divide between agency and structure in the innovation systems literature. Such divide – highlighted previously by Lundvall (2007) as a risk that 'system' brings with it in terms of structuralist explanations that neglect the

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[11] There is an important number of published studies addressing the role of universities in development processes. These studies emerged from the 'Universities in Development—the Evolving Role of Academic Institutions in Innovation Systems and Development (UniDev)' consortium. With 14 country teams, the UniDev network has published important contributions to understand the challenges and new roles for universities in economic and social development. Their research outputs have yielded useful insights to understand *i)* how the scope and meaning of universities' third missions vary across countries (Science and Public Policy Special Issue, 2009); *ii)* why the triple helix expresses itself differently across countries, leading to different development outcomes (Universities in transition, Göransson and Brundenius, 2011); *iii)* how universities organised themselves to facilitate cooperation and appropriation of a specific technology (Biotechnology and innovation policies, Göransson and Pålsson, 2011); and *iv)* how universities cope with new challenges such as rising economic inequalities and social exclusion and how they participate in inclusive development policies. However, less evidence has been produced for the case of Latin American countries, particularly in respect to how actors reconcile different institutional pressures in the quest to contribute to national development processes.

critical role of agency – has encumbered the development of accounts that take into consideration the interplay between agency and structure as mutual dependencies with ongoing interaction.

Furthermore, the extant literature relies primarily on the *ex-ante* and *propositional* dimensions of the systems of innovation framework to examine the potential ways in which inclusion can become a feature of an innovation system. While these contributions have advanced our understanding of the systemic aspects that can enable systems of innovation to embed social inclusion as a central element, their prospective inclination has left unanswered critical questions about the dynamic processes by which inclusive elements emerge, are assimilated, and co-exist with other features of an innovation system.

3.1. Thesis' proposition and research questions

Considering the arguments presented thus far, this PhD adopts a complementary approximation to the study of inclusion in national systems of innovation by using the concept of agency to shed light on the dynamics underpinning the emergence of inclusive innovations in existing systems. More specifically, it focuses on how actors make sense of and act to challenge existing and create new organisational structures that enable the development of inclusive innovations, using the NSI framework as an *ex-post* analytical device. Thereby, the research brings to the fore the complex relationship between institutional set-ups, organisations, and agency to expound how actors choose to produce knowledge to cater to societal needs, and modify organisational structures accordingly, in system's articulating organisations like universities. As derived from the considerations outlined above, the overarching question answered in this PhD is:

> How does agency in universities unfold to create favourable environments for inclusive innovation in existing systems of innovation?

Three subsidiary questions are proposed to answer the PhD's overarching question:

- What is inclusive innovation and what are the characteristics of innovations that cater to developmental aims?
- What elements explain researchers' choices for knowledge production in inclusive innovation projects? How do researchers mobilise their agency to develop such projects?
- How does collective agency trigger endogenous processes of organisational change within these universities, and to what extent do these changes create more enabling environments for inclusive innovation?

To understand how agentic behaviour initiates processes of institutional change that affect organisational configurations, the research builds on empirical observations emerging from twelve innovation projects in three universities in Peru (please, see Chapter 3 for more details). The following section develops a conceptual framework that brings together the notions of agency and structure by drawing on institutional and organisational theory, particularly on the concepts of *sensemaking* (Weick, 1995) and *institutional work* (Lawrence and Suddaby, 2006) and combines them with the concept of *free spaces* (Polletta, 1999) from social movements theory to conceptually substantiate the analyses that follow in Chapters 4 to 6.

4. Moving from an *ex-ante* to an *ex-post* conceptualisation of inclusion in systems of innovation: Institutions, knowledge and learning

This section takes up the challenge of redressing the balance towards understanding inclusion in existing systems from an *ex-post* perspective by proposing a conceptual framework that foregrounds the role of agency,

institutions, knowledge, and learning in inclusive innovation. In particular, the framework underscores actors' choices to produce knowledge for developmental aims and their actions in prompting processes of organisational learning despite the constraints imposed by their immediate institutional contexts. In the following sections, the concepts of agency and structure used in this research are defined and then related to the notion of institutional change through sensemaking and institutional work. Subsequently, knowledge production and organisational learning are introduced as the two domains chosen to observe the unfolding of agency in universities.

4.1. Defining agency and structure

Structure and agency are often defined by contrast, which prompts their meanings to become dependent on the concepts against which they are set (Hays, 1994). More specifically, the dichotomy of 'agency and structure' sometimes signals the idea that structure is systematic and patterned, while agency is contingent and random; that structure is constraint, while agency is freedom; that structure is static and collective, while agency is active and individual (Hays, 1994).

This use of agency and structure as contrast terms (i.e., agency is what structure is not and vice versa) glosses over the interconnected nature of the two. On the one hand, definitions of structure[12] focusing on its constraining nature fail to recognise its empowering aspects. On the other hand, conceptions of agency that narrowly limit it to the individual choice[13], neglect it as a structured component of social life (Hays, 1994). To avoid notions of structure and agency that are too rigid and, consequently, mutually exclusive, this research builds on Hays' (1994) definitions that regard these two constructs as complementary.

According to Hays (1994), three ideas can help to refine extant definitions of *structures.* First, structures are the creation of human beings as well as the mould

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[12] See, for example, Bowles and Gintis, (1976); Willis (1977).

[13] See, for example, Alexander (1987); Becker (1981); Elster (1989).

that they fit. In this regard, social structures would not exist without the willing or unwilling participation of human actors (Berger and Luckmann, 1991; Giddens, 1984a)[14]. Second, structures are enabling as well as constraining. This means that they limit but also lend actors their sense of self and the tools for creative and transformative action, rendering thus human freedom possible. As Hays suggests "[w]ithout structures there are no rules. Without rules, there is no grounding for, and no direction to, one's personality, and therefore no possibility for conscious, purposive action." (1994: 61-62). Third, there are different layers of social structures, more or less hidden from everyday consciousness, more or less powerful in guiding human thought and action, and more or less durable in their resistance to change (Hays, 1994). This means that some structures are more or less open to intentional human tinkering.

Following the above-refined conceptualisation of structure, *agency* would explain the creation, recreation, and transformation of social structures. In this regard, agency is made possible by the enabling features of social structures at the same time it is limited within the bounds of structural constraint (Hays, 1994). However, for the purposes of this research, a more tendentious concept of agency is adopted insofar as people do not follow a precise and all-encompassing pattern dictated by social structure. Rather, agency implies that an array of alternative forms of behaviours are possible and, hence, people make choices among those alternatives (Hays, 1994).

Therefore, the conceptualisation of agency used in this research puts forward the idea that structures are both *the source* and *the outcome* of human action and, consequently, emphasises that agency can take two main forms. First, agency can maintain structures through the interactional activities of individuals (see (Alexander, 1987; Berger and Luckmann, 1991; Blumer, 1986; Giddens, 1984a; Goffman and Berger, 1986). This form of agency is called by Hays (1994)

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[14] An example of this proposition is that Capitalism would not exist without the purposive actions of entrepreneurs, corporate leaders, bureaucrats, and workers. Even when these actors cannot fully understand the complex system that shapes their behaviour, this is a system created in the past by other social actors and that is persistently recreated by them (Hays, 1994).

'structurally reproductive action'. However, this action is not purely habitual and unreflective. Instead, in several instances, agents have the power to produce social change (Lukes, 1977). In other words, human social choices often have non-trivial consequences, which means that they can affect the pattern of social structures in some empirically observable way. This second form of agency has been called by authors such as Lukes (1977), Sewell (1985) and Hays (1994) 'structurally transformative agency'.

A particular feature of this second form of agency is that it occurs on a continuum. Thus, its transformative power is contingent in "the depth and durability of the structural form under scrutiny, [...] the level of power held by those making the choices, and [...] the larger cultural milieu in which the choices are made (as suggested by Giddens, 1984; Lukes, 1977; Sewell, 1992)" (Hays, 1994: 64). This means that people are agents, and structures are in process of constant readjustment.

In light of the arguments presented thus far, agency is defined in this research as the "human social action involving choices among the alternatives made available by the enabling features of social structure and made possible by a solid grounding in structural constraints" (Hays, 1994; 64). In this definition, 'choice' is an important construct to denote agency because it underscores the availability of alternative courses of action and, hence, agents' leeway to act in regard to one of them. Choices are always made within the realm of structurally provided possibilities, which make them patterned and comprehensible. However, choices are not always conscious. They can be unconscious as they are socially shaped and often the product of collective choices (Hays, 1994). It follows that the individual and collective autonomy of individuals, and hence their choices, is made possible by a solid grounding in the constraining and enabling features of social structure (Durkheim, 1966).

The framework proposed in this section pays special attention to the detachment of embedded actors from specific social structures. This detachment

enables actors to leverage resources to 'choose' to transform existing institutions and prompt changes at the organisational level. This phenomenon has been addressed in the institutional theory literature as the 'paradox of embedded agency' (Seo and Creed, 2002). The paradox highlights how actors, over-socialised by local institutions, are able to challenge the status quo and promote changes in their immediate environments (Hung and Whittington, 2011; Whittington, 1992). To provide an explanation of how over-socialised actors mobilise their agency to leverage resources and catalyse changes in their environments, the next section introduces the *sensemaking* approach as a conceptual vehicle to explain how these choices are made without losing sight of the constraining and enabling nature of the structures in which agents' actions are embedded.

4.2. Agency and change – an institutional approach

Since the early 1990s, institutional theorists have been increasingly preoccupied with explaining what contextual elements and how agents alter institutional arrangements (Cowan, 2013). An ongoing puzzle within this line of inquiry refers to how can actors change institutional arrangements if their actions, intentions, and rationality are conditioned by the same institutions they wish to change? (Holm, 1995). This puzzle brings to the fore the complex relationship between structure and agency (DiMaggio and Powell, 1983; Friedland and Alford, 1991; Holm, 1995; Seo and Creed, 2002), captured in the explanations of their interconnected nature presented in the previous section.

One way to address this conundrum can be found in the work of Seo and Creed (2002), who have theorised that the exposure to institutional contradictions enables actors enmeshed in institutionalised arrangements to rationalise their dissatisfaction and champion change. These contradictions arise because actors are often exposed to multiple *taken-for-granted resilient social prescriptions,* which underpin organisational practices in given settings and particular historical moments (Greenwood et al., 2010).

The multiple ways in which actors respond to these contradictions have been explored through 'institutional entrepreneurship' (Dimaggio, 1988), 'embedded agency' (Seo and Creed, 2002), and 'institutional work' (Lawrence and Suddaby, 2006). While these contributions have yielded important insights about the roles that organisational actors assume in promoting change projects (i.e., as entrepreneurs, agents, and workers), less attention has been paid to how change projects unfold when actors encounter multiple (and often conflicting) *taken-for-granted resilient prescriptions* in their work environments. Therefore, this PhD brings in the *sensemaking perspective* (Weick, 1995) to examine how actors with diverging interests cope with this complexity and accomplish change while enacting their organisational roles in their work environments.

Sensemaking refers to the process by which individuals give meaning to experience and take action on the basis of such meaning (Maitlis and Christianson, 2014; Mikkelsen and Wåhlin, 2020). The argument will be made that the elements that shape the meanings actors attribute to their experiences inform the changes they aim to accomplish. These elements cannot be understood without taking into consideration the institutional environment in which actors are embedded. Thus, the research uses institutions' constitutive elements (Scott, 2008) to shed light on how these elements enter and shape sensemaking processes.

4.2.1.   Institutional elements and sensemaking

Institutions have been defined as "more or less taken-for-granted repetitive behaviour that is underpinned by normative systems and cognitive understandings that give meaning to social exchange and thus enable self-reproducing social order" (Greenwood et al., 2008: 4-5). It follows that institutions are not only a guide to material activity but also a symbolic system used by actors to categorise and assign meaning to their activity.

"Institutions are composed of cultural-cognitive, normative and regulative elements that, together with associated activities and resources, provide stability

and meaning to social life" (Scott, 2008: 48). While it has been previously acknowledged that institutions can act as internalised cognitive constraints, "actors make sense with institutions and not outside them and despite them" (Weber and Glynn, 2006: 1642). This embeddedness has led to a re-conceptualisation of the relationship between *institutions* and *sensemaking* that suggests that institutions can elicit processes of sensemaking.

Extant conceptualisations of institutions in the innovation literature have focused largely on their formal dimension, regulative elements and relatively static nature, primarily in relation to markets (Hung and Whittington, 2011; Lundvall, 2007). This research, in contrast, proposes to use *normative* and *cultural-cognitive institutional* elements (i.e., values, role expectations, perceived responsibilities and beliefs) as the feedstock for actors' choices and actions during sensemaking (Weber and Glynn, 2016).

Sensemaking takes place when organisational members "encounter moments of ambiguity or uncertainty and they seek to clarify what is going on by extracting and interpreting cues from their environment, using these as the basis for a plausible account that provides order and 'makes sense' of what has occurred, and through which they continue to enact the environment" (Maitlis and Christianson, 2014: 58). As *sensemaking* is said to be invoked when actors experience ambiguity or uncertainty (Cowan, 2013; Weber and Glynn, 2006), the research focuses on actors' experiences of ambiguities when their own values, role expectations and beliefs are in contradiction with other institutionalised expectations introduced by an *event* or *happening* (Weick, 1995; Weick et al., 2005); in the case of this research, the introduction of a public funding scheme for research and development (R&D) and innovation projects to increase productivity and competitiveness.

Sensemaking is accomplished through three main moves: noticing or perceiving cues, creating interpretations, and taking action (Daft and Weick, 1984; Rudolph et al., 2009; Thomas et al., 1993; Weber and Glynn, 2006).

Institutional elements can enter these moves as, first, building blocks (i.e., as institutionalised roles, templates for action, scripts or schemas) for sensemaking; second, these elements dynamically guide and edit action formation; and third, they are continually enacted and accomplished in ongoing sensemaking processes (Weber and Glynn, 2006). This means that they act as priming, editing and triggering mechanisms (Maitlis and Christianson, 2014; Weber and Glynn, 2006).

The organisational science literature has established that sensemaking also accomplishes organisational processes. Primarily, sensemaking has been used as an explanatory mechanism for processes such as strategic or organisational change (Gioia and Chittipeddi, 1991), learning (Christianson et al., 2009), and creativity and innovation (Drazin et al., 1999). The next subsection unpacks the relationship between sensemaking and organisational change by introducing the concept of institutional work (Lawrence and Suddaby, 2006).

4.2.2. Sensemaking and institutional work

Weber and Glynn (2006) observed that institutions are primarily understood to provide a constraint on sensemaking. However, emerging research has shown that the influence in this relationship also flows the other way (Maitlis and Christianson, 2014). Thus, sensemaking enables other important organisational processes and outcomes. Actors can create a new organisational order through sensemaking about structures and strategies that offer a plausible response to their experiences of ambiguity and contradiction, and by convincing others of the value of these changes (Maitlis and Christianson, 2014). In this regard, sensemaking also unleashes the purposive action of individuals and groups to create, maintain, and disrupt institutions. Hence, it can be portrayed as a form of institutional work (Lawrence and Suddaby, 2006: 2015).

This form of institutional work typically takes place in richly contextualised areas where varied, multiple and inter-connected actors engage in an effort to develop collective understandings (Cowan, 2013). Here, the notion of *free spaces*

(Polletta, 1999) from the social movements' theory becomes useful to explain the settings where this work starts to take place. Free spaces are areas (physical or virtual) that are apart from those actors who would defend the status quo when the aim of the purposive action is to create new or disrupt existing institutions (Cowan, 2013; Polletta, 1999). The research argues that any project of change prompted by the experience of ambiguities and contradictions, and accomplished through sensemaking, would require isolated and interactive spaces where the challengers of the status quo can develop and mobilise the resources required for this endeavour.

4.2.3. Closing the level of analysis gap

As shown above, sensemaking as a conceptual vehicle can provide rich descriptions of the ways in which actors come to take note of events and engage in processes of interrelated sensemaking, offering hence the possibility of compelling theorisation at the level of individual action. However, the approach has been criticised for its lack of grounding in a historical, cultural and institutional context (Taylor and Van Every, 2000; Weber and Glynn, 2016) and for its insufficient account of the supra-organisational levels that are well addressed by institutional scholars. For this reason, institutional theory – which on its end struggles to extend its concepts from the upper levels of organisations down to the level of individual action (Cowan, 2013) – is a powerful conceptual companion for sensemaking.

Both concepts, used in a symbiotic way, can explain early stages of institutional deviation, which, in this research, are seen as a powerful source of organisational reconfigurations in systems oriented towards innovation for productivity and competitiveness. Although there are empirical limitations to exploring systems' change, this research provides new insights about how change within systems takes place by introducing *micro-level sensemaking,* and *meso-level collective action through institutional work* as forms of agentic behaviour,

leading to the creation of endogenous organisational configurations that enable inclusive innovation.

In summary, sensemaking and institutional theory have been chosen to conceptually explain early stages of institutional change that arise from a contradiction between actors' values, beliefs and role expectations, and competing expectations brought by the introduction of a top-down policy instrument to fund innovation projects for productivity and competitiveness in Peru. As sensemaking is a form of institutional work, the focus is placed on the purposive action of multiple and varied individuals, and the collective and negotiated responses that led to the creation of more conducive endogenous configurations for inclusive innovation in three universities.

Lastly, the combination of the fine-grained concepts from both institutional and sensemaking traditions will enable us to account for agentic behaviour in processes of institutional change in developmental universities, while bridging the level of analysis gaps between the micro (network) and the meso (organisational) levels. In the following section, we introduce *knowledge production* and *organisational learning* as the two domains selected to grasp the unfolding of agency in universities.

4.3. Knowledge and learning

a. *Knowledge production*

Universities have an important role as knowledge producers in emerging systems, even more so than firms in Global South countries (Arocena et al., 2018; Arocena and Sutz, 2005). Due to the developmental inclinations of the universities studied and their historical construction as institutions committed to teaching, research and extension, they often interact with different groups in society. This characteristic renders these organisations porous to different yet equally essential forms of knowledge.

To understand better the type and characteristics of the knowledge produced in the twelve research projects examined in this PhD, the research uses some of the elements put forward by Gibbons et al. (1994) in the 'Mode 2 knowledge production'. While the research does not go far enough to propose a substantive change in the Peruvian research system, nor within these three universities, some of the 'Mode 2' postulates are useful to describing some changes in these universities' research practice. More specifically, the argument will be made that researchers' values, beliefs and role expectations influence whether or not knowledge is generated in a context of application and/or is generated in a transdisciplinary fashion.

These elements can also influence if knowledge production results in a heterogenous practice that uses practical methodologies to solve problems and inform whether multiple views are incorporated in the process, making it *dialogic* rather than unidirectional. Lastly, these normative and cognitive elements can put forward alternative novel forms of quality control for the knowledge produced compared to more disciplinary and traditional forms to assess research 'excellence'.

b.   *Organisational learning*

The research focuses less on conventional firm-centred approaches and indicators – such as absorptive capacity (Cohen and Levinthal, 1990) – and adopts a social perspective to organisational learning. This perspective focuses on the way people make sense of their experiences in a work environment. As Easterby-Smith and Araujo (1999) explain, these experiences may derive from explicit sources (like codified information made available to them) or tacit ones (like how they feel). In this view, learning emerges from social interactions; more specifically, from joint processes of making sense of new information when the experience derives from an explicit source, and from situated practices, observation and socialisation when

more 'embodied' or tacit sources trigger such experiences (Blackler, 1993; Chaiklin and Lave, 1993; Easterby-Smith and Araujo, 1999).

The research couples this social perspective to organisational learning with Crossan et al.'s (1999) model of organisational learning to grasp better how learning unfolds in organisations. Crossan et al. (1999) argue that organisational learning is a multilevel process that begins with individual learning, then leads to group learning and, finally, to organisational learning. These levels are connected by four processes that involve both the creation and application of knowledge (Lawrence et al., 2005). These processes are intuiting, interpreting, integrating, and institutionalising.

Intuiting is "the preconscious recognition of the pattern and/or possibilities inherent in a personal stream of experience" (Crossan et al., 1999: 525). This process often takes place at the individual level because individuals develop novel insights based on their experience and their ability to identify patterns underlying that experience; these patterns are then communicated to other members of the organisation (Lawrence et al., 2005). Interpreting refers to the "explaining, through words and/or actions, of an insight or idea to one's self and to others" (Crossan et al., 1999: 525). This process starts at the individual level and then moves to include other individuals through conversation and dialogue. Here, ideas are made explicit, named, and incorporated through cognitive maps during this process.

The third process, integrating, is the first process that occurs at the group level. According to Crossan et al. (1999: 525), it is "the process of developing a shared understanding among individuals and of taking coordinated action through mutual adjustment". The focus of integrating is to accomplish coherent, collective action. Lastly, institutionalising is the final process that signals that learning has occurred among individuals and groups, and is embedded into organisations through "systems, structures, procedures, and strategy" (Crossan et al., 1999: 525). Through this final process, ideas are transformed into organisational institutions

that are available to other members. Together, these processes form a learning loop through the effect of new institutions on organisational members' experiences, that feed into their individual intuitions (Lawrence et al., 2005).

4.4.   Towards integrated framework: Agency in knowledge production and organisational learning

Building on the case of twelve inclusive innovation projects in three universities in Peru (please, see a detailed description in Chapter 3), this study seeks to explain how agency – conceptualised through sensemaking and institutional work – accounts for the endogenous creation of organisational configurations that enable inclusive innovation in existing innovation systems. To address this objective, the research first investigates how researchers' choices for knowledge production are determined by their values, role expectations, and beliefs, and how such elements both *condition* the type of knowledge created and *are conditioned* by the research system in which it is produced.   Second, it examines how organisational learning – conceived as a social process that entails intuiting, interpreting, integrating, and institutionalising – takes place through actors' purposive action to challenge existing and create new institutions that chime with their values, beliefs, and role expectations. Here, special attention is given to the role of *free spaces* in enabling the collective action of these actors.

As shown in Figure 2.1., the analysis comprises two main levels, individual and organisational, but takes into consideration the system level in which individuals and organisations are embedded. Individual processes of sensemaking are analysed in the knowledge production domain, as the focus is on explaining how *normative* and *cultural-cognitive* elements shape researchers' choices and actions in this domain. Collective processes, purposively directed towards creating new and altering existing values systems and organisational interpretive schemes, are analysed in the organisational learning domain, as the focus is on explaining the changes in universities' governance structures.

Figure 2.1 Conceptual framework: Sensemaking as a form of institutional work in knowledge production and organisational learning

Systemic

Deinstitutionalisation

Organisational Learning
Universities

Organisational

Institutional Theory
(*institutional work*)

Choices for Knowledge
Production
Researchers

Sensemaking

Individual

Values   Role
expectations   Beliefs
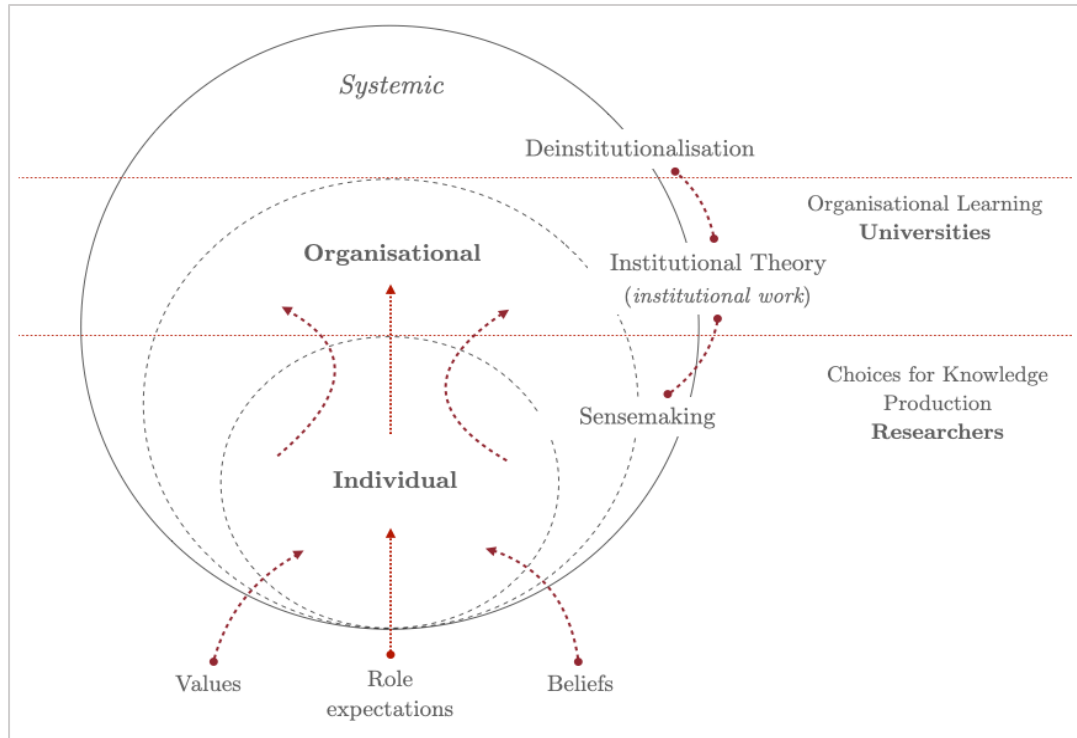
Source: Author's elaboration.

Lastly, by combining the fine-grained tools and key concepts from both sensemaking and institutional theory, it is possible to close the gap between the micro and the meso levels of analysis, relating the individual to the collective by using the universities (as organisations) as the bridging unit of analysis in this research.

5. Chapter summary

This chapter revisited the literature on national innovation systems, paying special attention to the current debates that purposively link the framework to the overarching goal of social inclusion through inclusive innovation. In more detail, the chapter started by discussing the limitations of defining innovation systems from a components and functions perspective, particularly when the framework is used as a focusing device to explain innovation dynamics in low and middle-income countries. Here, current claims to re-examine the determinants of

innovation in Global South countries were examined in light of the differences between the latter and industrialised countries regarding the type of demand for innovation, the interaction among actors and the countries' development priorities and opportunity costs of investing in science, technology and innovation.

Furthermore, the chapter discussed three crucial reflections around the nature of the national systems of innovation framework when seen from the South, formulated in response to the aforementioned distinctive patterns. First, the NSI no longer describes an existing situation and, consequently, no longer acts as an *ex-post* framework but as an *ex-ante* one in these settings. Second, the NSI acts as a guide for policy by leveraging its propositional elements to inform policy interventions in these countries. Third, the NIS aims at improving an existing situation and thus, holds a normative and evaluative imprint.

These characteristics provide a fertile ground to link systems of innovation research with the issue of social inclusion. Accordingly, the chapter discussed two sets of arguments in the literature proposing coherent avenues to accommodate inclusive innovation within this framework. On the one hand, some arguments suggest that the more inclusive the components of the system (i.e., goals, actors, knowledge and learning, institutions, and interactions), the more inclusive the outputs will be. Therefore, change in systems can be advanced by incorporating previously excluded components and stimulating previously neglected functions. On the other hand, another set of arguments proposing more emphatically to make inclusion a central feature of the NSI framework suggest that systemic change can be advanced if the social demand for knowledge and innovation is articulated and promoted through the 'developmental university'.

These arguments have yielded important insights to advance our understanding of social inclusion from an innovation systems perspective. However, the central critique made by this research to these approaches is that the particular emphasis placed on *functionalist* explanations has reproduced the divide between agency and structure in the inclusive systems of innovation

literature. This divide has encumbered the development of accounts that consider the interplay between agency and structure as mutual dependencies with ongoing interaction.

Consequently, the chapter proposed a complementary approximation to the study of inclusion in national systems of innovation that brings to the fore the complex relationship between institutional set-ups, organisations, and agency to expound how actors choose to produce knowledge to cater to societal needs and modify organisational structures accordingly. It follows that the proposed overarching question guiding this study is concerned with exploring *how agency in universities unfold to create favourable environments for inclusive innovation in existing systems of innovation.*

To answer this question, the chapter introduced a novel conceptual framework that draws on institutional and organisational theory, particularly on the concepts of sensemaking (Weick, 1995) and institutional work, and combines them with the concept of free spaces from social movements theory to explain the unfolding of agency in two domains: knowledge production and organisational learning. More specifically, this framework will be used in Chapters 4 to 6 to explain how agency – conceptualised through sensemaking and institutional work – accounts for the endogenous creation of organisational configurations that enable inclusive innovation in existing innovation systems. By using this framework, individual processes of sensemaking will be analysed in the knowledge production domain, as the focus is on explaining how normative and cultural-cognitive institutional elements shape researchers' choices and actions in this domain. Collective processes, purposively directed towards creating new and altering existing values systems and organisational interpretive schemes, will be analysed in the organisational learning domain, as the focus is on explaining the changes in universities' governance structures. The next chapter explains in detail the research design underpinning this thesis.

Chapter 3

Methodology

1.   Overview

This chapter introduces the research strategy adopted in this study. Here, I argue for the appropriateness of a qualitative approach to explain the role of agency in the creation of organisational configurations that enable inclusive innovation in emerging systems of innovation. The chapter starts by outlining the ontological commitments and epistemological assumptions underlying this research and unpacks the methodological implications of adopting a critical realist perspective. Then, the overall objective and supporting research question that guided the analysis in the empirical chapters are restated. I explain how the theoretical assumptions embodied in this research are used to address the subsidiary research questions and how these sub-questions are related to the central proposition of this study. Subsequently, the use of a case study methodology is justified and the rationale underpinning the case selection, data collection and analysis processes are explicated. The chapter ends with a section addressing the ethics in this research and the measures taken to ensure the study's validity.

2.   Ontological commitments and epistemological assumptions

Researchers have beliefs about how the social world is constructed and how it operates. These beliefs influence researchers' choices about how to produce and verify knowledge statements about the world (Bennett and Elman, 2006: 456-457). Consequently, any research enterprise rests on ontological commitments as

well as on epistemological assumptions. While the ontological commitments refer to the question of *what* constitutes the 'nature of reality', the epistemological assumptions refer to the philosophical grounding for deciding *the kind of knowledge that is possible to obtain* from a research process in an adequate and legitimate way (Maynard, 1994).

This research builds upon a critical realist ontology and epistemology to generate empirically supported causal explanations about the role played by agency in the endogenous creation of organisational configurations that enable inclusive innovation in emerging systems. Critical realism (CR), a philosophy of science widely used in the social sciences, combines '*ontological realism*' (which asserts that phenomena exist independently of our knowledge of them) with '*epistemological relativism*' (which states that human knowledge is socially produced, historically transcendent and fallible) and 'judgemental rationalism' (which claims that there are rational grounds for preferring some explanations about social phenomena over others) (Sorrell, 2018).

Critical realists argue that there is an independently existing world of entities (physical, social, or cultural)[15], which are wholes formed from a set of parts that are *related* or *structured* through *contingent* or *necessary* relationships[16]. These entities have causal powers (the capacity to act in certain ways) and liabilities (the susceptibility to particular types of change) (Bhaskar, 2008; Collier, 1994; Sorrell, 2018) that act in combination to create events, some of which can be observed and measured. However, depending upon the circumstances, critical realists argue that the same causal mechanisms may lead to different events, and

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[15] Critical realism argues that reality is a stratified open system of emergent entities and, therefore, can be studied at a variety of different spatiotemporal scales. These entities are wholes formed from a set of parts that are structured in a particular way. This structure ensures that the entity persists for a time period. At the same time, they can take different forms; for instance, they can be physical (organisms, minerals), social (families, organisations, markets) or cultural (languages, ideologies) and they may or may not be directly observed (Sorrell, 2018).

[16] For example, a university is formed from a number of social and material entities (e.g., academic departments, academics, building, equipment, bylaws, etc.), whose structural relationships endow the university with the power to recruit staff, conduct research, teach students, do extension work, among others but these constituent entities are also internally structured and have their own causal properties (Example taken from Sorrell, 2018).

the same events may result from different mechanisms. In this regard, the objective of science, as framed by this tradition, is to uncover the structure of these entities, identify and explain their causal properties, and use this understanding to explain the particular events that can be observed and measured.

Critical realism (CR) holds that the description and explanation of social events are the foundations of any research analysis (Wynn and Williams, 2012). Therefore, a primary objective of CR-based research is to provide empirically supported causal explanations of how events occur (Wynn and Williams, 2012); that is to say, explanations about how, why and under what conditions particular phenomena occur, taking into consideration that the accurate conceptualisation of a social structure must be pieced together from the multiple perspectives out of which it emerges in the first place (Gorski, 2013: 666). In this regard, critical realism argues that it is possible to offer causal explanations[17] via linking social structures – which belong to the real realm – with the events and objects that can be observed and measured – which belong to the empirical realm.

By adopting a critical realist position, this research has committed to a view of a complex social world characterised by tipping points, interactions, effects and path dependencies (Hall, 2003). This social world is stratified into three levels: the empirical, the actual, and the real (Bhaskar, 2008; Collier, 1994). The empirical is the realm of the events that can be measured empirically and observed. At this level, events or objects can be explained through 'common sense', but these explanations are always filtered by human experience and interpretation (Fletcher, 2017). In the realm of the actual, the events that occur tend to be different from what is observed at the empirical level and happen whether or not we experience or interpret them (Danermark et al., 2002). Here,

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[17] Critical realism's approach to causal mechanisms distances itself from conventional and positivist approaches to causation that rely solely upon correlations between observed events (Lawson, 1997). In other words, it rejects positivist definitions of causal laws qua 'constant conjunctions' between observable events (Gorski, 2013: 668). Rather, critical realism proposes to define causal laws as 'normic statements' concerning the tendencies of particular agents or entities; thus, these agents and entities (and not logical propositions about them) are the principal objects of the analysis (Gorski, 2013).

there is no filter of human experience. Lying behind these events is the domain of the real, which consists of entities of various forms with their own powers and tendencies. At this level, the causal structures or causal mechanisms that explain the events that can be observed at the empirical level exist (Fletcher, 2017).

Figure 3.1 The iceberg metaphor for critical realism as a philosophy of science

The Empirical Level:
Experienced & observed events –
understood trough human interpretation.

The Actual Level:
Events occur whether we observed them or
not – not mediated by human
interpretation.

The Real Level:
Causal mechanisms within objects or
structures cause the events seen at the
empirical level.
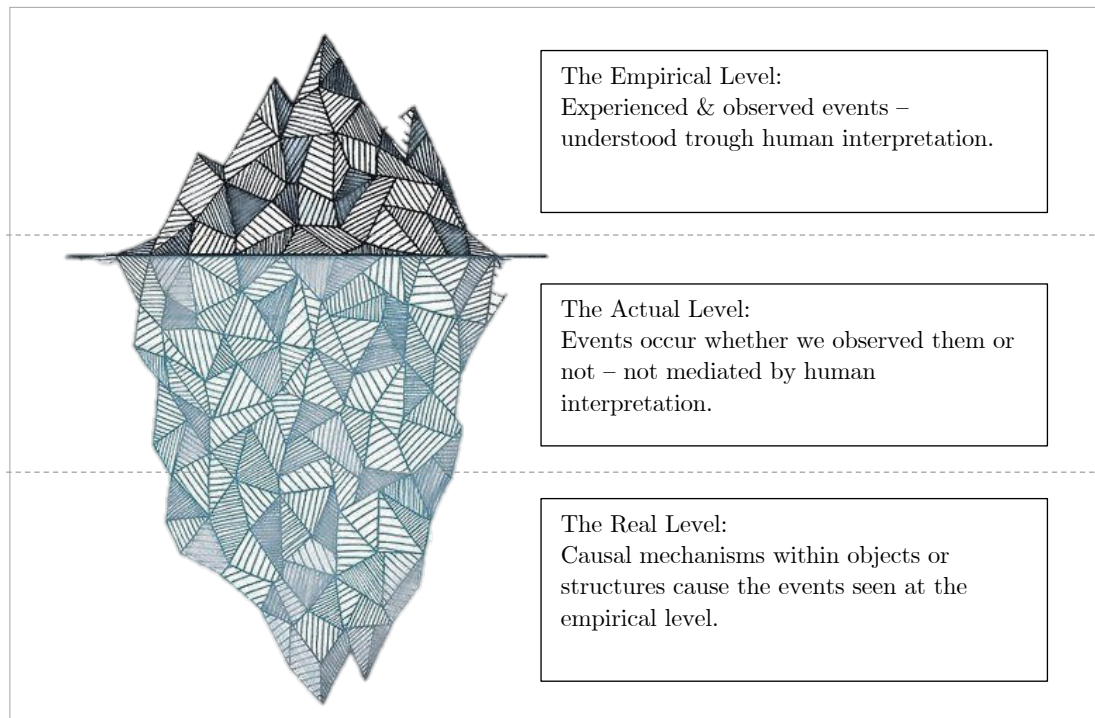
Source: Adapted from Fletcher (2017).

Thus, in this view of the world, the events that can be observed and measured in the realm of the empirical are often the net result of the simultaneous operation of multiple causal mechanisms associated with the *contingent* combination of multiple entities that belong to the realms of the actual and the real (Sorrell, 2018: 1271-1272). However, these contingent combinations are hard to reproduce *per se* in the social world because social entities are prone to change, and the contextual conditions influencing events are difficult or impossible to control. This is why critical realism claims that some explanations about the social world will offer a more accurate representation of it, but these explanations will always be socially determined and historically contingent (Sorrell, 2018: 1272).

Regarding the type of knowledge that can be generated (i.e., its epistemological assumptions), this tradition distinguishes between *reality* and *knowledge about reality*. The former exists independently of our ideas about it, and it is, to some extent, knowledgeable even when researchers' access to it is indirect and fallible. The latter "is neither wholly objective nor subjective but is, in fact, the result of interaction between subject and object". In this regard, "some (social) explanations are more adequate representations of reality than others, though all are, by virtue of the dialectic (subject-object) nature of knowledge, always 'partial truth'" (Proctor, 1998: 361).

A critical realist position constitutes a compromise between positivist positions (which neglect the formative power of ideas) and entirely constructivist positions (which reject an independent role for material reality) (Proctor, 1998). Therefore, compared to other competing philosophies of science such as positivism, interpretivism and constructionism (see Table 3.1), critical realism offers a more persuasive account of the nature of the reality under scrutiny in this research and the kind of knowledge emerging from it. Thus, a view of the social world as a complex one, characterised by interaction effects and path-dependencies (Hall, 2003), allows the formulation of nuanced and historically embedded explanations. In the case of this research, these explanations revolve around how agency unfolds through individual and collective processes of sensemaking to trigger the creation of organisational configurations that enable inclusive innovation in existing innovation systems.

Table 3.1 Competing Philosophies of Social Sciences

	Positivism	*Interpretivism*	*Critical Realism*	*Constructivism*
Ontology	Independent and objective reality. Causality is indicated by constant conjunctions of empirical events.	Socially constructed reality. Multiple realities are possible.	Objective, stratified reality consisting on surface-level events and real entities with particular structures and causal properties.	Reality is linguistically constructed. Multiple realities are possible.

Epistemology	Knowledge is generated by discovering general laws and relationships that have predictive power. Particular emphasis on prediction.	Knowledge is generated by interpreting subjective meanings and actions of subjects according to their own frame of reference. Emphasis on interpretation.	Retroduction is used to create theories about the entities, structures and causal mechanisms that combine to generate observable effects. Emphasis on explanation.	Epistemic relativism. The goal of the knowledge produced is to destabilise or subvert discourse and power.
Method	Quantitative methods, such as experiments, surveys and statistical analysis of secondary data.	Qualitative methods, such as ethnographies and case studies.	No preference for a particular method. Choices depend upon the research questions and the nature of the relevant entities and causal mechanisms.	Qualitative methods such as ethnographies.

Source: Adapted from Sorrell (2018); Gorski (2013) and Mingers (2006).

In summary, a critical realist position assumes that there is a reality that is independent of our observations. Science, in this regard, offers the possibility to acquire more or less truthful knowledge about such reality using a panoply of scientific theories and observations. These theories serve as an interpretative framework to understand the world as they help to conceptualise the causal mechanisms behind the events we observe and measure (Danermark et al., 2002). However, theories are abstractions, and they describe phenomena with reference solely to certain aspects, which have been separated from others that may also cause the phenomenon in question (Danermark et al., 2002).

Consequently, a critical realist approach to research brings together theories and other competing explanations (e.g., the research participants accounts, researcher's own activity, findings in the extant literature), which despite being fallible in themselves, have the potential to offer more accurate explanations about the phenomenon at stake when pieced together. Thus, in an iterative process that entails moving continuously back and forth between the data and the theory, the research attempts to bring together different narratives (innovation theory, institutionalism, principal investigators' views, universities' discourses) to provide

explanations about how individuals create organisational configurations that enable inclusive innovation in emerging systems of innovation.

3.   Research objective and supporting questions

In an attempt to complement functionalist approaches in the extant inclusive systems of innovation literature, this research introduces agency as a conceptual vehicle to explain how inclusive elements emerge, get taken up and co-exist with other features of an innovation system. In more detail, by weaving together elements from organisational, institutional, and social movements theory, the research seeks to understand how agentic behaviour initiates processes of institutional change that affect organisational configurations, creating more enabling environments for inclusive innovation.

To fulfil this objective, the concept of agency is operationalised using 'sensemaking' as a form of institutional work in two domains: knowledge production and organisational learning. In particular, the focus is on how actors within universities exercise their agency by choosing to produce knowledge to cater to societal needs and to change organisational structures to fit that purpose while making a difference to the system in which they participate (Giddens, 1984a). The following questions are answered in this PhD:

Main Research Question:

How does agency in universities unfold to create favourable environments for inclusive innovation in emerging systems of innovation?

Supporting Research Questions:

- What is inclusive innovation and what are the characteristics of innovations that cater to developmental aims?

- What elements explain researchers' choices for knowledge production in inclusive innovation projects? How researchers mobilise to develop such projects?

- How does collective agency trigger endogenous processes of organisational change within these universities? To what extent do these changes create more enabling environments for inclusive innovation?

Building on the case of twelve inclusive innovation projects in three developmental universities in Peru, the research discusses first the characteristics of inclusive innovations and distinguish them from other types of innovation catering to developmental aims. Second, it investigates how researchers made sense of two new funding instruments for science, technology and innovation (STI) projects and explains how researchers' values, beliefs and role expectations shaped their choices to produce knowledge for inclusive innovation. Then, it uses these findings to expound on how these elements conditioned the means and characteristics of knowledge created.

Third, the research examines how organisational learning, conceived as a social process, takes place in complex and plurivocal organisations such as universities and brings to the fore the enabling role of richly contextualised physical areas in these processes (i.e., free spaces where collective and negotiated processes of sensemaking take place between different actors). Lastly, the research explores how institutional missions, governance structures, and the positionality of different university workers shape these processes as a way forward to account for the interplay between agency and structure as two mutual dependencies in enabling learning and change.

The analysis comprises the individual and organisational levels primarily. Individual sensemaking processes are analysed in the knowledge production domain as the focus is on the cognitive frames shaping researchers' choices and actions. Collective sensemaking processes, and their derived purposive actions (i.e., endogenous changes in organisational interpretive schemes), are examined in

the organisational learning domain. These results are used to discuss the effects and implications of aggregated purposive actions in sparking more encompassing changes outside universities' boundaries in existing systems, as shown in Figure 3.2.

Figure 3.2 Conceptual framework: Sensemaking as a form of institutional work in knowledge production and organisational learning
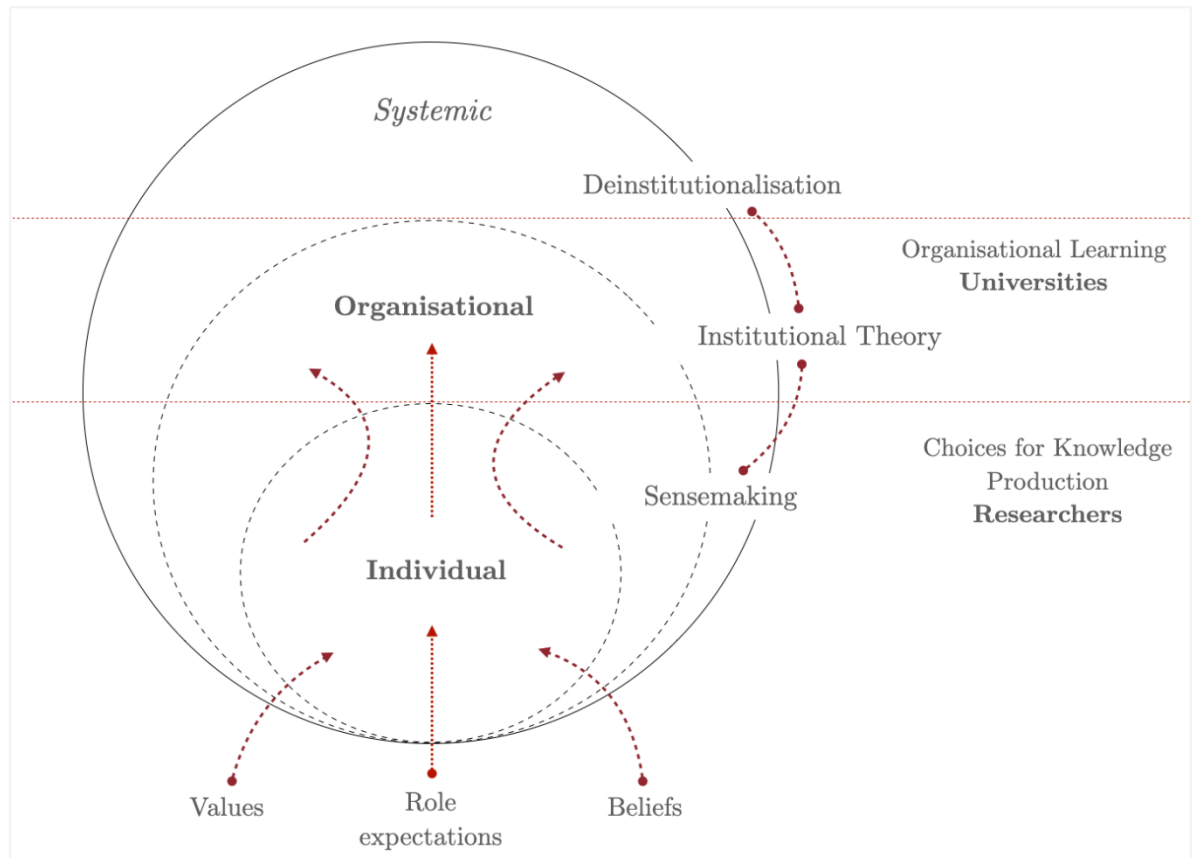
Source: Author's elaboration.

The combination of the fine-grained tools and concepts from sensemaking and institutional theory with those of social movements theory makes it possible to bridge the gap between the micro (networks) and the macro (system) levels of analysis; that is to say, relating the individual to the collective by using the universities (as organisations) as the bridging unit of analysis in this research.

4. Research strategy and approach

The use of any methodological approach entails a set of assumptions about the nature of reality and the different ways in which it is possible to understand and create knowledge about the social world (Morgan and Smircich, 1980). Ontological commitments and epistemological assumptions, in this regard, inform researchers' methodological choices. Critical realism-based research, like any other research philosophy, carries some methodological implications that have been taken into consideration in the research strategy. First, given the complex nature of social reality, CR-based research demands the identification of structures, power mechanisms and attention to contingent conditions and connectedness between individuals (Hu, 2018). In this context, social phenomena can, at best, be recorded or described by researchers in a way close to how the event under scrutiny happened (Easton, 2010).

A second methodological implication of CR-based research is that different researchers may develop alternative explanations for the same social event since the same causal powers and mechanisms (depending on the surrounding conditions) may produce different events, or the same event can emerge due to divergent causal powers and mechanisms (Sayer, 1992). Third, critical realism highlights the importance of context in research. Individuals' behaviour, activities and outcomes are conditioned by the context. Hence, any research endeavour underpinned by critical realism must be contextualised. Lastly, social events emerge from interactions at different levels (the empirical, actual, and real). Therefore, a critical realist explanation of why a social event occurs builds upon an account of how people and the structures surrounding them are intertwined by including elements of connectedness that articulate these different levels (Archer, 1995; Hu, 2018).

In addition to these methodological implications, the research strategy adopted in this study has been informed by the position of the research question in regard to the extant literature. Edmondson and Mcmanus (2007) suggest that

as research questions are defined by the state of prior theory and knowledge, it is possible to identify three archetypes of methodological fit: nascent, intermediate, and mature, as shown in Table 3.2.

Table 3.2 Three archetypes of methodological fit in field research

State of Prior Theory and Research	*Nascent*	*Intermediate*	*Mature*
Research questions	Open-ended inquiry about a phenomenon of interest	Proposed relationships between new and established constructs	Focused questions and/or hypotheses relating existing constructs
Type of data collected	Qualitative, initially open-ended data that need to be interpreted for meaning	Hybrid (both qualitative and quantitative)	Quantitative data; focused measures where extent or amount is meaningful
Illustrative methods for collecting data	Interviews; observations; obtaining documents or other material from field sites relevant to the phenomena of interest	Interviews; observations; surveys; obtaining material from field sites relevant to the phenomena of interest	Surveys; interviews or observations designed to be systematically coded and quantified; obtaining data from field sites that measure the extent or amount of salient constructs
Constructs and measures	Typically new constructs, few formal measures	Typically one or more new constructs and/or new measures	Typically relying heavily on existing constructs and measures
Goal of data analyses	Pattern identification	Preliminary or exploratory testing of new propositions and/or new constructs	Formal hypothesis testing
Data analysis methods	Thematic content analysis coding for evidence of constructs	Content analysis, exploratory statistics, and preliminary tests	Statistical inference, standard statistical analyses
Theoretical contribution	A suggestive theory, often an invitation for further work on the issue or set of issues opened up by the study	A provisional theory, often one that integrates previously separate bodies of work	A supported theory that may add specificity, new mechanisms, or new boundaries to existing theories

Source: Edmondson and Mcmanus (2007).

Well-developed models and constructs characterise mature theory. These models and constructs allow for research questions that relate to specific aspects of existing theories and are often paired with hypothesis-testing approaches and quantitative data. Intermediate theory is likely to generate tentative constructs

to existing theorisations by using qualitative, quantitative or mix-methods. Lastly, nascent theory examines little-theorised topics and asks how and why questions that use qualitative methods (Edmondson and Mcmanus, 2007). This study falls into the last category since the extant literature about inclusive innovation from a systems perspective is still in its early stages, and an important deal of work, particularly in the form of empirical research, remains to be done to advance our understanding of how complex and evolving systems can incorporate inclusion as a central feature beyond rhetorical statements in policy discourses.

This research's ontological commitments and epistemological assumptions and the formulation of research questions fitting the *nascent* theory archetype have informed the choice of a qualitative methodology. In more detail, from a CR-based research perspective, the use of qualitative methods is often preferred due to the importance given to the context in which the social phenomenon under analysis is embedded. Qualitative methods facilitate the description of a social phenomenon and the production of situated analytical explanations (Zachariadis et al., 2013). As the social world, in the view of critical realists, consists of multiple and dynamic relationships in an open system where human agency plays a determining role, the interpretation and understanding of human actions become essential in understanding a social event (Hu, 2018). Moreover, as participants and researchers' understandings are multiple and varied, CR-research needs to be paired with methodologies that allow embracing such complexity rather than prematurely categorising or otherwise reducing data.

Second, this study addresses phenomena that are not yet fully understood (i.e., the role agency plays in institutional change regarding inclusion within emerging innovation systems), hence the inclination for qualitative methodologies to address the open-ended inquiry about such social phenomena in this research enterprise.

4.1. Case study design

Qualitative approaches are a suitable option to address 'how' questions and understand the world from the perspective of those whose views and behaviours are of interest in a research endeavour (Pratt, 2009). A **case study design** has been chosen within the realm of qualitative approaches because it allows a detailed and intensive analysis of a case, which is instrumental to understanding complex and dynamic relations (Eisenhardt, 1989; Hu, 2018). This research uses a case study design to understand how multiple and varied actors exercise their agency to trigger changes at the organisational level by showing how inclusive elements emerge, get taken up, and coexist with other features of an innovation system.

A careful exploration of a single case often leads to an intimate engagement with the phenomenon studied. This engagement can lead to a deep contextual understanding that enables researchers to see new theoretical relationships and question existent ones (Dyer and Wilkins, 1991). Case studies, in this regard, are particularly suitable when the phenomenon at stake cannot be separated from its context as participants' voices and their interpretations need to be contextualised in a particular socio-historical milieu (Yin, 2009).

To understand the role of agency in the creation of endogenous organisational configurations that favour inclusive innovation in existing systems, an *exploratory* and *embedded single case study* (Yin, 2009) has been chosen. However, I adopted a refined approach to the single-case design by distinguishing three embedded sub-cases (or sub-units). The purpose of choosing a single case study with embedded sub-units is to acknowledge the voices of diverse organisational actors to maximise variation through within-case comparison by bringing to the fore different perspectives regarding the phenomena studied in this research (Maxwell, 2005). Furthermore, the case design chosen allows addressing the concern that a single case design strategy will not allow scope for generalising the study's results as the sub-cases facilitate theorisation across different levels of analysis (Yin, 2009) and organisations.

Lastly, following the methodological implications of undertaking CR-based research, the nature of the research question (nascent) and the methodological fit (qualitative approach), this research applies an ideographic approach (which focuses on contingent phenomena) as opposed to a nomothetic one (which emphasises the generation of statements regardless of the time and place). Nonetheless, the refined approach to a single case study and the possibilities it offers for theorising across different levels of analysis may allow the formulation of complementary questions and to pose new puzzles to advance our understanding of inclusion as a potential feature of innovation systems in other low- and middle-income countries.

4.1.1. The case

An empirical setting that offers rich insights about the mechanisms involved in the unfolding of the phenomenon of interest needs to be carefully selected when applying a single case study methodology. In this regard, two elements informed the purposive sampling adopted in this study. First, the sampling technique was informed by a specific gap identified in the literature, namely the lack of detailed explanations about how inclusive elements emerge, get taken up and coexist with other features of an innovation system. Second, the choice of adopting an embedded case design was informed by the contextual knowledge about the Peruvian Higher Education Sector and the government's innovation strategy acquired as a result of my previous work experience.

The research distinguishes between the **context**, the **single case**, the **sub-units** and the **individual voices** as the building blocks of the methodology's architecture. The *context* of this study is an emerging system of innovation where the demand for science, technology and innovation is overall scarce; the linkages between the actors within the system as well as their relations have shown to be weak; the influence of international organisations (particularly the Inter-American Development Bank and the World Bank) has shaped the directionality of national and regional STI policy; and two governance subsystems dealing with STI-related

activities – one oriented to the promotion of research and the other to the promotion productivity – coexist.

The *case study* is developmental universities in emerging systems of innovation. These universities hold as their third mission (extension) a commitment to the social development of the country. Within this overarching case, three research-intensive universities (two non-for-profit private and one public) have been selected as sub-units. The individual voices in this study are collected through 12 innovations projects that used public funding originally aimed at the intensification of scientific knowledge and technological development through the co-funding of projects of applied research between universities and firms and associations of productive nature. The choice of sub-units and individual voices collected through the innovation projects allows for theorisation across levels of analysis (Yin, 2009). Table 3.3 shows a synthesis of the sampling decisions, rationale, and technique.

Table 3.3 Sampling rationale and choices

Sampling level	*Sampling decision*	*Sampling rationale*	*Sampling technique*
Context	Emerging system of innovation where the overall demand for knowledge and innovation is low and the linkages between actors are weak. Two sub-systems co-exist: one oriented towards the promotion of science and technology, and the other to the promotion of innovation for productivity and competitiveness.	Emerging system that shares similarities with other systems in Latin America due to the role of international organisations (Interamerican Development Bank and World Bank) in the design of regulations and policy instruments since the 1990s.	--
Single case	Developmental universities in emerging systems. These universities hold as their third mission (extension) a commitment to the social development of the country.	Universities in emerging systems are the main providers of knowledge and innovation in contexts where the market demand is absent. Other organisations within the HE sub-system are predominantly focused on training.	Purposive sampling that builds on previous choices in the realm of individual voices and embedded cases.
Embedded cases (sub-units)	Three research-intensive Peruvian universities (one public and two private not-for-profit).	Most influential and engaged universities within the sub-system of innovation for productivity and competitiveness.	Purposive sampling that builds on the analysis of individual voices (i.e., patterns of funded projects).

| Individual voices | Twelve R&D projects that received public funding for innovation from two policy instruments oriented to foster innovation for productivity and competitiveness. The research teams behind these projects used the funds to develop inclusive innovations. | Researchers and research groups that repurposed the funding provided by the government to develop inclusive innovations. | Identification of projects started with the previous knowledge of the researcher. Then, the funding sources were traced back to two funds (FINCyT I&II and FIDECOM). Purposive sampling based on prior and contextual knowledge of the researcher. |

Source: author's elaboration.

4.1.2. Sampling procedure

The first encounter with some of the innovation projects analysed in this study took place while I was a research manager at one of the universities targeted as the sub-units of the case study. To broaden the number of projects for the study, I adopted a more systematic sampling technique compared to using a snowball technique within the same organisation. Thus, first, the source of funding for these projects was traced back to two government funds, FINCyT I&II (i.e., the Innovation, Science and Technology Fund) and FIDECOM (i.e., the Competitiveness Research and Development Fund). These funds were administered by the Peruvian Ministry of Production (Produce) under the National Innovation Programme for Competitiveness (Innóvate Perú). These two funds included a wide range of policy instruments (approximately 29 in 2018) to foster innovative activity in different productive sectors in Peru.

Four of those instruments aimed at increasing the rate and effectiveness of business innovation by providing public grants to support innovation efforts while creating and/or strengthening the linkages between the country's research and higher education sector and Peruvian firms. The projects identified before the sampling took place received funding from either one of these four policy instruments described in Table 3.4: Call for innovation projects for micro-enterprises – PIMEN; Call for individual enterprises' productive innovation projects – PIPEI; Call for applied research projects – PIAP; and Call for innovation projects for individual enterprises – PITEI. These funds (FINCyT I&II

and FIDECOM) and the associated policy instruments (*calls for funding* - PIMEN, PIPEI, PIAP and PITEI) served as the *location* for a more systematic sampling approach. The location itself is not part of the object of analysis of this study but acts as a backcloth to the data collection (Bryman, 2015).

After identifying the funding sources, I reviewed the total number of projects that applied to these calls since they were first launched (2007 onwards) until 2018 (i.e., 1,907 projects according to the information made available by the Ministry of Production). Then, I identified 65 R&D projects associated with an inclusive innovation as a potential outcome; 34 of those projects obtained funding from the Peruvian government, and 19 were developed in partnership with a university, as shown in Figure 3.3.

Figure 3.3 Number of projects funded and developed with or by a university with an inclusive innovation as potential outcome
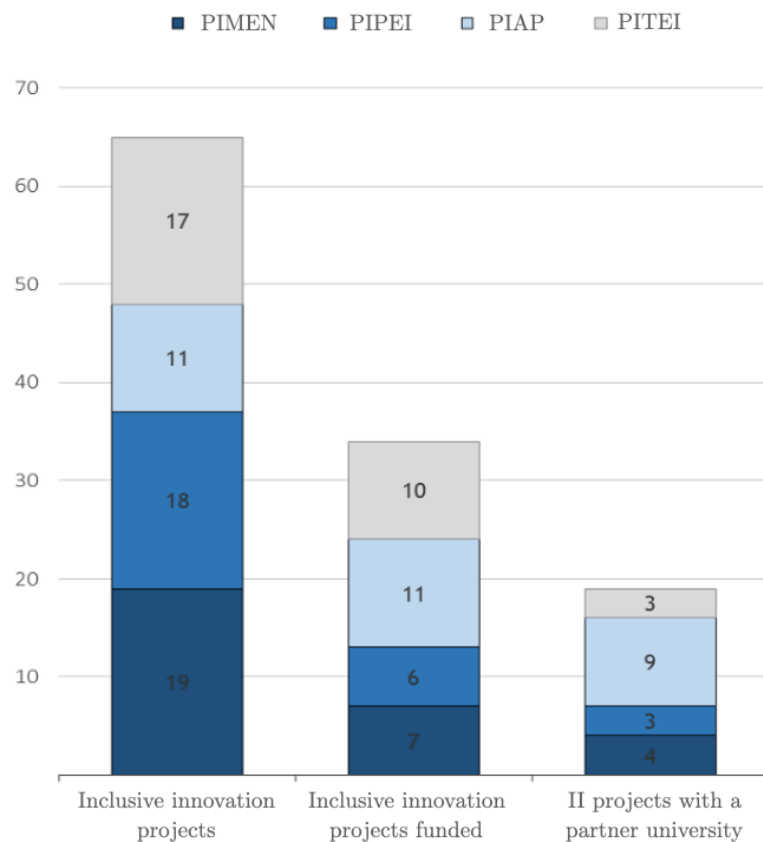
Source: Author's elaboration with data from the Peruvian Ministry of Production.

Table 3.4 Calls for funding targeted in this research

Year	Name	Aim	Eligible Candidates	Associated Entities
FIDECOM 2010 - 2018	Call for innovation projects for micro-enterprises – PIMEN / Concurso de Innovación para la Microempresa – PIMEN	To fund projects oriented to develop a new (or substantially enhanced) product (good or service and/or process).	Micro-enterprise operating at least for one year according to the National Superintendence of Tax Administration and with an annual rate sale equal or less than 150 UIT (S/. 607,500 Peruvian soles and civil associations of productive nature).	The applicant entity can have as an associated entity universities or Higher Education institutions legally constituted in Peru or overseas (private or public), non-profit research, development and innovation institutions, government entities, other enterprises, and civil associations of productive nature.
FIDECOM 2010 - 2017	Call for individual enterprises' innovation projects – PIPEI / Concurso de Proyectos de Innovación Productiva para Empresas Individuales – PIPEI	To fund projects oriented to strengthen the technological capability for innovation in enterprises. The resources will fund a new (or substantially enhanced) product (good or service and/or process).	Legal or natural persons, or that own a business that have, at least, 1 year of uninterrupted functioning according to the National Superintendence of Tax Administration and with an annual rate sale greater than 150 UIT (S/. 577,500 Peruvian soles) and lesser than 2300 UIT (S/. 8'855,000 Peruvian soles – 2015 rates), and civil associations of productive nature.	The applicant entity can have as an associated entity universities or Higher Education institutions legally constituted in Peru or overseas (private or public), non-profit research, development and innovation institutions, government entities, other enterprises, and civil associations of productive nature.
FINCYT 2013 - 2014	Call for applied research projects – PIAP / Concurso de Proyectos de Investigación Aplicada – PIAP	It aims to contribute to the intensification of scientific knowledge and technological development through the co-funding of projects of applied research presented by the applicant entities. This call funds innovation projects developed by universities, higher education and research institutions, both private and public, and alliances between these entities and firms and associations of productive nature.	Universities, higher education and research institutions, both private and public, and alliances between these entities and firms and associations of productive nature.	The applicant entity can have as an associated entity firms and associations of productive nature.
FINCYT 2014 -2017	Call for innovation projects for individual enterprises – PITEI / Concurso de Proyectos de Innovación de Empresas Individuales	The aim of the call is to fund technological innovation projects that will obtain a new or substantially improved product, process, organisational or commercialization method that will be successfully introduced in the market.	Small, medium and large enterprises that have, at least, 1 year of uninterrupted functioning according to the National Superintendence of Tax Administration.	The applicant entity can have as an associated entity other firms, universities, higher education and research institutions, both private and public.

Source: Author's elaboration with data from the Peruvian Ministry of Production.

The official documentation consulted (Ministry of Production's available records) did not include information about partnerships, sector, and geographical setting of the project. To obtain this information, I conducted a complimentary online search for each one of the 34 R&D projects funded by the Peruvian government. While it was not possible to find detailed information for all of them, I could retrieve information about partnerships for 19 of these projects. A possible explanation for this lack of information is that some projects were interrupted or terminated before delivering results. Alternatively, some of them might continue being under development. Therefore, the number of R&D projects that included a university as a partner might increase as more information about their development and results may be disclosed, but they are not included in this research due to the research's time constraints.

The information retrieved showed that only 10 universities from the 143 in the country were involved in the development of an R&D project with an inclusive innovation as a potential outcome. 60% of those universities are located in the province of Lima (the capital of the country), and only one of them, *University 1* (a private non-for-profit university located in the capital of Peru), was a partner or the lead institution in nearly 40% of the projects identified, as shown in Figure 3.4.

In addition to it, the data collected showed a concentration pattern where, besides *University* 1, two other universities in the Province of Lima obtained funding that came from the same policy instruments for at least three projects. These universities are *University 2* (a public university located in the capital of Peru – with 2 R&D projects) and *University 3* (a private non-for-profit university located in the capital of Peru a – with 3 R&D projects).

Figure 3.4 Number of R&D projects with an inclusive innovation outcome by partner university
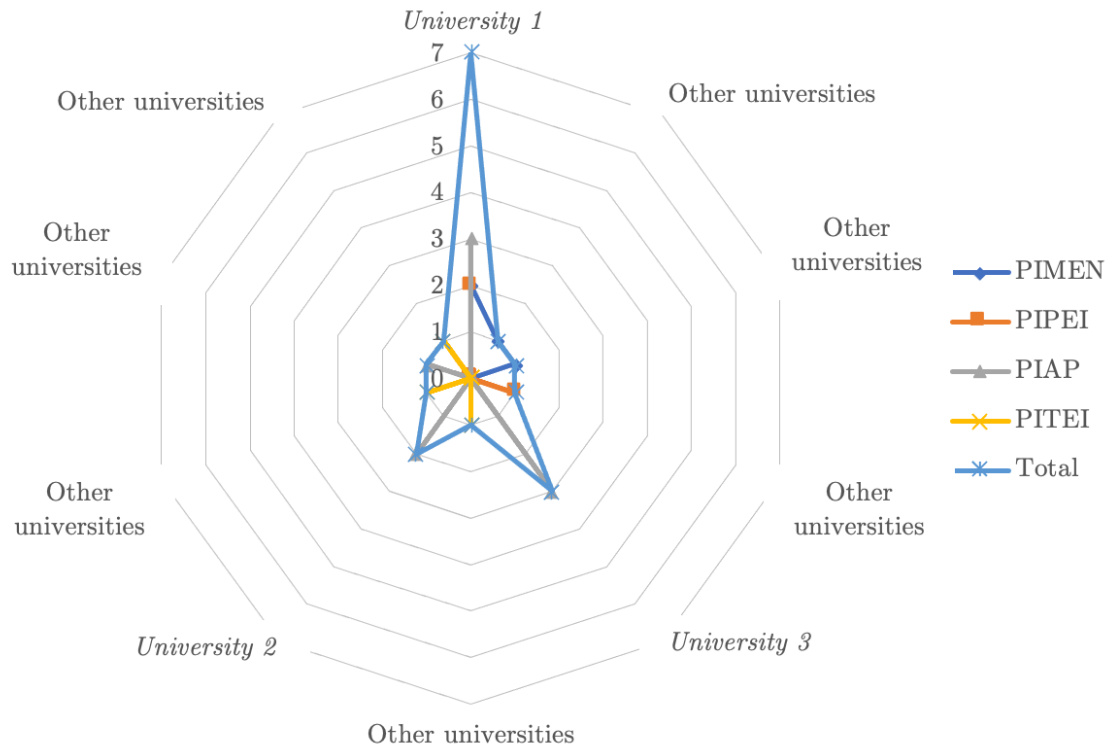
Source: Author's elaboration with data from the Peruvian Ministry of Production.

The concentration pattern observed (of about 63% of the total number of projects funded) informed the selection of these three universities as the sub-units or embedded cases and the 12 R&D projects analysed in this study. It is worth mentioning that these universities, in general, presented more projects and were the recipients of more funding compared to the rest of the universities in the country. Among the reasons why these universities were more likely to obtain public funds is that they have more capabilities to conduct research as shown by the 2018 Research Excellence Ranking elaborated by the Peruvian National Superintendence of Higher University Education (SUNEDU for its Spanish acronym), in which *University 1, 2* and *3* ranked among the top 20 institutions. Table 3.5 contains information about the call, the year, the university, and the title of the projects selected.

Table 3.5 Innovation projects funded through PIMEN, PIPEI, PIAP & PITEI

Call	Code	University	Project
PIAP	1	University 1	– Desarrollo de tecnologías para enlaces inalámbricos de larga distancia en zonas rurales – Development of technologies for long-distance wireless links in rural areas
PIAP	2	University 1	– Chocolate solar: desarrollo de un sistema automático y ecológico para la elaboración de pasta de cacao de calidad como una alternativa nutricional para las comunidades de Huyro en Cusco – Solar chocolate: Developing an automatic and ecological system for the production of quality cocoa paste as a nutritional alternative for the communities of Huyro in Cusco
PIAP	3	University 1	– Desarrollo de cocinas a gas (GLP y GN) residencial y comercial de alta eficiencia térmica, bajas emisiones ambientales y bajo coste para un rango de altitud entre 2,000 y 4500 msnm. en nuestras ciudades y comunidades del Perú – Development of residential and commercial gas stoves (LPG and NG) with high thermal efficiency, low environmental emissions and low cost for an altitude range between 2,000 and 4500 masl. in our cities and communities in Peru
PIMEN	4	University 1	– Desarrollo de un proceso para la regeneración autóloga de heridas empleando un soporte orgánico de bajo costo – Development of a process for autologous wound regeneration using low-cost organic support
PIPEI	5	University 1	– Elaboración de silla de ruedas para niños con parálisis cerebral – Developing a wheelchair for children with cerebral paralysis
PIPEI	6	University 1	– Desarrollo de un monitor de signos vitales de bajo costo utilizando tablet y con conexión a la nube – Development of a low-cost vital signs monitor using tablet and cloud connection
PIPEI	7	University 1	– Climatización y otros beneficios de confort de habitabilidad de construcciones geodésicas, especialmente domos, mediante materiales de cambio de fase que almacenan calor y frio – Climate control and other comfort benefits of geodesic constructions, especially domes, through phase change materials that store heat and cold
PIAP	8	University 3	– Desarrollo de un equipo automático para lecturas de placas, mods, y un sistema web en línea para el diagnóstico rápido y remoto de tuberculosis y la determinación de suceptibilidad a drogas – Developing automated plaque reading equipment, mods, and an online web-based system for rapid and remote diagnosis of tuberculosis and determination of drug susceptibility
PIAP	9	University 3	– Sistema automático de diagnóstico de parásitos intestinales a través de imágenes digitales – Automatic system for the diagnosis of intestinal parasites through digital imaging
PIAP	10	University 3	– Desarrollo de biosensores para la detección de tuberculosis basados en nanoestructuras de carbono – Developing biosensors for TB detection based on carbon nanostructures
PIAP	11	University 2	– Propuesta técnica de confort térmico para viviendas en comunidades localizadas entre 3000 y 5000 msnm – Technical proposal for thermal comfort for homes in communities located between 3000 and 5000 masl.

PIAP	12	University 2	– Desarrollo e implementación de un sistema de monitoreo ambulatorio con tecnología celular para la detección oportuna de arritmias y eventos coronarios: una contribución para el diagnóstico precoz a cardiopatías en el Perú – Development and implementation of an ambulatory monitoring system with cellular technology for the timely detection of arrhythmias and coronary events: A contribution to the early diagnosis of heart disease in Peru

Source: Author's elaboration.

4.2. Research methods

Thus far, this chapter explained how the overall objective and supporting research questions are best served by a qualitative approach, particularly by a case study with three embedded sub-cases. This qualitative methodological architecture points towards specific complementary methods and analytical procedures. In more detail, this research uses document review and semi-structured interviews as methods for data collection. These methods allow the collection of fine-grained material and are coupled in this study with an abductive approach to conceptualisation to explore the temporal unfolding of a case embedded in a particular socio-material context.

4.2.1   Document review

Document review not only is an unobtrusive method but is also "rich in portraying the values and beliefs of participants" (Marshall and Rossman, 1999: 116); hence, our choice of documentary evidence. Documents are particularly helpful to mitigate any retrospective inaccuracies that can be present in interviews or contemporary accounts of past events (Creswell, 2003). However, they also may contain inaccuracies and biases (Marshall and Rossman, 1999). For this study, there is intrinsic value in these biases because they indicate actors' positionality regarding the different topics they were inquired about - including their beliefs, values, role expectations, and the norms and perceived responsibilities of the universities targeted as embedded sub-cases. Furthermore, documents are rich

sources for history and context about the phenomenon studied. In this regard, they hold the potential to perform a triangulation function, which is key to ensuring validity in qualitative research (Campbell and Fiske, 1959; Denzin, 1978).

The documentation collected in this research includes policy documents from the Ministry of Production related to the National Innovation Programme for Competitiveness (Innóvate Perú). These documents include the Law Nº 29152 by which FINCyT and FIDECOM were established; The Supreme Decree Nº 003-2009-PRODUCE by which FINCyT and FIDECOM are regulated; the Ministry's Glossary of Terms (which is a document that contains the formal definitions regarding innovation activity endorsed by the Ministry); and the cooperation agreements PE0203 (2005-2013 for US$24 million) and PE L1068 (2012 for US$35 million) with the Inter-American Development Bank (IADB). The Innovation, Science, and Technology Fund (FINCyT) was created with the funds attached to the first loan from the IADB and continued operating with the funds coming from the second loan. The second loan also funded the Innovation for Competitiveness National Project where the Research and Development for Competitiveness Fund (FIDECOM) operates.

These loan agreements are of particular interest for this research because they evince the role of the IADB – and this international organisation's framing about innovation – in the creation of innovation policy instruments in Peru. In this respect, the Inter-American Development Bank claimed that "[o]n science, technology, and innovation, the Bank provided significant support for the institutionalization of innovation policy in Peru. This was done by creating the Innovation, Science, and Technology Fund (FINCyT) [...] which was continued through the Innovation for Competitiveness Project" (Inter-American Development Bank, 2016: 29-30).

The secondary data collected for the universities include regulations – like university statutes and the institutional strategic plans –, research activity policies –like universities' research policies and research regulations –, and all

relevant documentation related to social responsibility and their extension missions – like the ones produced by the Academic Directorate of Social Responsibility in the case of *University 1*, the Centre for Cultural Extension and Social Projection in the case of *University 2,* and the University Directorate for Social Responsibility in the case of *University 3.*

4.2.2. Interviews

Qualitative studies often rely, at least to some extent, on interviewing. As Marshall and Rossman (1999) and Yin (2009) argue, interviews provide large amounts of data about events that might be either time-consuming or impossible to obtain by using other methods for data collection. Furthermore, interviews can provide valuable insights into subjective perspectives, which are relevant in this research as delving into the factors that explain actors' purposive actions is consequential to understanding endogenous changes in organisational structures that favour inclusive innovation in emerging systems.

I conducted interviews with various actors, including 'elites' who are influential, prominent and well-informed actors, selected for their expertise in relevant realms (Marshall and Rossman, 1999: 13), such as the governance of the universities and decision making processes in pivotal government bodies. Two significant advantages of having conducted elite interviews are, first, that the participants were familiar with the origins, functioning, and the politics behind policy and organisational strategies, and second, that they were able to articulate a 'big picture' account of events (Marshall and Rossman, 1999) that allowed to establish links between intertwined processes taking place in the context of this study.

These interviews can be classified into two main categories. First, I conducted informal 'guided conversations' (Yin, 2009) with people who did not work in the universities or the government but belonged to these organisations in the past. The informal interviews were instrumental to building a network of gatekeepers,

who later helped me book appointments with senior public officials and managers at the universities targeted.

Second, I conducted one round of in-depth semi-structured interviews with key informants (please see Appendix B-1 for the interview guides' main topics). This round took place after I had several informal conversations with gatekeepers and former colleagues. In this round, 26 interviews lasting between 45' and 2h25' took place. By that time, I started to question my initial assumptions about the case as I acquired a better understanding of the dynamics within some research teams, the relationship between these teams and their academic departments, the governance of the universities, and the history of the National Innovation Programme for Competitiveness (Innóvate Perú). Before conducting the interviews, I elaborated a list of key informants to approach for one-on-one discussions about the range of topics covered in this thesis and drafted tailored interview guides for each type of informant. I took notes of the conversations in all the opportunities and recorded the face-to-face discussions when consented by the informants.

Semi-structured interviews were conducted to gain access to the experience and knowledge of civil servants working in the Bureau of Innovation, Technology and Digitalisation and Formalisation, the division in charge of managing the funds targeted in this research within the Ministry of Production. However, although an invaluable resource, these interviews were used to test the accuracy of the patterns identified through coding and data analysis; that is to say, to triangulate the findings from the secondary data analysis. In addition to it, semi-structured interviews were used to gain access to the experience and knowledge of research managers and employees working at the Vice-Pro-Chancellorships of Research at the three universities, and the Academic Directorate of Social Responsibility – *University 1*, the University Directorate for Social Responsibility – *University 3*, and the Centre for Cultural Extension and Social Projection – *University 2*. These interviews were also used to test the accuracy, elaborate, and gain further knowledge about the patterns identified through the secondary data analysis.

Lastly, semi-structured interviews were also used as a method for data collection to delve into the identity, values, and practices of the Principal Investigators of the twelve research projects targeted in this study. I interviewed eleven PIs for the projects developed with universities 1, 2 and 3. To safeguard the identity of the researchers interviewed, they were given pseudonyms (letters of the alphabet) for the purposes of notes, recordings, and in- text citations. Table 3.6 presents a summary of the sources of information and the methods employed in the data collection by the level of analysis.

Table 3.6 Data sources and data collection method by level of analysis

	Actor	Source	Method	Purpose
Organisational level	Ministry of Production (PRODUCE)	– Innovate Peru policy documents and reports about FINCyT I & II and FIDECOM. – Cooperation agreements with the Inter-American Development Bank. – Pool of projects funded by FIDECOM and FINCYT.	Desk research	Main method
		Knowledge and experience of: – Civil servants working in the National Programme of Innovation for Competitiveness (Innovate Peru).	Semi-structured interviews	Triangulation
	University 1	University regulations – University bylaws – Institutional Strategic Plan 2011-2017 (i.e., Plan Estratégico Institucional – PEI 2011-2017). Research Activity Policies – Research internal policy	Desk research	Main method
		Knowledge and experience of: – Research managers from the Pro-Vice-Chancellorship of Research, specifically from the Research Management Directorate and the R&D Office (i.e., Dirección de Gestión de la Investigación and Oficina de I+D+i). – Employees from the Academic Directorate of Social Responsibility (i.e., Dirección Académica de Responsabilidad Social)	Semi-structured interviews	Triangulation
	University 2	University regulations – University bylaws – Institutional Strategic Plan 2014-2021 (i.e., Plan Estratégico Institucional – PEI 2014-2021). Research Activity Policies – Research internal policy	Desk research	Main method
		Knowledge and experience of: – Research managers from the Pro-Vice-Chancellorship of Research, specifically from the Research Management Bureau (i.e., Oficina de Gestión de la Investigación). – Employees from Centre for Cultural Extension and Social Projection (i.e., Centro de Extensión Cultural, Proyección y Responsabilidad Social).	Semi-structured interviews	Triangulation

		University regulations – University bylaws – Institutional Strategic Plan 2014-2018 (i.e., Plan Estratégico Institucional – PEI 2014-2018). Research Activity Policies Research internal policy	Desk research	Main method
	University 3	Knowledge and experience of: – Research managers from the Pro-Vice-Chancellorship of Research, specifically from the Innovation, Science and Technology Directorate (i.e., Dirección de Innovación, Ciencia y Tecnología). – Employees from the niversity Directorate for Social Responsibility (i.e., Dirección Universitaria de Responsabilidad y Vinculación Social).	Semi-structured interviews	Triangulation
Individual level	University 1	Knowledge and experience of the principal investigators from 7 previously identified R&D projects.	Semi-structured interviews	Main method
	University 2	Knowledge and experience of the principal investigators from 2 previously identified R&D projects.	Semi-structured interviews	Main method
	University 3	Knowledge and experience of the principal investigators from 3 previously identified R&D projects.	Semi-structured interviews	Main method

Source: author's elaboration.

4.3. Coding and Analysis

The research relied on two main sources of information – secondary data and semi-structured interviews. These sources of information were used to draw abductive inferences about how institutional elements such as values, beliefs and normative expectations fed individual and collective processes of sensemaking that led to the creation of organisational configurations that favour inclusive innovation. Particularly, these inferences explain how actors understood and, consequently, acted to repurpose top-down policy instruments initially targeted at fostering innovation for productivity and competitiveness and how they changed the organisational environments in which they operate.

One of the implications of combining a single case study with a critical realist ontology and epistemology is the dynamic and iterative relationship between data collection, coding, analysis and provisional theoretical inferences. This iterative

process was organised around three main stages during the course of the research: coding and the identification of demi-regularities, abduction or theoretical redescription, and retroduction.

First, after collecting the data corpus for this research, a two-cycle coding process took place using the software NVivo (please see Appendix B-2 for the full list of codes). The aim of using two cycles of coding was to build more accurate analytical categories, which were later aggregated in the themes used in the empirical chapters. Thus, during the *first-cycle coding*, affective methods (particularly values coding) were applied to delve into the subjective qualities of the participants' experiences; this method enabled the identification of participants' integrated values, attitudes, and belief systems at work. Additionally, exploratory methods, particularly provisional coding, were applied in this stage using a preliminary list of the codes based on the preparatory investigation (i.e., literature review). Then, codes list was revisited and expanded following the unexpected patterns that emerged during the coding process. This stage was helpful to pilot-test the initial coding choices before applying them to the whole data corpus. After this first coding stage, *code-mapping* and *code-landscaping* techniques were used to have a more graphic account of the emerging demi-regularities in the data.

The objective of first-cycle coding is to obtain an initial list of codes, whilst the second-cycle aims at facilitating the construction of linkages among the codes identified in the prior stage so they can be aggregated into themes. Thus, during the second-cycle, pattern coding was selected as a method to reorganise and reanalyse the data coded during the first one. This method, particularly fitted for examining social networks and patterns of human relationships, permitted the aggregation of previous codes into a smaller and more select list of broader categories and themes. After the second-cycle coding, demi-regularities (or patterns) signalling the influence of certain institutional elements in the choices for knowledge production were revealed. Additionally, the second-cycle coding

also unveiled particularities in researchers' processes of collective interpretation and purposive action.

Second, after the identification of categories and themes, theoretical redescription was applied. Theoretical redescription, also known as abduction, is a process of inference in which a particular phenomenon or event is interpreted from a set of general ideas or concepts (Danermark et al., 2002). During this process, the aim is to go beyond a thick description of the empirical entities (i.e., the events observed and measured) and use theoretical constructs to interpret the observed events. Here, the theoretical constructs of sensemaking as a form of institutional work (coming from organisational studies), collaborative relations (coming from institutional theory) and relational spaces (coming from social movements theory) were applied to re-describe the empirical data re-coded during the second-cycle. This process took place following the CR-based research principle that the explanations about a phenomenon are theory-laden, not theory-determined, due to the fallible nature of theoretical constructs.

The final stage of data analysis was retroduction. This stage entailed moving from the manifest phenomena (the observable and empirically measurable) as conceptualised in the experience of the social agents to the essential relations that are needed for such phenomena to happen (Bhaskar, 2008). Therefore, as the objective of this stage was to identify the necessary contextual conditions for a particular causal mechanism to take effect and result in the patterns observed during the coding stage, the analysis moved from the concrete to the abstract (and back again) to examine what social conditions caused these regularities to appear as they do in the realm of the empirical and measurable (Fletcher, 2017).

Figure 3.5 The iceberg metaphor for critical realism as a philosophy of science applied to this research

The Empirical Level:
Experienced & observed events –
Inclusive innovations and organisational changes in the universities.

The Actual Level:
Events occur whether observed or not –
individual and group sensemaking processes and collective action in relational spaces.

The Real Level:
Causal mechanisms that cause the events seen at the empirical level.
Cognitive-cultural and normative frames of reference.

Source: Author's elaboration adapted from Fletcher (2017).

5.   Research Ethics

Due to the involvement of human subjects, the study required the rigorous implementation of an ethical protocol (please see Appendix A-1 and A-2 for the full protocol). Before starting the first round of interviews, the research was granted ethical approval in March 2019 from the Cross-School Research Ethics Committee (C-REC) at the University of Sussex (Reference Number: ER/MG505/1).

As part of the ethical conduct applied in this study, the participants were given pseudonyms for the purposes of notes, recordings, and in-text citations. The notes taken during the interviews and the recordings were available only to the researcher. Furthermore, the interview transcripts were encrypted before storing them, and the key that linked the transcripts to the interviewees was kept in a different location.

Every participant received a Plain Language Statement (PLS) in advance with information about the purpose of the research, the reason why they were asked to take part in it, their rights before, during, and after taking part in the study, and how the data was intended to be used. Additionally, the participants received a Consent Form in advance, which they were asked to sign after the interview. Lastly, all participants were told about their right to participate in the study and withdraw from it at any time, no questions asked.

6. Validation and reliability

Validation in qualitative research is the attempt to assess "the accuracy of the findings as best described by the researcher and the participants" (Creswell, 2003: 249-250). Validation is a strength of qualitative research as the value or accuracy of the study follows an extensive time spent in the field, detailed thick description about the phenomenon under study, and the closeness of the researcher to the research participants (Creswell, 2003). In this regard, validation transcends mere verification as it entails applying an array of strategies throughout the research process.

There exist many perspectives regarding the importance of validation in qualitative research[18]. This research follows Eisner's (1991) proposal to ensure credibility in qualitative research and combines it with Angen's (2000) criterion of substantive validation. Thus, four main criteria have been followed to safeguard the credibility of the results presented in this study: structural corroboration, consensual validation, referential adequacy and substantive validation.

First, to comply with the criterion of structural corroboration, this research used multiple types of data to support the interpretations made during the analysis stage. Thus, during the data collection stage, a confluence of evidence that breeds credibility was brought together to create confidence about the

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[18] See Lecompte and Goetz, 1982; Lincoln and Guba, 1985; Eisner, 1991; Lather, 1993; Wolcott, 1994; Angen, 2000; Whittemore et al., 2001; Denzin and Lincoln, 2011; St. Pierre, 2017.

observations, interpretations and conclusions made in this study (Eisner, 1991). In more detail, to meet the criterion of structural corroboration, *triangulatio*n (Creswell, 2003; Lincoln and Guba, 1985) was applied by locating evidence to document the codes and themes used in different sources of data. Additionally, *negative case analysis* (Lincoln and Guba, 1985) was used for those circumstances in which the evidence did not fit the pattern of a code or theme. The latter helped refine the codes and themes that emerged during the data analysis to have a more compelling and realistic assessment of the phenomena under study.

Second, to comply with the criterion of *consensual validation*, the research sought agreement among competent others that the data description, interpretation and evaluation were compelling and accurate. More concretely, *peer review and debriefing* were applied as strategies to achieve this goal. Here, parts of the research in the form of chapters, reports, and proceedings were reviewed by colleagues and senior academics from diverse institutions, including the Science Policy Research Unit at the University of Sussex), Aalborg University, MIOIR at the University of Manchester, University College London (UCL), the Centro Interdisciplinario de Estudios en Ciencia, Tecnología e Innovación (Argentina), and colleagues at the Global Network for Economics of Learning, Innovation, and Competence Building Systems (Globelics), and its regional chapter for Latin America, Lalics.

Third, *referential adequacy* suggests the importance of criticism, which seeks to illuminate the subject matter and bring about more complex and sensitive perception and understanding (Eisner, 1991). In this regard, I employed one main strategy to achieve referential adequacy. Namely, *rich and thick description* (Lincoln and Guba, 1985; Merriam, 1998; Creswell, 2003), which enables readers to make decisions about the transferability of this research (i.e., to what extent the findings can be transferred to other contexts or settings because of shared characteristics).

Lastly, *substantive validation* emphasises that researchers are socio-historical interpreters that interact with the subject matter to co-create the interpretations

derived (Angen, 2000; Creswell, 2003). As this type of validation entails understanding one's own positionality, but also how understandings derived from other sources substantiate the inquiry, self-reflection is a critical step. To fulfil this criterion, I clarified my own biases as a former employee of one of the universities studied from the outset of the study, so the readers, academic colleagues and participants understand my position and the assumptions that influenced the research process, as my subjectivity is both a producer and a product of this research.

7. Chapter summary

This research builds upon a critical realist ontology and epistemology, which have guided the generation of empirically supported causal explanations about how actors make sense and act to create organisational configurations that enable inclusive innovation in existing systems. Consequently, this research has committed to a view of the social world as complex and stratified and assumed that the explanations about social phenomena need to piece together different accounts (theory, participants' narratives, the researchers' understanding) to offer a more accurate representation of it, taking into consideration that these explanations are socially determined and historically contingent.

These ontological commitments and epistemological assumptions have informed this study's choice of method. Critical realism-based research needs to be contextualised. Thus, this research used a case study design with three embedded sub-units. This methodology entails a detailed and extensive analysis of a case, in which the researcher makes a distinction between the context, the single case, the embedded sub-units, and the individual voices of the research participants. As the chapter shows, the context of the research (which acts as a backlot for the data collection) is the Peruvian National Innovation Programme for Competitiveness. The single case is the role of developmental universities in the Peruvian system of innovation, and the embedded sub-cases are three

research-intensive universities (Universities 1, 2 and 3). The individual voices correspond to the PIs and research teams of twelve inclusive innovation projects developed within these universities.

Following this choice of methodology, the research relied on two primary methods for data collection: document review and semi-structured interviews. After the data corpus was collected, the analysis took place in three stages. The first one was 'coding and the identification of demi-regularities (or patterns)', where *affective*, *explanatory* and *pattern* coding methods were applied in two coding cycles to build more accurate analytical categories. These categories were later aggregated in the themes that guided the development of the subsequent empirical chapters (Chapters 4, 5 and 6). The second one was 'theoretical redescription (or abduction)', where the theoretical constructs of sensemaking as a form of institutional work (coming from organisational studies), collaborative relations (coming from institutional theory) and relational spaces (coming from social movements theory) were applied to re-describe the empirical data re-coded during the second-cycle. Lastly, the third one was 'retroduction', where the necessary contextual conditions for explaining the patterns observed during the coding stage were identified by moving from the data to the theoretical inferences (and back again) in an iterative process. These processes gave way to a series of explanations about how inclusive elements emerge, get taken up and coexist with other features of a system of innovation.

As this research involved human subjects, an ethical protocol was rigorously implemented during fieldwork, and consent forms from all the participants were obtained before the interviews. Finally, this research applied four criteria (structural corroboration, consensual validation, referential adequacy, and substantial validation) to safeguard the validity and reliability of the results presented in the following chapters. The next chapter presents the first set of findings in response to the first subsidiary question 'what is inclusive innovation and what are the characteristics of innovations that cater to developmental aims?'.

Chapter 4

Reconceptualising Inclusive Innovation: Beyond intentions, processes, and outcomes

1. Overview

The objective of this PhD is to understand how agency in developmental universities unfolds to create favourable environments for inclusive innovation in existing innovation systems. Following the arguments presented in Chapter 2, from which we concluded that inclusive innovation remains a weakly defined area of enquiry with multiple roots and little synthetic analysis, this chapter is concerned with explaining *what inclusive innovation is and what are the characteristics of innovations that cater to developmental aims.* Here, the chapter builds on two widely debated topics in the extant literature, namely the definition of inclusive innovation and the definition's implication for research to later propose a normative and evaluative framework to assess innovation in terms of inclusion.

In more detail, section 2 discusses the previous definitions in the inclusive innovation literature, particularly, those formulated around outcomes, processes, and intentions. Then, building on the path-breaking work done by researchers regarding inclusive innovations' normative criteria, a framework to assess inclusive innovation in terms of 'equity' and 'participation' is proposed. Here, both categories are reformulated under the light of the social justice and basic needs approaches. Section 3 proposes a redefinition of the concept of inclusive innovation in light of this framework and section 4 uses this redefinition to analyse

the different 'models' of innovation for inclusive development discussed in the academic literature. Finally, section 5 presents an assessment of the twelve research projects analysed in this PhD as a means to empirically substantiate this framework.

2. Inclusive innovation's conceptual underpinnings

The inclusive innovation literature has become a rather heterogenous body of knowledge since the term was first coined in the late 1990s and gained traction in academic and policy agendas during the last decade[19]. Over the years, the term has been given different meanings and, consequently, has been used to discuss a wide range of topics including the rationale of business modes and entrepreneurship activities, community development practices, knowledge creation dynamics, information and communication technologies, and workforce development, among others. While it is widely recognised that inclusive innovation reflects a concern about how innovation affects or may be affected by underprivilege people, the concept remains ill-defined and liable to be used as a catch-up-all conceptual tool to explain innovation's positive spillovers in developmental backgrounds (Bryden et al., 2017; Chataway et al., 2014; Jiménez, 2019).

In an effort to develop its conceptual strength, Foster and Heeks (2013) identified four aspects of inclusivity cutting across this literature, namely innovation agendas include problems relevant to the poor (*intentions*), the poor participate in the innovation (*processes*), innovations are used by the poor (*outcomes*), and innovations benefit the poor (*impact*). These four themes were merged into a conceptual whole where different gradients of inclusion were conceptualised as a ladder comprised by inclusion of *intention, impact, process,*

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[19] In a Google Scholar search, 609 publications addressing inclusive innovation were identified between 2013 and 2014. This amount grew on an approximately 20% the following years. Thus, between 215 and 2016, 993 documents were published, between 2017 and 2018, the number raised to 1340, and between 2019 and March 2020, 862 publications appeared in the search.

structure and *post-structural* inclusion[20] as shown in Figure 4.1 (Heeks, Foster and Nugroho, 2014).

This multileveled approach to inclusion responded to early debates that regarded inclusive innovations as outcomes (products that contribute to improve the lives of the poor) (George et al., 2012; Guth, 2005) or processes (a chain of actions in which the poor participate to develop products that contribute to improve their live quality) (Bryden et al., 2017; Cozzens and Sutz, 2014). Here, the authors merged the product/process distinction into a continuum by suggesting that greater levels of inclusivity can be achieved as one moves up on the inclusive innovation ladder.

Figure 4.1 The ladder of inclusive innovation depicting the gradients of inclusion
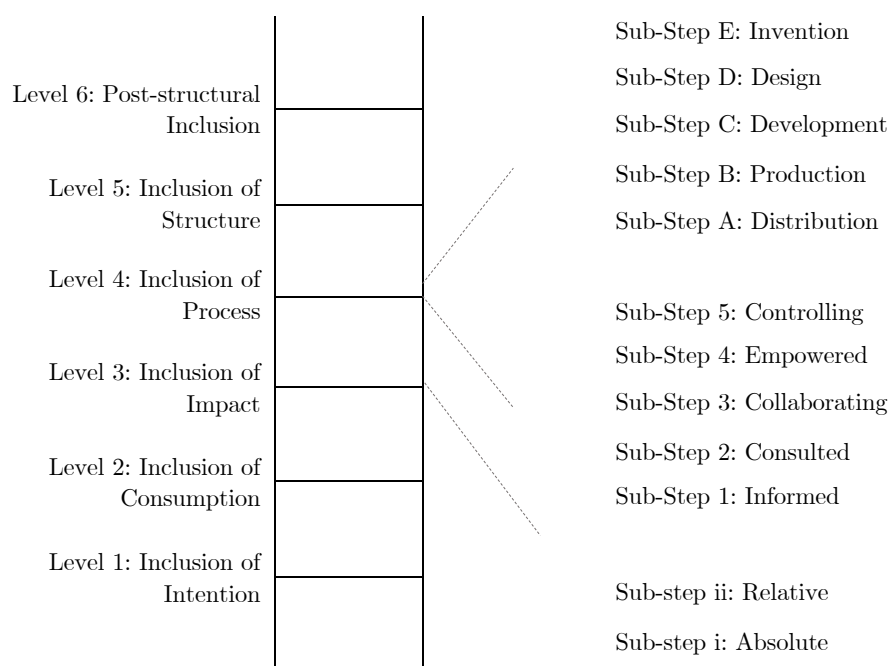
Source: Heeks, Foster and Nugroho, (2014) and Onsongo and Schot (2017)

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[20] Heeks, Foster and Nugroho (2014) argue that an innovation is inclusive if the intention behind the innovation is to address the needs or problems of an excluded group. Second, an innovation is inclusive if it is adopted and used by the excluded group. Third, an innovation is inclusive if has a positive (either relative or absolute) impact on the livelihoods of the excluded group. Fourth, an innovation is inclusive if the excluded group is involved in the development of the innovation (either in the invention, design, development, production, or distribution stages) either being informed or in control of one of the above-mentioned stages. Fifth, an innovation is inclusive if it is created within a structure that is itself inclusive. Finally, an innovation is inclusive if it is created within a frame of knowledge and discourse that is itself inclusive.

The ladder of inclusive innovation has been instrumental in identifying the different ways in which innovations' users can take part in or benefit from the innovation process. However, 'inclusion' – as stated in this approach – can be subject to different interpretations that may not respond to the concerns (i.e., improving the lives of excluded communities) that gave origin to this construct. For instance, the categories of inclusion of *intention, consumption* and *impact* are susceptible to be used to cover corporate-centric framings that emphasise market-readiness and participation to seek profit generation by stimulating the consumption of affordable products and services by low-income groups. Similarly, inclusion of *process,* which entails sub-steps such as 'informed' and 'consulted' and highlights the role of beneficiaries in the 'production' and 'distribution' of innovations, does not guarantee the incorporation of the final beneficiaries' interests and needs as steering elements in the innovation process.

Consequently, this chapter advances the argument that a more careful conceptualisation of 'inclusion' in relation to 'innovation' is needed to prevent both 'conceptual stretching'[21] and the co-optation of the language of inclusion to favour firms and stakeholders other than the final beneficiaries of these innovations. As inclusive innovation reflects policy makers and scholars' concerns about how innovation affects or might be affected by underprivileged people (Bryden et al., 2017), the following section addresses the questions of *who is considered as underprivileged?* and *in what ways innovations both affect and are affected by these populations*?

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[21] Stable concepts and a shared understanding of certain categories are viewed as a foundation of any research community. Nonetheless, ambiguity and disputes about categories are common in the social sciences and in other fields where different disciplines interact, like innovation studies. A major source of ambiguity and confusion is the quest for generalization. As scholars seek to apply models to more cases, they must often adapt these categories to fit new contexts (Collier and Mahon, 1993). However, in this process of adaptation, the medullar conceptual underpinnings of such categories might get lost. Giovanni Sartori (1984) has addressed the pitfalls of extending the meaning of certain categories to other contexts in his work about 'conceptual stretching', which refers to the distortion that occurs when a concept does not fit the new cases (Collier and Mahon, 1993).

2.1. The beneficiaries of inclusive innovation

Underprivileged people and the different forms in which they participate and are benefited by innovation processes have become a focal point in the inclusive innovation literature. Scholars in the field have employed terms like 'the poor', 'marginalised', 'low-income populations', and 'bottom of the pyramid populations' to refer to the final beneficiaries of such innovations. From these categories, it can be inferred that a substantial part of the extant literature has relied on monetary approaches (the poor, low-income and bottom of the pyramid) to define exclusion. This means that the beneficiaries of these innovations are reduced to those who experience a shortfall in income from a pre-defined threshold (i.e., the poverty line).

Monetary approaches to define 'excluded' populations have been justified by the existence of available and transparent indicators (e.g., consumption and income) and the need of purchasing power in order to have a minimum level of wellbeing (Grynspan and López-Calva, 2011). However, monetary approaches fail to consider that some of the goods and services needed by these populations do not have a market (e.g., public goods). Furthermore, they often overlook heterogeneity among people (e.g., personal requirements and inequalities) and neglect subjective aspects related to wellbeing (Grynspan and López-Calva, 2011).

Another subset of the literature has pointed to the *disenfranchised*, *marginalised*, and *underprivileged* as the beneficiaries of inclusive innovation. While these categories may contemplate monetary aspects (i.e., economically poor populations can be disenfranchised, marginalised and underprivileged), their scope is not limited to income and consumption. Rather, these categories point to some form of social exclusion; that is to say, they refer to people excluded from certain living standards that reflect economic, social, political, or spatial dimensions.

Bryden et al. (2017) argue that what makes innovation inclusive relates to the position of the beneficiaries, making the improvement of their lives a focal point of motivations, processes, and the results of such innovations. In this regard,

it is argued that monetary approaches to defining the beneficiaries of inclusive innovations are insufficient since exclusion is a multidimensional and relational concept that refers to people excluded from observed living standards in society, and whose exclusion is not necessary tackled by making goods and services more affordable.

Therefore, defining the beneficiaries of inclusive innovations requires a contextualised approach that entails a description of what characterises the disadvantages people experience. Thus, the term 'excluded populations' makes the concept of inclusiveness versatile in terms of the settings to which it can be applied. At the same time, it entails the recognition of heterogeneity among people and allows the satisfaction of people's needs (as opposed to their purchasing power) to become a focal point of these innovations. Hence, the research adopts an approach to defining the beneficiaries of inclusive innovation based on the multidimensional and relational concept of 'social exclusion' from observed living standards.

2.2. How innovation affects and is affected by the beneficiaries

Chataway, Hanlin and Kaplinsky (2014) suggest that a holistic understanding of inclusive innovation requires a distinction between process and product innovation, and the role played by excluded populations, both as producers and beneficiaries of these innovations. That is to say, of how innovation both affects and is affected by its beneficiaries. To understand this two-way relationship between innovation and its beneficiaries, this section builds on the normative premises discussed in the path-breaking work of Papaioannou (2014a, 2014b), with a particular focus on the principles of 'equity' and 'participation'. The argument will be made that the elements underpinning the concept of 'equity' could lead to a conceptualisation of the effects of inclusive innovation on the lives of its beneficiaries, while the ones underpinning the concept of 'participation' may

allow to explain how beneficiaries shape both the outcomes and processes of inclusive innovation.

2.2.1. Equity

Equity has been defined in the extant literature in terms of access to goods and services, and the distribution of benefits among excluded populations (Papaioannou, 2014a). This principle highlights inclusive innovation's potential to challenge the material causes of destitution and social exclusion. However, exclusion is a relational concept, and often results from the interaction between a person and their social environment. This means that there is more to exclusion than its material aspect. Hence, we propose that a more tailored conceptualisation of *equity* is needed to explain how inclusive innovation affects the wellbeing and quality of life of its final beneficiaries beyond a material redistribution of goods, services, and benefits.

Two cornerstones of Fraser's theory of social justice – redistribution (which refers to the material aspect) and recognition (which refers to the symbolic one) – are proposed to substantiate the construct of *equity* in inclusive innovation. Fraser's conceptualisation of material redistribution resonates with previous contributions in the inclusive innovation literature that emphasise innovation's role in making available affordable quality goods and services for excluded populations (see Kaplinsky *et al.*, 2009; Kaplinsky, 2011; George, McGahan and Prabhu, 2012; Grobbelaar and van der Merwe, 2016). Nonetheless, an egalitarian redistribution only rooted in a material analysis neglects other dimensions of exclusion. Thus, Fraser combines the paradigm of distributive justice with the normative concept of 'recognition' (Fraser, 2001, 1998). Here, material redistribution is complemented by the acknowledgement of the status of individual group members as full partners in any social interaction.

Any attempt of material redistribution without recognition would entail social subordination, which is a form of preventing individual group members from

participating as peers in the reproduction of social life (Fraser, 2000: 113). A lack of recognition (and, by extension, social subordination) may take different forms, e.g., legal, institutional, policy-bound, among others. In innovation processes, lack of recognition can take place in two ways. First, when knowledge, ideas and technology are used to seek rents for firms under the appearance of helping to improve the life of the 'poor' and, second, when the knowledge, ideas, interests and needs of the final beneficiaries are disregarded in the innovation process. It follows that criteria such as *inclusion by intention* or *consumption* alone do not reflect equity in innovation processes and, therefore, are not sufficient to catalogue an innovation as inclusive.

In consequence, redistribution and recognition (as two distinct analytical standpoints), combined in an integrative (and not additive) way, provide a better account of the material and symbolic dimensions of equity in inclusive innovation. Here, *redistribution* advocates for the alteration of social and physical environments through the distribution of material resources, while *recognition* advocates for the acknowledgement of cultural practices, traits, knowledge, and identities during the redistributive process. Therefore, innovation processes that are equitable not only push forward changes towards equalising resources, incentives, and benefits, but also revalue the identities of the beneficiaries by taking into consideration their knowledge, interests, ideas, and cultural practices.

2.2.2 Participation

In the innovation discourse, participation has been associated with the different roles that beneficiaries can take in the innovation process; for example, participation in the *consumption, production* or *distribution* of innovations – as portrayed in the ladder of inclusion (Heeks et al., 2014). Nonetheless, these forms of participation do not necessarily respond to the concerns that gave origin to this construct. They do not indicate how or if the final beneficiaries are shaping an innovation process that would lead to improvements in their life quality and

wellbeing. In this regard, the principle of 'parity of participation' (Fraser, 2001) can help to have a more tailored conceptualisation of participation in inclusive innovation.

Fraser's concept of 'parity of participation' refers to the social arrangements that enable people to participate as equal peers in public life – across economic, cultural and political domains (Fraser, 2001). Although this principle is part of a broader theory of social justice, it emphasises equal participation in the material and symbolic reproduction of social life. In this regard, it highlights the preservation of people's independence and voice, and advocates for equal respect for all the participants in any social processes (Fraser, 2001: 34). As innovation is a social process where different stakeholders' views, valuations and interests interplay, and where social dynamics such as knowledge exchanges, learning processes, and power relations take place, parity of participation can be extended into this domain to safeguard the equal participation of inclusive innovation's beneficiaries.

Inclusive innovation is a construct that pivots on the role of the beneficiaries in the agenda-setting, the development of the innovations and innovations' impacts on their wellbeing and life quality. In this respect, participation framed in terms of parity emphasises beneficiaries' role as equal partners in the innovation process. Hence, contrary to previous approaches to participation (e.g., in the *consumption*, *production* or *distribution* of innovations), parity of participation (coupled with recognition and redistribution) places the interests, knowledge and ideas of the beneficiaries as steering elements in a process that seeks to bring a positive impact in their life quality and wellbeing.

In summary, this section discussed how recognition, redistribution and parity of participation can allow for a more tailored conceptualisation of equity and participation in inclusive innovation. First, redistribution and recognition, as two dimensions of 'equity', advocate for the alteration of social and physical environments through a rearranged distribution of material resources that is guided by the recognition of cultural practices, knowledge, ideas, and the

identities of those who are excluded. In other words, innovations that are equitable affect the lives of their final beneficiaries by enabling a rearranged material distribution while recognising their interests, knowledge ideas and cultural practices.

Table 4.1 Normative principles in inclusive innovation processes

Inclusive Innovation	*Equity*	Recognition	Recognition of beneficiaries' cultural practices, traits, knowledge and skills
		Redistribution	A rearranged distribution of material resources that improves beneficiaries' life quality and wellbeing
	Participation	Parity of participation	Beneficiaries' participation in the innovation process as equal partners

Source: Author's elaboration.

Second, the principle of 'parity of participation' highlights the idea that any participation throughout the innovation process should acknowledge beneficiaries' agency. Therefore, the normative principles of *equity* and *participation*, used in a symbiotic way, advocate for processes where the beneficiaries take part as equal partners in developing innovative goods and services that improve their well-being and life quality. More specifically, for processes that accomplish a material and symbolic redistribution through innovation while having beneficiaries' interests, knowledge, and ideas as steering elements.

3. Towards an evaluative framework for inclusive innovation: Equity, participation, and perceived basic needs

The previous section explained how the principles of redistribution and recognition, and parity of participation can serve as conceptual vehicles to redefine *equity* and *participation* in inclusive innovation. As this chapter advances the

argument that inclusive innovation should be assessed on its potential to cater to the needs of excluded populations, this section discusses the *basic needs* approach as a way forward to provide an evaluative framework for innovation that encompasses both the normative and pragmatic dimensions of inclusive innovation.

The argument will be made that the basic needs approach (BNA) constitutes a powerful conceptual companion to the principles of equity and participation as it gives priority to meeting people's basic needs. That is to say, it prioritises "ensuring that there are sufficient, appropriately distributed basic needs and services to sustain all human lives at a minimally decent level" (Wolff, 2009).

The basic needs approach – which refers to all the natural (e.g., nutrition, health, life) and social (e.g., education, housing, etc.) elements required for a flourishing life (Wolff, 2009: 215) – has been widely used as a tool to understand and assess interventions in development. However, the approach has not been immune to criticism. This BNA leaves questions such as 'how to define basic needs' and 'at what level are those needs considered basic' unanswered due to the high level of subjectivity imprinted in the approach (Grynspan and López-Calva, 2011). This flexibility, nevertheless, makes the approach useful to evaluate the extent to which innovation processes reflect the interests of its beneficiaries and contribute towards improving their lives.

As remarked earlier in the chapter, inclusive innovation relates to the position of the final beneficiaries, making the improvement of their lives a focal point of its motivations, processes, and outcomes. This focus entails context-sensitive approximations to the disadvantages experienced by the beneficiaries, and the recognition of heterogeneity among people as well as of other aspects related to wellbeing lying in the realm of the subjective. Therefore, to provide a conceptual ground to answer the questions of *what needs need to be met and how*, we propose to combine the BNA with a subjective approach to wellbeing.

'Subjective wellbeing' refers to individuals' evaluation of their positive and negative experiences regarding their satisfaction with life and their degree of

perceived happiness (Guardiola and García-Muñoz, 2011). Individuals evaluate their level of subjective wellbeing depending on their circumstances, but also by comparing themselves with others, and with past experiences and future expectations (Frey and Stutzer, 2002).

By adding a subjective approach to the framework of basic needs, it is possible to delve into individuals' personal valuations regarding what they consider are their basic needs. Consequently, 'perceived basic needs' – defined as the needs perceived by individuals as necessary to have a flourishing life (Guardiola and García-Muñoz, 2011) – in combination with equity and participation can provide the normative and pragmatic grounds to assess inclusive innovations. The introduction of this subjective valuation brings to the fore the issue of *whose needs* are met by these innovations and *how*. Moreover, this subjective dimension enables the historically, socially, and culturally contextualisation of these needs because the beneficiaries' commodities, sources of livelihood and environment are taken into consideration.

Table 4.2 Normative and pragmatic criteria to assess inclusive innovation

Inclusive Innovation			
Normative dimension	*Equity*	Recognition	Recognition of beneficiaries' cultural practices, traits, knowledge, and skills
		Redistribution	A rearranged distribution of material resources that improves beneficiaries' life quality and wellbeing
	Participation	Parity of participation	Beneficiaries' participation in the innovation process as equal partners
Pragmatic dimension	*Perceived basic needs*		The needs perceived by individuals as necessary to have a flourishing life

Source: Author's elaboration.

Considering the arguments presented thus far, inclusive innovations would:

- Enable the alteration of social and physical environments through a rearranged distribution of material resources to cater to the perceived needs of excluded populations;

- Promote a material redistribution guided by the recognition of cultural practices, traits, knowledge, and identities of excluded populations; and
- Incorporate excluded populations as equal partners in the processes of developing such innovations.

In this respect, to assess innovation in terms of its inclusiveness, any innovation can be placed along two perpendicular axes: a *normative axis* (X) which refers to the dimensions of equity and participation, and an *evaluative axis* (Y) which refers to the fulfilment of the beneficiaries' perceived needs as shown in Figure 4.2.

Figure 4.2 Evaluative and normative axes to assess innovation in terms of inclusion

Evaluative Axis

Beneficiaries' Perceived
Basic Needs as drivers

1 Innovation for Development	**2** **Inclusive Innovation**
3 Conventional Innovations	**4** Innovation for Development

Normative Axis

Participation through consumption

Equity & Participation in the process

Other stakeholders' interests as drivers
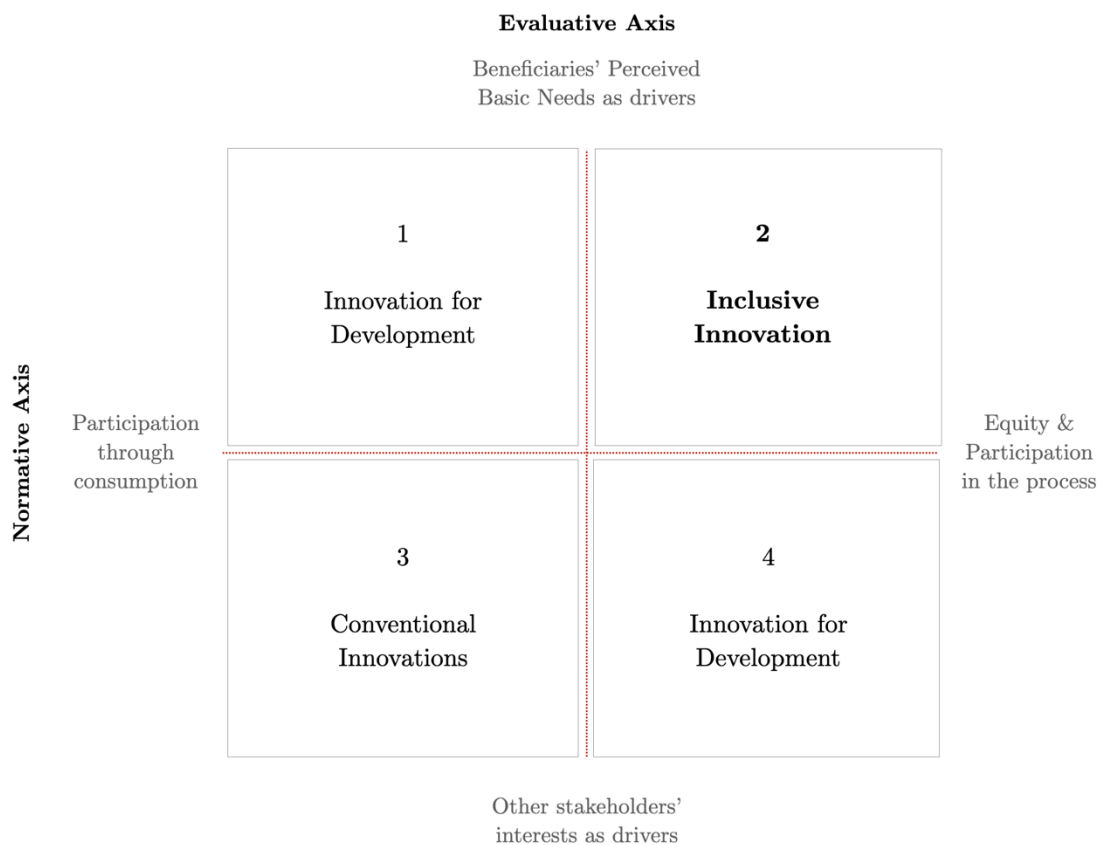
Source: Author's elaboration.

Inclusive innovations would fit within quadrant 2. These innovations not only cater to the perceived needs of excluded populations but are also developed through equitable and participatory processes where excluded populations'

interests and agency are recognised. Other forms of innovation that seek to cater to the perceived basic needs of excluded populations (quadrant 1) can be catalogued as 'innovations for development' since they may contribute to the improvement of the life quality and wellbeing of excluded groups without necessarily incorporating them as equal partners in the innovation process.

The innovations that do incorporate the beneficiaries as equal partners in the process, but whose final aim is not to cater to the perceived needs of these populations (quadrant 4), may achieve the alteration of social and physical environments but not necessarily through the rearranged distribution of goods, services and benefits. In this regard, they may contribute to a broader development agenda but not necessarily by catering to the beneficiaries' basic needs[22]. Lastly, we catalogued as conventional innovations (quadrant 3) those innovations that do not cater specifically to excluded populations perceived basic needs and include the final beneficiaries solely as consumers of goods and services.

In the following section, this framework will be applied to a range of innovation models for development discussed in the extant inclusive innovation literature as a means to substantiate this conceptual contribution before using this framework to assess the innovation projects analysed in this PhD.

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[22] A few examples of these innovations are the ones developed in spaces where citizens come together to address urban problems. The case of the Laboratorio para la Ciudad (i.e., City Laboratory in Mexico City) and Citilab167, a centre for social and digital innovation in Cornellá de Llobregat in Barcelona, constitute interesting referents of physical spaces where participatory methodologies are deployed to train citizens, foster their participation in research projects and develop business and social initiatives to tackle problems in their urban environments. Citilab167's work is directed to enable universal access to innovation through individual and community innovation literacy. The initiatives led by the Laboratorio para la Ciudad allowed the development of 52 web and smartphone apps to tackle urban problems in Mexico City. The innovations developed in these spaces recognises citizens' full interests and agency, but they do not necessarily aim to cater to the needs of populations excluded from observed living standards in these territories.

4.   Models of innovation for inclusive development

Models of innovation have been drawn into the focus of 'inclusive development' or 'shared prosperity' as a response to the increasing inequality associated with mainstream innovation (Heeks et al., 2014; Lazonick and Mazzucato, 2013). This shift prompted the gain in prominence of categories such as *grassroots innovations* (Gupta, 2013; Seyfang and Smith, 2007); *bottom of the pyramid* (Prahalad, 2009; Prahalad and Hart, 2002); *inclusive business (BIF, 2011; Gradl and Knobloch, 2010; Wach, 2012)*; *appropriate technologies* (Jequier, 1976); *below the radar innovations* (Kaplinsky et al., 2009); *pro-poor innovation* (Chataway et al., 2010; Hanlin and Muraguri, 2009); *and social innovations* (Dagnino, 2009) in both academic and policy arenas.

These models[23] are an abstraction from and a simplification of reality. They aim at making it easier to understand, communicate, discuss and prioritise certain innovation interventions (Heeks et al., 2014). Although these models have been catalogued in general terms as 'models for inclusive innovation', the argument will be made that some of these models' framing-in-use (i.e., the particular way in which they are circulated and applied) reflect some norms and values that underplay beneficiaries' interests and needs as steering elements of the innovation process. Consequently, these models are revisited in this section using the lenses of equity and participation to discuss the extent to which they place beneficiaries' interests and needs as steering elements in the innovation process.

4.1.   Inclusive innovation models

Grassroots innovation

This model is based on an integrated bottom-up approach where collaborative work and partnerships create conducive environments for the emergence of

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[23] The choice of the category 'models' follows the publication of the special issue on Models of Inclusive Innovation for Development (Heeks et al., 2014) in the Journal 'Innovation and Development' 4 (2), Taylor & Francis Publisher.

innovation. As defined by Smith and Stirling (2017), grassroots innovations are "a diverse set of activities in which networks of neighbours, community groups and activists work with people to generate bottom-up solutions for sustainable developments; novel solutions that respond to the local situation and interest and values of the communities involved; and where those communities have control over the process and outcomes (Gupta et al., 2003; Seyfang and Smith, 2007)" (2017: 67). Here, grassroots organisations are a source of innovative diversity that extends the potential for community development (Buitrago-Guzmán and Reynolds-Cuellar, 2018).

The coordinated activities that give rise to innovations are instigated and governed from the bottom. In this regard, social learning processes and social networks within the community that respond to the local context and challenges faced by grassroots organisations are relevant features of this model.

It follows that grassroots innovation efforts are often directed towards developing goods and services that meet the needs of the communities that both foster and participate in the development of these innovations (Buitrago-Guzmán and Reynolds-Cuellar, 2018).

Bottom of the Pyramid (BoP)

The BoP model relies on a proposition of mutual value generation. That is to say, the greater availability of the enterprise to meet the needs of the poor, the greater the return to the partners involved. In this regard, a BoP venture generates revenue by either selling goods to BoP consumers or sourcing products by BoP producers (Antúnez-de-Mayolo, 2012). Here, firms can leverage their capabilities in terms of engineering skills and connect them with the capabilities of local actors through local networks and distribution channels.

This model follows from a consumption-side vision focused on product innovation that argues that poverty can be alleviated through businesses (Iizuka and SadreGhazi, 2011). More specifically, the BoP perspective relies on the view that unmet social needs are also potential business opportunities (Antúnez-de-

Mayolo, 2012). Thus, low-income populations are attractive markets for firms if they serve them with products and services that are useful for them (Prahalad, 2009; Prahalad and Hart, 2002).

Inclusive business

This model entails creating a net positive development impact through a financially profitable business model (Wach, 2012). More explicitly, inclusive business is defined as a "profitable core business activity that also tangibly expands opportunities for the poor and disadvantaged in developing countries". (BIF, 2011; Wach, 2012). This model focuses on poverty alleviation by promoting the development of businesses where poor populations benefit not only as consumers but also as producers, entrepreneurs and employees (Gradl and Knobloch, 2010).

Here, poor populations are integrated into value chains, both on the supply and demand sides through partnerships and mutual value creation (UNDP, 2008). As opposed to other models, like bottom of the pyramid innovations, inclusive business encourages activities that lead to income generation and capacity building to help poor communities to be active parties in the production of innovations. Furthermore, this model seeks the development of useful and affordable products and services to facilitate their consumption by these groups.

Appropriate technologies

Appropriate technologies refer to a "wide range of low-cost technologies aimed specifically at meeting the most basic needs of the world's poorest people, addressing their fundamental problems [...]" (Jequier, 1976: 541). More specifically, these technologies "are appropriate for low-income countries in that they are labour-intensive, simple to operate and repair, producing products for low-income consumers at small scale and with minimally harmful impact on the environment" (Kaplinsky, 2011: 195-196).

According to Kaplinsky (2011), the appropriate technologies models emerged as an ethical response to the prevalence of poverty as opposed to being driven by the pursuit of growth through the development (and use) of more profitable choices of technology. Consequently, some of the most salient features of the technologies developed under this model are their capacity to be well adapted to the local environment, be small in scale, self-reliable, and sustainable (Thomas, 2012).

Below the radar innovation (BRI)

This model situated the processes of innovation 'for' and 'by' the poor in the current global context by shedding light on the innovations developed in emerging countries aiming to solve problems that are specific to those contexts (Kaplinsky *et al.*, 2009). Cozzens and Sutz (2014) suggest that the origin of this model can be traced back to three inter-related trends: shifting capabilities (towards science and technology capacity in low-income countries), shifting markets (with growing numbers of low-income households that have disposable income), and a distinctive, if not new, set of labour conditions (that characterise the environments in which new innovators manufacture the products they introduce).

As Clark *et al.* (2009) suggest, there are parallels between BRI and appropriate technologies as the former is the maturation of many of the ideas of the appropriate technologies movement. For example, those of blending simple technologies with advanced ones and drawing on local knowledge and available technologies to generate innovations by and for low and middle-income groups (Papaioannou, 2014a).

Pro-poor innovation

According to Cozzens and Sutz (2014), this model highlights public research institutions and universities' invention efforts that target low-income users. These efforts are geared to produce products for the poor while incorporating them as producers through public-private partnerships (Chataway et al., 2010). Unlike

previous models, pro-poor innovation entails a "multi-stakeholder social learning process that generates and puts to use new knowledge, and [...] expands the capabilities and opportunities of the poor" (Berdegué, 2005: 15). In this regard, the model fosters collaborative efforts among public R&D entities, industry, universities, non-governmental organisations, donors and global networks (Knorringa et al., 2016).

Social innovation

This model emphasises society's participation in the collective creation of heterogeneous networks and hybrid organisations (Amanatidou et al., 2018; Edwards-Schachter and Wallace, 2017) to develop new goods and services through the combination and/or configuration of social practices, the transformation of social relations and the revival of social values. These new configurations allow the development of technologies that seek to improve the life quality of its final users rather than the generation of profit (Dagnino, 2009; Cozzens and Sutz, 2014).

Other models

In the special issue titled 'New Models of Inclusive Innovation for Development' (Innovation and Development Journal), Heeks, Foster and Nugroho (2014) introduced a set of 'new models' of inclusive innovation. These models included 'innovation platforms', which are mechanisms to bring together a group of stakeholders that seek to address a particular issue of common interest (Cullen et al., 2014; Swaans et al., 2014); 'cluster innovation', which refers to the innovation that takes place within a co-located group and cannot be attributed to any individual because it emerges from a process of group learning (Voeten and Naudé, 2014); 'user–producer interaction' which refers to the innovation that occurs in the connection between producers and consumers (Foster and Heeks, 2014); and, finally, 'frugal innovation', which refers to the innovation that minimises resource

usage, cost and complexity in the production, constitution and operation of new goods and services (Papaioannou, 2014a).

4.2. Equity, participation, and perceived basic needs in inclusive innovation models

The models discussed in the previous section have been instrumental in advancing our understanding of the different ways in which innovation for inclusive development can be carried out. However, approaching these models using the lens of equity, participation, and perceived basic needs can help us identify to what extent these models place beneficiaries' interests and needs as steering elements in innovation processes and, consequently, distinguish between *innovation models for inclusive development* and *inclusive innovation models.*

4.2.1. Equity: Redistribution and recognition

In general terms, most of the models described in the previous section aim to generate changes in beneficiaries' social and material environments through a rearranged distribution of material resources. However, in the case of models such as the BoP, redistribution is not guided by the recognition of cultural traits, knowledge, and identities of the beneficiaries since the focus of this model is on making goods and services more affordable for poor populations.

As opposed to BoP's focus on product innovation, grassroots and social innovations promote the creation of technologies that respond to the interests and values of communities that both benefit from and participate in their development. Inclusive business, in a similar vein, seeks to create a net positive development impact through business models where excluded populations participate as producers, entrepreneurs, and employees. In that sense, this model also incorporates the skills and knowledge of the beneficiaries in the innovation process. Pro-poor innovation models promote partnerships and collaborative efforts among different stakeholders (primarily R&D entities, industry,

universities, non-governmental organisations). However, although these partnerships can incorporate excluded populations' knowledge and skills, the focus of this model is on other actors' (R&D entities, industry, NGOs, universities) coordinated actions to expand capabilities and opportunities for the 'poor'.

Lastly, appropriate technologies and below the radar innovation also attempt to achieve a material redistribution of resources by solving the problems and meeting the needs of excluded populations (primarily in the emerging countries). However, recognition is subject to the incorporation of the knowledge, skills, and interests of the beneficiaries in the process. Hence, appropriate technologies and below the radar innovation can promote a material redistribution that may or may not be guided by the recognition of cultural practices, traits, knowledge, and identities of excluded populations depending on two aspects: first, which stakeholders are involved in the case of BRI and, second, how and who defines 'appropriateness' in the case of the appropriate technologies model.

4.2.2. Parity of participation

The participation of beneficiaries in innovations processes can take place in different ways depending on the model. While in grassroots innovation and social innovations models, the beneficiaries govern and control the activities, in the bottom of the pyramid model, the beneficiaries are seen as consumers of cheap goods and services mainly developed by firms.

The inclusive business model sees beneficiaries as consumers, producers, and entrepreneurs, in a similar fashion to pro-poor innovations, which regard the beneficiaries as partners to develop these innovations. Appropriate technologies and below the radar innovations promote the involvement of NGOs and local communities. However, contrarily to other models, their role may have a dual nature (active producers or passive consumers) depending on whether the beneficiaries are considered equal partners or not in the innovation process, even if they have different roles along the innovation cycle. Table 4.3 presents a synthesis of this assessment.

Table 4.3 Models of innovation for inclusive development and inclusive innovation models

	Actors	Equity		Participation	Origin	Model
		Recognition	Redistribution			
Grassroots innovation	• Non-profit organisations, activists, private actors and communities	• Emphasis on local talent • Local knowledge and technology • Responds to interests and values of communities	• Locally embedded innovation to improve people's lives.	• Activities are governed from the bottom. • Community owned and controlled innovation	Bottom-up	Inclusive innovation model
Bottom of the Pyramid	• Western multinationals and MNCs in emerging economies	• Beneficiaries are passive consumers	• Products and services to cater for low-income communities' needs	• Low-income communities as attractive markets (i.e., consumers)	Top-down	Conventional innovation
Inclusive Business	• Partnerships to develop the innovations	• Partnerships and co-creation of value	• Poverty alleviation, income generation and capacity building	• Beneficiaries are consumers and producers, entrepreneurs and employees	Top-down and Bottom-up	Inclusive innovation model
Appropriate technologies	• Entrepreneurs in the informal sector and	• Beneficiaries can take part on the process as equal	• Meeting the most basic needs of the world's poorest	• Beneficiaries can participate in the design, development,	Bottom-up	Dual nature: can be an inclusive innovation model if beneficiaries

	formal sector, ONGs	partners where their knowledge and skills are seen as equally valuable		production, distribution of innovations		participate as equal partners in the process
Below the Radar Innovations	• Stakeholders in emerging countries	• Innovations for the poor (mostly)	• Innovation to solve the problems that are specific to emerging countries	• Beneficiaries can participate in the design, development, production, distribution	Top-down and Bottom-up	Dual nature: can be an inclusive innovation model if beneficiaries participate as equal partners in the process
Pro-poor innovation	• Public–private partnerships to develop innovations, University research	• Innovations for and by the poor in general	• Innovation to alleviate situations of social exclusion and to reduce inequalities	• Poor as producers through partnerships with other stakeholders	Top-down and Bottom-up	Dual nature: can be a model of inclusive innovation if beneficiaries participate as equal partners in the process
Social innovation	• Community-based innovation connected to marginalised populations	• Power and control remain on the hands of the communities	• Problem-solving oriented innovation	• Locally/community owned	Bottom-up (mostly)	Inclusive innovation model

Source: Author's elaboration.

4.2.3 Perceived basic needs

The models described aim to cater to the needs of excluded populations. However, the definition of these needs will vary depending on who is defining them. Firms (as in the case of BoP models) may define these needs differently from Universities, ONGs, and Governments (as in the case of pro-poor innovations). Hence, we argue that when *equity* and *participation* guide an innovation process, it is more likely that the outcome will cater to the needs identified as basic and unmet by the beneficiaries. This is exemplified in the case of grassroots innovations, social innovations, and inclusive business models where the innovation process is controlled and governed from the bottom by local communities.

In a similar fashion, appropriate technologies, below the radar innovations and pro-poor innovations hold the potential to cater to the perceived basic needs of excluded populations. Nevertheless, if equity and participation are not guiding principles in the process, innovations carried out through these models may still serve a development agenda but would be less likely to be considered inclusive. Figure 4.3. places these models along the normative and evaluative axes discussed in section 3.

Figure 4.3 A classification of the models of innovation for inclusive development according to equity, participation, and perceived basic needs

Evaluative Axis

Beneficiaries' Perceived
Basic Needs as drivers

Grassroots Innovation

Appropriate Technologies

Inclusive Business

Below the Radar

Social Innovation

Pro-poor Innovation

Normative Axis

1

2

Participation
through
consumption

Equity &
Participation
in the process

Bottom of the
Pyramid

3

4

Other stakeholders'
interests as drivers
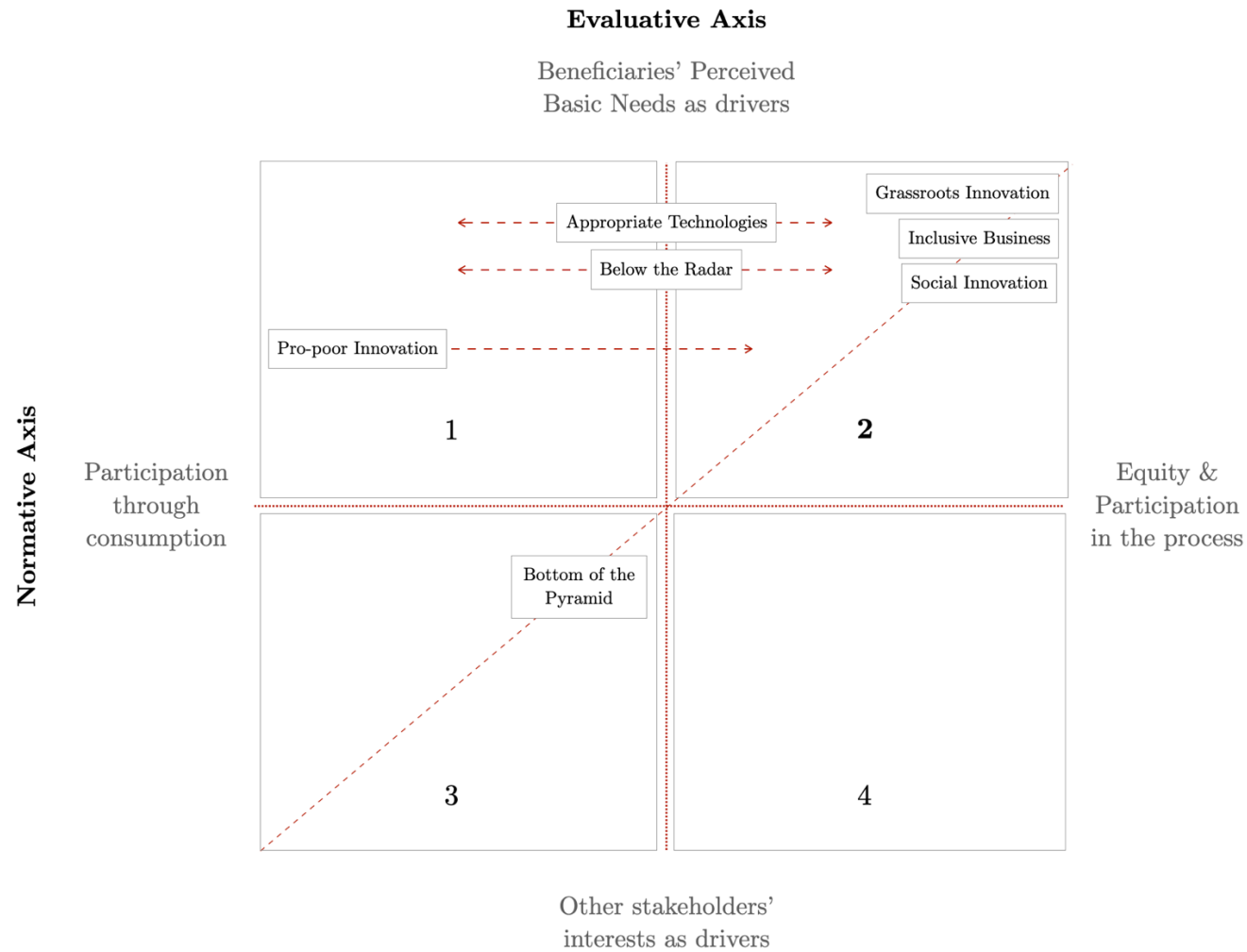
Source: Author's elaboration.

4.2.4   A note on other models

Heeks, Foster and Nugroho (2014) introduced 'innovation platforms', 'cluster innovation', 'user–producer interaction' and 'frugal innovation' as new models of inclusive innovation. We propose that *innovation platforms* and *cluster innovations* can be seen as mechanisms to foster the development of innovation in a participatory and equitable way. However, their intrinsic characteristics are insufficient to catalogue them as models for inclusive innovations.

Furthermore, 'user–producer interaction' and 'frugal innovation' are potential features of inclusive innovations and not models in themselves. Resource usage, cost and complexity can be minimised during the development of inclusive innovations, and connections between producers and consumers can take place during these processes. Both features do not determine whether an innovation is inclusive or not. On the contrary, they can also be features of other forms of innovation that do not aim to cater to the needs of excluded populations or are not participatory nor equitable.

In summary, the assessment of these models using the lens of equity, participation and perceived basic needs leads us to conclude that *grassroots innovations*, *social innovations*, *inclusive business* can be classified as models for inclusive innovation. Whether *below the radar innovation*, *appropriate technologies* and *pro-poor innovations* fit or not within this category would depend on the acknowledgement of beneficiaries as equal partners in the innovation process.

Bottom of the pyramid is outside the scope of our re-definition of inclusive innovation as only material redistribution is likely to be achieved through this innovation model. Finally, *cluster innovation* and *innovation platforms* are mechanisms that can be paired with any of the models described above to develop innovations in a participatory and equitable way. Similarly, *user-producer interaction* and *frugal innovations* are features that can be present in any of the

models described above but are not exclusive of innovation models for inclusive development.

5. Towards an evaluative framework for inclusive innovation: Empirical illustrations

Twelve research projects developed within the framework of the Peruvian National Programme for Competitiveness and Productivity (Innóvate Perú) between 2008 and 2017 were analysed in this PhD (please, see Table 4.4 and Chapter 3 for more details). These projects we funded to contribute to the overarching goal of intensifying scientific knowledge and technological development through the co-funding of applied research projects. The empirical data collected from these projects was analysed employing the framework proposed in this chapter to assess if they fit within the category of innovation for development, but more specifically within the inclusive innovation one.

Table 4.4 Innovation projects developed in partnership with a university

Code	Project
1	– Desarrollo de tecnologías para enlaces inalámbricos de larga distancia en zonas rurales – Development of technologies for long-distance wireless links in rural areas
2	– Chocolate solar: desarrollo de un sistema automático y ecológico para la elaboración de pasta de cacao de calidad como una alternativa nutricional para las comunidades de Huyro en Cusco – Solar chocolate: Developing an automatic and ecological system for the production of quality cocoa paste as a nutritional alternative for the communities of Huyro in Cusco
3	– Desarrollo de cocinas a gas (GLP y GN) residencial y comercial de alta eficiencia térmica, bajas emisiones ambientales y bajo coste para un rango de altitud entre 2,000 y 4500 msnm. en nuestras ciudades y comunidades del Perú – Development of residential and commercial gas stoves (LPG and NG) with high thermal efficiency, low environmental emissions and low cost for an altitude range between 2,000 and 4500 masl. in our cities and communities in Peru
4	– Desarrollo de un proceso para la regeneración autóloga de heridas empleando un soporte orgánico de bajo costo – Development of a process for autologous wound regeneration using low-cost organic support
5	– Elaboración de silla de ruedas para niños con parálisis cerebral – Developing a wheelchair for children with cerebral paralysis

6	– Climatización y otros beneficios de confort de habitabilidad de construcciones geodésicas, especialmente domos, mediante materiales de cambio de fase que almacenan calor y frio – Climate control and other comfort benefits of geodesic constructions, especially domes, through phase change materials that store heat and cold
7	– Desarrollo de biosensores para la detección de tuberculosis basados en nanoestructuras de carbono – Developing biosensors for TB detection based on carbon nanostructures
8	– Desarrollo de un monitor de signos vitales de bajo costo utilizando tablet y con conexión a la nube – Development of a low-cost vital signs monitor using tablet and cloud connection
9	– Propuesta técnica de confort térmico para viviendas en comunidades localizadas entre 3000 y 5000 msnm – Technical proposal for thermal comfort for homes in communities located between 3000 and 5000 masl.
10	– Desarrollo e implementación de un sistema de monitoreo ambulatorio con tecnología celular para la detección oportuna de arritmias y eventos coronarios: una contribución para el diagnóstico precoz a cardiopatías en el Perú – Development and implementation of an ambulatory monitoring system with cellular technology for the timely detection of arrhythmias and coronary events: A contribution to the early diagnosis of heart disease in Peru
11	– Sistema automático de diagnóstico de parásitos intestinales a través de imágenes digitales – Automatic system for the diagnosis of intestinal parasites through digital imaging
12	– Desarrollo de un equipo automático para lecturas de placas, mods, y un sistema web en línea para el diagnóstico rápido y remoto de tuberculosis y la determinación de suceptibilidad a drogas – Developing automated plaque reading equipment, mods, and an online web-based system for rapid and remote diagnosis of tuberculosis and determination of drug susceptibility

Source: Author's elaboration.

As shown in Figure 4.4, the projects developed in partnership with three Peruvian universities fit within the broad category of innovations for inclusive development as all of them have procured an alteration of social and physical environments through the distribution of material resources that improved the life quality and wellbeing of the final beneficiaries. However, although these projects sought to cater to the perceived needs of the final beneficiaries, only seven fit strictly within the inclusive innovation parameters proposed in this chapter. These seven projects achieved a material redistribution that catered to the perceived needs of the beneficiaries while acknowledging their cultural practices, traits, knowledge, and identities during the innovation process.

This assessment shows that the outcomes of these projects that contribute to a development agenda can be placed within a *spectrum* where excluded populations can be benefited as users or can actively participate in equal conditions in the innovation process. The following sections present a systematisation of the analysis' findings, which are presented around the normative and evaluative axes discussed in this chapter.

Figure 4.4 Assessment of the innovation projects in terms of inclusion

Evaluative Axis

Beneficiaries' Perceived
Basic Needs as drivers

Projects
4, 7, 10, 11 and 12

Innovation for
Development

Projects
1, 2, 3, 5, 6, 8 and 9

**Inclusive
Innovation**

Participation
through
consumption

Normative Axis

Equity &
Participation
in the process

Conventional
Innovations

Innovation for
Development

Other stakeholders'
interests as drivers
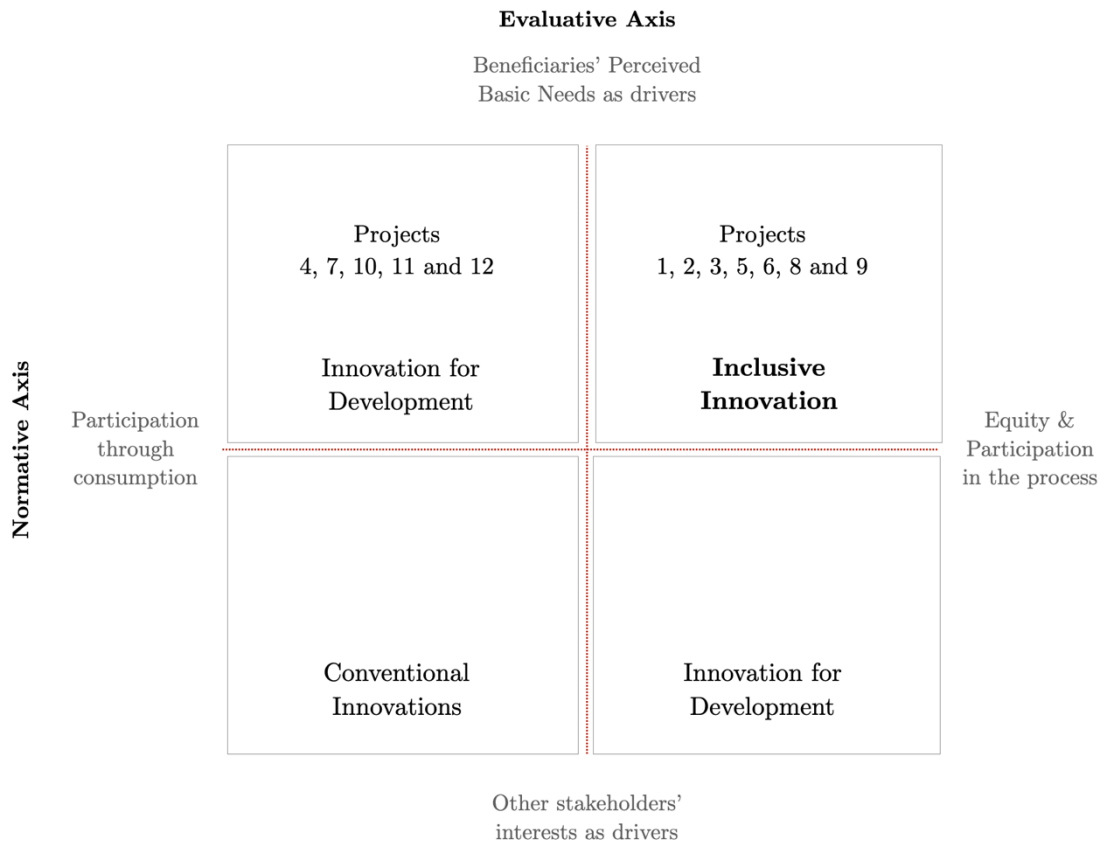
Source: Author's elaboration.

5.1. Equity and participation

5.1.1. Redistribution

The twelve projects studied in this PhD attempted to achieve some material redistribution (i.e., the alteration of social and physical environments through the rearranged distribution of material resources) with different degrees of success. Four themes were identified in the projects' Principal Investigators (PIs)

testimonies regarding the motifs and implications of redistribution. First, redistribution can be triggered by the absence of a market response to the demands of low-income populations and by the 'un-done' technology that could have met the country's particular geographical requirements. Second, redistribution of immaterial resources is as consequential as the redistribution of material ones. Third, the practises underpinning redistribution prompt the questioning of the conventional ways in which basic services are provided in deprived areas. Fourth, the government role in redistributing cannot be limited to the mere provision of funding for these initiatives. These themes are explained in detail below.

What triggers the attempts to redistribute?

On the one hand, the principal investigators interviewed pointed to the absence of technologies that fit the needs of low-income populations. They identified that, often, the industry sees investing in the development of valuable and affordable products for low-income groups as unnecessarily expensive because they considered that market 'unattractive'.

The analysis unveiled that the processes of *tailoring* and *adapting* highlighted by the PIs during the interviews did not entail only reducing the cost, resource use and price of these innovations, but the *invention* of new devices that are appropriate for the settings in which low-income populations live. Peri-urban areas and slums in Peruvian cities often lack electricity and water provision infrastructure, roads, and interconnected transport systems. Therefore, in the case of devices such as the special chair for children with cerebral paralysis (Project 5) and the low-cost vital signs monitor (Project 8), it was not a matter of simplification or adaptation but of designing new devices that would be appropriate for these settings.

The researchers interviewed also indicated that there exist a wide range of technological devices and other products that are not suitable for particular areas in the country due to their geographical characteristics – e.g., high-altitude

(>2,500 m.a.s.l.), lack of roads (because of the country's topography), low-temperatures in the Andean region, among others. They identified that the industry was not interested in producing devices that would function in these geographical settings because rural and urban areas in the Andes and Amazon have a low-income distribution and, consequently, lower purchasing power compared to coastal urban areas in the country. Additionally, the PIs emphasised that some devices needed certain features that were not 'on the radar' of the producers (e.g., self-management functionalities for reutters to be installed in the Amazon Forest in the case of Project 1) and that the geographic barriers continue to be a significant constraint for the development of regions in the Peruvian Andes and Amazon.

What needs to be redistributed?

These projects focused on a wide range of problems including the provision of decent housing, energy, connectivity, healthcare, and the creation of local technologies to support local processes of development in rural and peri-urban areas in Peru. Consequently, they attempted to achieve a material redistribution to improve the quality of life of the beneficiaries. However, the researchers interviewed also remarked an immaterial redistribution related to capabilities was also urgently needed.

They acknowledged that the public funding for innovation projects is highly concentrated in the capital of the country. This concentration prevents universities in other regions and local actors from benefitting from the spillovers of these projects. Hence, they regarded it as one of the main challenges for developing research and training capabilities in other universities in the Andes and Amazon of Peru. In this regard, they remarked that redistributing monetary resources to create local and regional capabilities in addition to fostering cooperation between universities could be a major factor in fulfilling this purpose.

What are the implications of redistributing?

Another theme that emerged from the interview data is that redistribution demands to rethink how basic services are provided in deprived areas. To exemplify this point, the researchers behind the development of devices supporting access to healthcare through telemedicine (Projects 8 and 10) argued that it is imperative to rethink how healthcare reaches people in rural areas. More specifically, they argued that the geographical barriers and the lack of medical staff and hospitals in these areas should lead us to question how practitioners are being trained, how the medical acts are performed, and how the patients can interact with medical staff through cloud technologies.

The case of the low-cost vital signs monitor (Project 8), for instance, taught researchers that medical practices and people's understanding of them needed to change. The communities that benefited from these technologies do not have immediate access to medical facilities. Therefore, the device required that the people living in the communities do the ultrasound screening themselves and send the images to the closest medical centre for diagnosis. These processes entailed not only the adaptation of citizens and medical professionals to new procedures, but also the re-examination of their preconceptions about medical acts.

Who should support material and immaterial redistribution and how?

The interviewees argued that private firms are reluctant to invest in the design (or adaptation) of new technological devices that cater to the needs of geographically and economically excluded populations. Therefore, other actors need to intervene to catalyse and support researchers' efforts to alter social and physical environments through innovation. Here, the interviewees acknowledge the importance of the economic support provided by the government but argued that funding is not enough. In more detail, research teams for Projects 1, 2, 8 and 9 contacted other government entities like the Ministry of Health and the Ministry of Energy and Mining to help scale up these innovations after testing their devices.

These experiences led them to remark that the government's intervention in post-prototyping stages is fundamental for achieving this redistribution.

5.1.2. Recognition

As shown above, all the projects aimed to achieve material redistribution. Recognition, however, was not a variable present in the development of all of them. In general terms, this can be explained by the fact that some projects developed technological devices to be used by doctors or other professionals (like diagnostic equipment in the case of Projects 4, 7, 10, 11 and 12), which only prompted a relationship with the users of these devices but not with the final beneficiaries. Nevertheless, communities' cultural practices and identity traits were respected, and their knowledge and skills were incorporated when researchers worked directly with these groups (see below the Yachachiq methodology for more detail). The PIs argued that respecting cultural traits allowed them to initiate a working relationship with the communities, but more importantly, that maintaining this respect and incorporating their knowledge and skills allowed them to ensure their continuity.

Beyond the scope of the projects targeted, the researchers interviewed argued that the local knowledge and skills of researchers in local universities are not sufficiently recognised. As per their accounts, researchers in local universities are more knowledgeable about the characteristics of the areas of intervention, local customs, and practices, and yet they often do not get support in terms of funding and equipment to carry out R&D projects that could improve the lives of marginalised communities in rural areas of Peru.

5.1.3. Parity of participation

Parity of participation refers to the inclusion of the beneficiaries as equal partners in the innovation process. The analysis unveiled that parity of participation took place in two ways. First, through the application of a methodology called

'Yayachiq'. Yachachiq is a Quechua[24] word that refers to the local community leaders in the Andes of Peru. These community leaders were incorporated in the projects as technical experts and innovators, working closely with researchers in the definition of the problem and the development of the innovations. One of the main features of this methodology is its emphasis on knowledge exchange between community leaders and researchers. This knowledge is expected to flow to other members of the community in later stages, so the community can intervene in the maintenance and improvement of technologies developed over the course of the project.

This methodology was coupled with the implementation of a 'local knowledge centre' called 'Yachaiwasi', which means 'house of knowledge' in Quechua. These centres are physical spaces created by one of the universities (University 1) in partnership with Andean communities to develop local and appropriate technologies and train these groups in matters related to the developments of technologies for healthcare, energy efficiency and the preservation of the environment. These centres were created to maintain long-lasting relationships with the communities, design future interventions and address local problems by incorporating the knowledge, skills, and cultural practices of these groups. A key element that enabled the creation of these centres were the prior relationships some researchers (primarily from Project 2) had with specific communities, and the trust that was built up between these parties through smaller projects developed in the past.

Second, where researchers did not have a previous relationship with the communities, parity of participation took place through the revaluation and reorientation of the initial aims of the projects. Here, the requirements and interests of the communities became the steering elements for redefining the aim and type of intervention of these projects. For instance, the PIs of Projects 1, 3

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[24] Quechua is an indigenous language family spoken by people in the Peruvian and Bolivian Andes.

and 5 explained that after having a first encounter with the communities and beneficiaries, they reconsidered the project's initial objectives because they were originally defined based on the team's academic and social interests. For instance, in the case of project 1, researchers were interested in bridging of the digital divide between rural and urban areas. However, once researchers heard about the priorities of the community, they redefined the goals of the project to use wireless technologies to improve healthcare and education access.

5.2. Perceived basic needs

The projects identified a broad range of unmet basic needs in rural and peri-urban areas across Peru. In some projects, these needs were communicated directly by the communities and articulated by researchers due to the existence of communication channels (like the case of Yachaywasi centres). However, these channels did not exist in most of the projects. In these cases, researchers' previous experience (some of them worked in similar topics albeit not with the same communities) facilitated formulating projects that addressed the unmet needs of excluded communities.

Another factor that contributed to researchers' receptivity to the demands of these groups is their life stories. Some of the PIs interviewed come from poor backgrounds or grew up in rural areas. They acknowledged these factors as a source for their understanding of the pressing problems the beneficiaries of these innovations face (we delve into more detail about this factor in the next chapter). Lastly, the interview data indicated that the information they obtained from other actors with whom they collaborated during the development of their projects (e.g., doctors or international organisations working in those areas) allowed them to establish direct links between the objectives of the research project and the demands coming from the communities.

In summary, this section explained that redistribution can be triggered by the absence of a market response to the demands of low-income populations or the

un-done technology for geographically challenged areas like the case of the Andes and Amazon regions in Peru. Second, in the quest to use innovation as a vehicle to achieve a material redistribution, the government needs to provide a more holistic support to these projects, primarily during post-prototyping stages. Third, the analysis showed that *redistributing* also entails questioning the conventional ways in which basic services are provided in deprived areas as the technologies developed by the research teams are likely to reshape conventional roles and practices, primarily in the realm of healthcare provision.

Regarding recognition, respecting beneficiaries' cultural practices and identity traits enabled researchers to maintain long-lasting relationships with the communities, and the incorporation of their knowledge and skills led to the development of valuable and appropriate technological devices for this group. With respect to parity of participation, beneficiaries participated as equal partners in the innovation processes when they were seen as technical experts and innovators (the Yachachiq) and when physical spaces for knowledge exchange were reified during these processes. In other instances, parity of participation took place through the revaluation and reorientation of the initial aims of the projects based on the requirements of the communities.

Finally, regarding meeting the basic needs of the beneficiaries, the existence of channels of communication with the final beneficiaries facilitated the articulation of their demands in the initial stages of the projects. However, when these channels did not exist, researchers' expertise, previous experiences, and connexions with other actors (ONGs, international organisations and the government) facilitated a first assessment of the potential unmet needs that their projects could tackle.

6.   Chapter summary

The objective of this PhD is to explain how agency in universities unfolds to create favourable environments for inclusive innovation in existing innovation systems. This chapter contributed to this overall objective by proposing a redefinition of "inclusive innovation" that helps to distinguish it from other forms of innovation. In more detail, by building on the pathbreaking work of Papaioannou (2014a, 2014b), the chapter proposed a normative and evaluative framework to assess innovation in terms of inclusion. The framework was built upon the redefinition of the normative principles of *equity* and *participation* using Fraser's (1998, 2000, 2001) theory of justice. This redefinition was coupled with the *perceived basic needs approach* to evaluate the extent to which excluded populations' interests and needs are incorporated as steering elements in the innovation process. The framework was also conceptually and empirically tested; first, through the assessment of the innovation models for inclusive development discussed in the extant literature and, second, through the application of the framework to the twelve research projects analysed in this PhD.

The arguments presented in this chapter allowed us to propose that a favourable environment for inclusive innovation would prompt the development of innovations that *a)* enable the alteration of social and physical environments through a rearranged distribution of material resources to cater to the perceived needs of excluded populations; *b)* promote a material redistribution that is guided by the recognition of cultural practices, traits, knowledge and identities of excluded populations; and *c)* incorporate excluded populations as equal partners in the innovation process. The following chapter builds on these findings to address the second subsidiary question of this research, namely, 'what elements explain researchers' choices for knowledge production in inclusive innovation projects and how do researchers mobilise their agency to develop such projects?'.

Chapter 5

Making sense of choices for knowledge production in inclusive innovation

1. Overview

The **previous chapter** put forward a framework to assess innovation in terms of inclusion. This framework allowed the thesis to articulate the following proposition: An innovation can be deemed as inclusive if it *i)* enables the alteration of social and physical environments through a rearranged distribution of material resources to cater to the perceived needs of excluded populations; *ii)* promotes a material redistribution that is guided by the recognition of cultural practices, traits, knowledge and identities of excluded populations; and *iii)* incorporates excluded populations as equal partners in the innovation process, recognising their full interests and agency.

The alteration of social and physical environments, through a redistribution that contemplates *equity* and *participation,* entails a conscious decision to produce knowledge that caters to developmental aims. Bearing this in mind, **this chapter** is concerned with explaining what elements underpin researchers' choices for knowledge production in inclusive innovation projects, and how researchers mobilised their agency to develop such projects. To understand how these choices were made and how researchers acted on the basis of such choices, the chapter builds on the first stage of this PhD's conceptual framework – institutional elements and sensemaking – and its content is organised around three interrelated processes taking place during sensemaking: meaning creation, interpretation and enactment (Weick, 1995). More specifically, this framework is used to explain how

researchers in three universities generated plausible meanings to rationalise their actions in response to the introduction of a new funding scheme for STI projects, and how these meanings prompted their choices to produce knowledge for inclusive innovation projects and guided their actions.

Section 2 starts by explaining how meaning is created through 'attending' and 'bracketing' cues, and describes how these processes generated an initial sense of an unforeseen event (i.e., the introduction of a new public funding scheme for R&D). Section 3 describes how this initial sense was developed into a more coherent account aligned to researchers' values, beliefs, and role expectations, and explains how these elements influenced researchers' actions. Here, the chapter shows how these normative and cultural-cognitive institutional elements acted as frames for interpretation, used by researchers to make sense of what to do with and how to approach the funding made available by the Peruvian government. The purpose of these interpretations is to guide action towards an outcome. Therefore, the chapter concludes by elucidating how researchers mobilised their agency by repurposing a policy instrument initially designed to improve the innovation climate and leverage private investment in innovation into a vehicle to develop innovation projects that *tackled local problems* and *benefitted disenfranchised communities* in Peru.

2. Disrupted activities: Attending cues and creating meaning

Sensemaking is the process by which individuals give meaning to experience and take action on the basis of such meaning (Maitlis and Christianson, 2014; Mikkelsen and Wåhlin, 2020). It takes place when unexpected cues interrupt individuals' ongoing flow of activity and create uncertainty about how to act. These cues may follow situations, events, or issues from which the meaning is ambiguous and outcomes are uncertain; for example, environmental jolts, organisational crises, threats to organisational identity, planned organisational

change, or simply new or unforeseen events (Maitlis, 2005; Maitlis and Christianson, 2014). When such occurrences are noticed, people's flow of activity is interrupted, prompting the development of plausible meanings that guide actors' choices and actions (Maitlis and Christianson, 2014; Weick, 1995).

As explained in the description of the case (see Chapter 3), Peru's government support for research and innovation was limited in scale before the introduction of the Innovation, Science and Technology Fund (Fondo para la Innovación, Ciencia y Tecnología, or FINCyT-I) in 2007 and the Competitiveness Research and Development Fund (Fondo de Investigación y Desarrollo para la Competitividad, or FIDECOM) in 2009[25] (Bazán et al., 2014). According to the Executive Director of the National Innovation Programme for Competitiveness and Productivity (Innóvate Perú), the first call for projects (launched in 2007) received 400 applications when the programme only had a budget to fund 60 projects. This event led them to realise that "[t]here was an unsatisfied demand. Universities' research groups and businesses had not had funding for years, so there was a 'thirst' for funding" (Executive Director, Innóvate Perú).

An important feature related to the unprecedented nature of the funding was their scale. FINCyT-I was launched with "an endowment of USD 36 million to promote a wide range of programmes, the most important of which aimed at strengthening the research and innovation capacity of enterprises, universities and public research centres and promoting the collaboration among them" (OECD, 2011: 17). FIDECOM, on the other hand, was endowed with approximately USD 65 million to promote productive innovation with an emphasis on collaborative projects among firms, research institutes and universities (OECD, 2011).

The uniqueness of these policy instruments brought to the fore a series of cues that drew researchers' attention. For instance, Researcher C (U1) mentioned that "it was a great opportunity that, at that time [2007], the government started to launch calls for Science and Technology projects. That had never happened before,

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[25] Although the Ministry of Economy and Finance created FIDECOM in 2006, it was not until 2010 that the first grants were distributed under the management of the Ministry of Production.

it was something unprecedented in Peru." (Researcher C, U1)[26]. Furthermore, most of the researchers interviewed commented on their struggle to obtain funding for research and their attempts to resort to external funding agencies and programmes (including the Ibero-American Program of Science and Technology for Development –CYTEC, Organisation of American States –OEA) to develop more ambitious projects before these funds were introduced. For instance, Researcher K explained that:

> "Before that [2007], there was no money to carry out big projects. You could maybe get PEN 10,000 [approximately USD 2,800] after a considerable struggle for your project, but our first project [funded by one of these calls] cost PEN 350,000 [approximately USD 97,300]. So, back then, there was no money." (Researcher K, emphasis added).

The *novelty* and *scale* of these funds (against the backdrop of researchers' previous experiences) are the cues that drew their attention. These elements represented an interruption in their ongoing flow of activity as they were used to develop smaller-in-scale projects (prototyping) or apply for international funds to engage in more ambitious research and development (R&D) activities.

2.1. Attention-prompted sensemaking and meaning creation

The identification of cues alone does not trigger sensemaking processes. Rather, sensemaking is prompted by the sustained attention actors pay to an event (Nigam and Ocasio, 2009). However, as individuals have a limited capacity to attend to the constant inputs and stimuli from their environments, they selectively attend to some external events and ignore others. In other words, they

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[26] Researcher A (U1) also explained that before the implementation of the Washington Consensus measures in the 1990s, there was little funding for projects managed by the National Council for Science and Technology (Concytec). However, these funds were not explicitly aimed at funding R&D projects. He mentioned a book on "poetics of space" (Cosmopoética o poética del espacio) as an example of the type of outcomes that resulted from those projects in the late 1980s. Most of the government bodies in charge of designing and implementing STI policy interventions stopped operating as a consequence of the Washington Consensus reforms. Therefore, until 2007, the only active programme to foster technological innovation was the Program for the Promotion of Technological Innovation and Competitiveness in Peruvian Agriculture (or INCAGRO in Spanish) (2001), which was an initiative developed by the Ministry of Agriculture and co-financed by the World Bank.

encode, interpret and devote time and effort to deal with some *issues* (e.g., problems, *opportunities* and threats) and formulate *answers* to those issues (e.g., *proposals*, projects, programmes, procedures) (Ocasio, 1997). In the cases analysed, opportunities (in the form of applying to funds described above) and *proposals* (the projects they developed to apply to them) were respectively the *issues* and *answers* to which researchers devoted time and effort.

In more detail, researchers' *selective attention* was not driven by the introduction of the funds as a stand-alone event but by its enactment in their environments (Hoffman and Ocasio, 2001; Ocasio, 2001; Weick, 1995). That is to say, researchers' sensemaking processes were triggered by the opportunities they associated with the availability of the funding, particularly the prospect of using public funds to have a more tangible impact through their research activities.

The issues (opportunities) and answers (proposals) researchers focus on are contingent on their particular context or situation (Hoffman and Ocasio, 2001; Ocasio, 1997). Namely, their attention is shaped by the type of organisation to which they belong through the organisations' communication and socialisation channels (Cowan, 2013; Ocasio, 1997). The accounts of the researchers interviewed pointed to three levels in which a panoply of social interaction and communication channels operate: i) a *network* level, comprised by research groups; ii) an *organisational* level, comprised by academic departments and research centres; and iii) a *hierarchical* level, comprised by the universities' Vice Pro-Chancellorships of Research and alike governing bodies. Each of these three levels operates as an *arena* for interaction and information exchange.

In the first arena, social interaction and communication channels were built between the researchers interviewed and other colleagues that shared a similar narrative about the role of research and innovation in overcoming development challenges in Peru. For instance, Researchers A (U1) and F (U1) referred to the links with a research group founded in 1992 (whose members were also interviewed for this PhD) and referred to the group's work as their reference point and inspiration. Similarly, Researcher K (U2) pointed to the collaborations with

researchers from the Department of Science, with whom, he remarked, shares the aim of developing prototypes that improve the living conditions of rural communities in Peru. These channels emerged organically due to the physical proximity of researchers (all of them working on campuses), shared interests and collegiality, as opposed to the ones operating in the remaining arenas, which were created in a top-down fashion, are formal and more established.

In the second arena, the Engineering Departments, these channels were the same used by each department's leadership (heads of departments and directors of department's academic divisions) to disseminate information on a regular basis, including the department's newsletters, emails, and meetings. Here, the heads of each division (i.e., mechanical, civil, electronic engineering, etc.) played a key role in carrying on the message about the availability of funding and the ways in which the department could support staff applications.

Lastly, in the third arena, the Vice Pro-Chancellorships and other university governing bodies, the communication channels were mediated by innovation and technology transfer liaison offices, as shown in Graphic 5.1. These offices were in direct contact with the Ministry of Production division in charge of administrating the competitive calls. These consolidated channels of communication allowed a more dynamic flux of information from the government to the researchers via a set of workshops intended to provide information about the application process and the benefits associated to applying to the competitive calls.

Therefore, whether researchers paid attention or not to the new funding and how they started to construct meaning about it was influenced by their position within the socialisation and communication channels described. At the network level, socialisation and communication took place among researchers that shared a similar narrative about the role of research and innovation for development, and was facilitated by researchers' proximity, collegiality, and shared interests. The informal links that operate in this arena are an important feature of these three universities that stand in contrast to the formal and institutionalised ones operating in the organisational and hierarchical levels. Thus, in the organisational

and hierarchical levels there was not a shared narrative about the role of research and innovation for development as in the case of the network level. Nonetheless, the socialisation and communication channels were built at this level upon the need to support research and innovation enterprises in these three universities.

Figure 5.1 Social interaction and communication channels in three university arenas
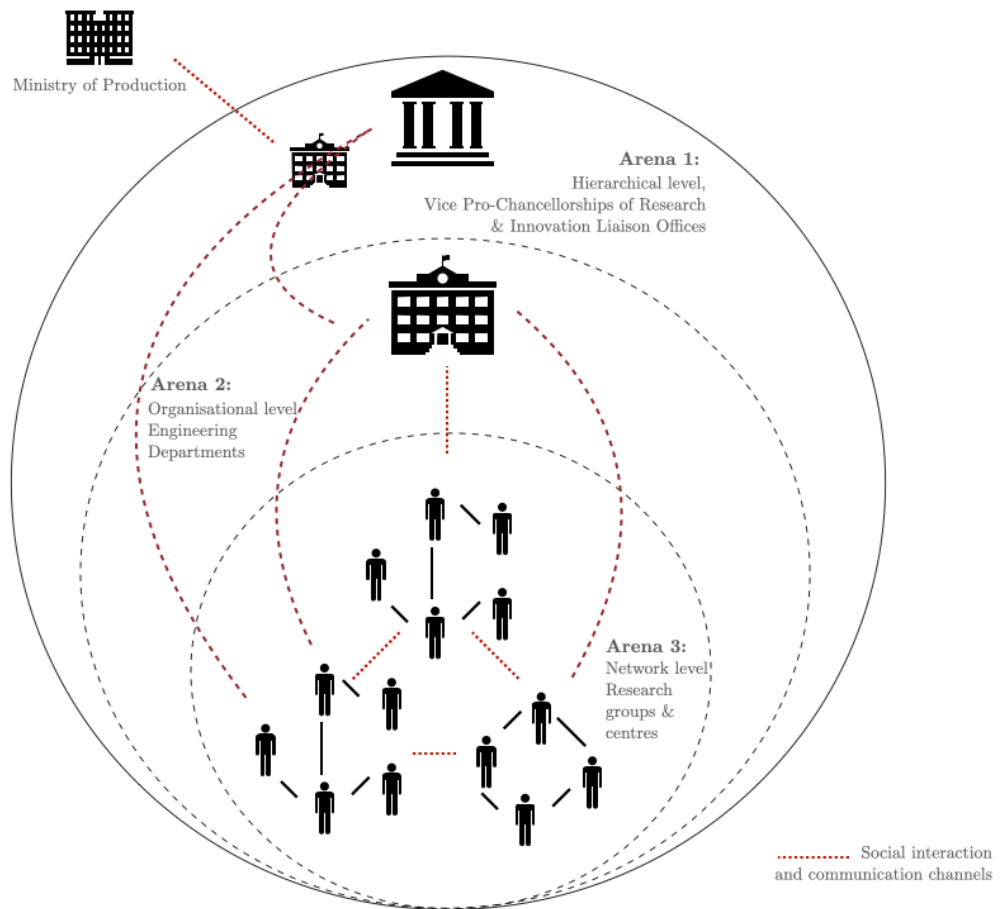
Source: Author's elaboration.

Besides the channels of communication and socialisation, the way in which individuals think and attend to an event is influenced by social and cultural features (Hoffman and Ocasio, 2001). That is to say, researchers' attention is determined by the (formal and informal) rules of their academic environments, their identity and social relations, their status, and the resources they had at their

disposal. Ocasio (1997) and Hoffman and Ocasio (2001) call these elements *the social structures of attention.*

Regarding the *rules of the academic environment* (or the formal and informal principles of action, interaction and interpretation that guide and constraint decision making), most of the researchers interviewed referred to the lack of institutionalisation of *research* as a salient feature of their work environments. Although the three universities in this study have been recognised among the top 20 research-leading universities, they have had a strong focus on teaching and human capital formation since they were created. Research activities, in this regard, only gravitate teaching roles for most of the full-time academic staff. This lack of institutionalisation is exemplified in the fact that the equivalent of a 'research fellow' position (i.e., investigator adjunto o principal) was only formally created in 2014 in one of these universities[27].

The lack of institutionalisation of research roles is also evidenced by the inexistence of publication quotas for researchers. The prevalent model to assess research impact is a points-based system, where, depending on the outlets chosen by researchers to publish their work, they obtain a monetary compensation at the end of each academic year[28]. In this sense, the incipient institutionalisation of the role of "researcher" enabled the PIs interviewed to have more leeway to diversify their research initiatives and to pursue short-term impact activities without putting their jobs in jeopardy.

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[27] These three universities are regarded as leading institutions training future labour force and developing human capital and research. According to the Revista América Economía and the QS Ranking by country, these universities are ranked among the top 20 universities in the country. The specific positions in the ranking will not be disclosed to maintain their anonymity.

[28] According to the guidelines of the "Reconocimiento a la Investigación" (2020) (i.e., the Research Acknowledgement Scheme), launched by the Pro-Vice-Chancellorship of Research at University 1, researchers who publish in four-star journals can receive between PEN 6,500 and PEN 10,000 (the equivalent of US$ 1600 and US$2500 respectively) per publication depending on their seniority. Other publications in peer reviewed journals, as well as books, book chapters, and conference proceedings also receive monetary awards ranging from S/. 650 to S/. 8000 (the equivalent of US$ 150 and US$ 1,970 respectively) per output. For University 2, a public university, the monetary awards are more limited. According to the Plan Único de Investigación (2017) (i.e., the Unified Research Plan), researchers can receive a stipend that ranges between PEN 500 and PEN 2,000 (approximately US$ 123 and US$ 491) depending on the type and outlet of publication.

Second, regarding *identity*, some researchers immigrated to the capital of Peru to pursue their academic careers. This aspect of their identity enabled them to attribute their interest on the funds to the fact that they were migrants, and they knew first-hand the type of problems faced by rural populations in the country. Hence, their desire to address them:

> "Our interest grew from the fact that we were a group of immigrants. For instance, I am from Chachapoyas in the Amazonas region. Six colleagues of mine that belong to the [research] group are also from different parts of the country: Cusco, Arequipa, Huánuco, Chimbote [...]. So, there was a full understanding of the '*two Perus*' – the urban Peru and the rural one." (Researcher C, U1)

Researcher I (U3), on a similar note, remarked that he fully understood the challenges faced by poor populations in rural areas of the country, and that this awareness drove them to think about the funding as a chance to have a more tangible impact by improving the lives of these communities: "My mum and my dad were both schoolteachers in rural areas in the highlands of Puno[29]. When I was little, I went with them, I saw the reality of the children, and it is really sad..." (Researcher I, U3).

When the place of birth was not a prominent identity element shaping researchers' attention, other features, primarily rooted in their upbringing and work experience, prompted a sustained interest in these funds. For instance, Research F (U1) mentioned that due to his exposure to hospital environments since he was a little boy, he knew he wanted to transform medical practices and the way in which medicine reaches people in Peru; for that, the scale of the funds made a big difference. Researchers B (U1), C (U1) and E (U1) also claimed that their work experience allowed them to see the precarious living conditions in which thousands of their fellow citizens live. This exposure became a driver for this constant pursuit of opportunities to have a more tangible impact.

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[29] Puno is a Province located in South-eastern Peru with a population of approximately 140,839 inhabitants. According to the Director of the National Institute of Statistics and Informatics, in 2014, 32% of Puno's population live in dire poverty and about 9% live below the poverty line (CORREO, 2014).

The way in which researchers' identity shaped their interest in the funds was complemented by their *social relations*. Several researchers belonged either to a research group or research centre where they claimed there was a common interest and shared narrative about the social impact of their academic activities. In that sense, the prospect of building research teams to apply for government funding seemed like an achievable goal. In the cases where there was not a group or centre affiliation, Researchers K (U2), B and D (U1) indicated that the university environment, in general, was conducive to build alliances with researchers, affiliated to other departments, sharing a similar vision.

Third, the *status of the individuals* also shapes how salient an event becomes for them (Fiske and Taylor, 1991; Hoffman and Ocasio, 2001). Nearly all the researchers interviewed had either about thirty years working in the same university or were actively engaged in research activities during the last twenty years. Most of them were also in a position of leadership (either as a coordinator of a section within the Engineering Department, a leader of a research group, the director of a research centre or laboratory, among others) by the time they were interviewed. The analysis unveiled that this status of seniority triggered a feeling of confidence that facilitated the decision to compete for these funds.

Furthermore, the confidence associated to their status was also built upon the fact that most of the interviewees provided advice to international organisations (e.g., the United Nations Development Programme -UNDP) and/or worked with communities in the Peruvian Andes and Amazon in previous projects. Also, nearly all of them collaborated with government bodies prior the launch of the calls. These past collaborations allowed them to understand the intricacies of working with the government, particularly with ministries such as the Ministry of Housing, Construction and Sanitation; the Ministry of Development and Social Inclusion; and the Ministry of Energy and Mining. In Researcher B's (U1) words they already knew "how it is to deal with the government". All these experiences acted as contextualising factors and sources of reassurance of the prevalence and

urgency of the issues they aimed to address in their research projects and their chances to obtain government funding to support them.

Lastly, regarding the *resources*, the interview data pointed to human capital (in the form of networks and teams), experience and trajectory, and conducive environments for research as the resources researchers had when the funds were introduced. These resources, combined with the aforementioned social *structures of attention* (i.e., identity, status, social relations, and the rules of their academic environments) increased the salience of the funding mechanisms introduced by the Peruvian government, and shaped the way in which researchers thought about the funding; namely, what they could achieve with and how to approach it.

To summarise, this section showed how the introduction of government funding for R&D projects represented a disruption in researchers' activities, who were used to develop small-in-scale R&D projects or struggled to obtain funding to develop research projects that entailed other stages beyond prototyping. The accounts from the PIs interviewed unveiled that the mere introduction of government funding did not trigger an initial interest to use it for inclusive innovation projects. Rather, it was the interpretation of the event as an *opportunity to have a more tangible social impact through their research activities* (*selective attention*) that prompted the development of an initial sense of 'what to do with' and 'how to approach' the competitive calls. This initial sense was supported by the channels of socialisations and communication used by researchers within their universities (*situated cognition*); and the rules of the game of academia in Peru, their identities, social relations, status, and resources (*structural determination*). The next section explains how this initial sense was developed into a more coherent account aligned to researchers' values, beliefs, and role expectations, and shows how this coherent account guided researchers' choices and actions in the realm of knowledge production.

3.   The role of normative and cultural-cognitive elements in guiding researchers' interpretations and actions

"Actors make sense *with* institutions, not despite them or outside them" (Weber and Glynn, 2006: 1642). Institutions are a source of meaning structures (Giddens, 1984b; Weber and Glynn, 2006), which are the *action scripts* and *roles* that enter sensemaking processes as shared cognitive structures. In the cases analysed, normative and cultural-cognitive institutional elements (Scott, 2008) acted as a symbolic code during these processes. More specifically, researchers' *self-perceived role expectations*, *values* and *beliefs* acted as the scripts and roles that guided their actions. The following sections describe how these normative and cultural-cognitive structures acted as the frames of interpretation researchers used to choose to produce knowledge for inclusive innovation projects, be reassured on their choices, and act on the basis of such choices.

3.1.   Meaning interpretation: Researchers' values, beliefs, and role expectations as the 'feedstock' for sensemaking

Institutions enter sensemaking processes in three ways. First, they serve as building blocks or the substance for sensemaking (priming mechanisms); second, institutions guide and edit action formation (editing mechanisms); and third, institutions are continually enacted and accomplished in sensemaking processes (triggering mechanisms) (Weber and Glynn, 2006). The analysis unveiled that researchers' role expectations and values entered their sensemaking as priming and editing mechanisms and that the enactment of their beliefs was subsequently visible through researchers' actions.

In more detail, where institutional elements acted as building blocks, they entered researchers' sensemaking processes in the form of institutionalised roles (role expectations) and templates for action shaped primarily by their values. These elements also edited the meaning they created through social feedback processes, and triggered contradictions when they faced expectations that

challenged their own beliefs and perceived role expectations (Brown et al., 2014; Cowan, 2013; Weber and Glynn, 2006). The following sub-sections explain how these institutional elements primed and edited the meaning researchers created, and how they subsequently triggered researchers' action.

a. Researchers' role expectations and values as building blocks for interpretation

The interview data showed that researchers had a particular understanding of their roles as university workers. Their narratives highlighted their privileged positions as educated individuals (some of them with PhD degrees obtained in foreign universities and some of them benefited from a free public education[30]) working for prestigious universities in Peru. Researcher M (U2), for example, said: "I am the product of a free public education, so my responsibility is to society. My responsibility is to give my best to make Peru a better place to live. That is my responsibility, my only responsibility [as a beneficiary of public education]" (Researcher M, U2).

This particular understanding of their position as a *privilege* is not only retrospective (i.e., built upon the resources they had at their disposal in the past) but also strongly associated with a prospective sense of *responsibility.* In this regard, researchers remarked at different points in the interviews that they "desire to achieve meaningful transformations" (Researcher C); "engage with topics of social significance even when they represent a cost in terms of other opportunities" (Researcher A); "aspire to benefit more communities" and "have a wider impact through their research and teaching activities" (Researchers B and K); "produce research that tackles local problems" (Researchers H, D, I and J); "try to be sensitive with the issues that are *wrong* and respond to them" (Researcher K); and "reflect on the impact of their research activities" and "convey a need for

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[30] Quality higher education in Peru is either private or very restricted when public. Prestigious public universities can attend only a fraction of the total demand. For instance, according to the data from the Peruvian National Assembly of Rectors (ARN), in 2010, 309,215 applicants competed for an offer from a public university. Only 20% (63,900) of the applicants obtained a place. These figures remained fairly consistent in the last years. In 2017, the National Superintendency of Higher Education (SUNEDU) reported that about only the 20% of the applicants to public universities in Peru obtained an offer (1 offer per 5.1 applications).

reflexivity to other members of the university community" (Researchers A and C).

This means that, in their views, the expected and demanded patterns of behaviours due to their social position (Linton, 1936) (i.e., role expectations), carried a particular weight as explained by Researcher F (U1):

> "It is so hard for me to imagine that the activities of an engineer can be conceived without contemplating their social impact". He continued saying "As soon as I returned [to Peru] from my PhD, I applied for funding to work in rural areas. I was interested in endemic diseases in Peru, like Tuberculosis [TBC]. It has been a constant practice of mine to focus on things that are particular to Peru because *this is my country, my environment*" (Researcher F, U1)

In addition to researchers' role expectations, their values influenced how they turned an initial sense of the funding as an *opportunity* into a more coherent account. For instance, most principal investigators stressed that the majority of their activities were guided by the principle of *helping others*. Their accounts included compelling descriptions of the situations they considered unfair and unacceptable as recounted by Researcher M (U2): "I mean, we are in the 21st century and people still die from consuming water contaminated by bacteria [...] because they have to walk for days to reach a medical centre. That *hurts*." (Researcher M, U2).

These descriptions were, in almost all cases, followed by an account of how they attempted to respond to what they perceived as unfair and unacceptable through their research activities. Researcher M's testimony exemplifies this point:

> "My main aim in my research activities is to improve water quality in rural areas, which are areas where the State presence is almost inexistent [...], where there is a low density and dispersed population, appallingly challenging geography, and very limited access to energy and technical capacity. They are people who live in an inadequate geographical environment, and because they haven't had access to education, *or the luck we had*, they couldn't improve their life quality. Don't you think that if those people would have had the knowledge and technical capacity, they wouldn't have done it already?" (Researcher M, U2, emphasis added)

The retrospective (based on their previous opportunities and privileged positions) and prospective (professional missions, particularly that of *helping others*) dimensions of researchers' understanding of their roles as university workers were the frames that they used to interpret the events they encountered in their profession. In this regard, the *opportunity* they associated with the new R&D funds was pondered against these frames to develop a coherent account about how to approach the government funding in a way that chimed with the fulfilment of their self-perceived roles. This account later primed and shaped their choices to produce knowledge for developmental aims; namely, to *engage with topics of social significance* and develop research projects that *tackled local problems* and *benefitted communities,* while *reflecting on and responding to issues that are 'wrong' for them.*

As sensemaking is fundamentally a social process, individuals seek reassurance and confirmation of their own interpretations (Cowan, 2013). Institutional elements, in this regard, act also as editing mechanisms during sensemaking through social feedback processes. As shown earlier in the chapter, researchers socialised with similarly situated and like-minded individuals. This means that most of their interpretations about their roles as university workers and the values associated to their profession are *shared* cognitive structures.

The analysis unveiled that researchers not only drew on these *shared* cognitive structures to guide to their own interpretations, but also to get reassurance and confirmation on their choices. This finding shows that the existence of common narratives at the network level played a key role in supplying the contextual influence that enabled researchers to move from interpretation into concrete action (i.e., applying for the funds and developing the projects) after they were reassured on their choices by other members of their own networks.

b. Institutional elements triggering sensemaking: Researchers' beliefs and institutional contradictions

The previous sections showed how normative institutional elements such as a (prospective and retrospective) sense of responsibility and the vocation to help

others enabled researchers to develop an initial sense of *opportunity* into a more coherent account and to get reassured on their interpretations of the funding available. However, while values and perceived role expectations played an important role in meaning creation and interpretation processes, the analysis revealed that cultural-cognitive elements (i.e., researchers' beliefs) also influenced their choices and actions during the sensemaking process.

More specifically, in contrast to the role played by normative elements as frames for interpretation (Maitlis, 2005; Weick et al., 2005), researchers' cultural-cognitive elements evidenced the existence of a gap between their intentions to produce knowledge for inclusive innovations and the expectations from the government regarding the new funding available. For instance, researchers' beliefs denoted a strong sense of commitment to engage in projects that they knew would not give them revenue or any monetary compensation for their intellectual property, as declared by Researcher B (U1): "We are not interested in getting paid for that project, but we do want it done right. That they [the citizens or the government] copy and replicate it is not a problem as long as they do it well." (Researcher B, U1).

On the contrary, researchers' concerns had to do more with the spillovers of their projects than any kind of recognition in terms of income or revenue as exemplified in Researcher C's (U1) testimony:

> "This project was not going to give us any money because the solution is relatively simple, but to find that solution, you have to invest time and human capital [...] The results, however, generated a lot of spillovers. But if you give yourself the job of patenting it, it doesn't really matter [...] in the end, you have the satisfaction that someone is going to use it. These types of projects have this characteristic...that the contribution is to the country, to reduce emissions and help to improve the health of the population." (Researcher C, U1)

Another contrasting element emerging from the data was that the researchers interviewed believed in the importance of building lasting interventions, regardless of the resources they would obtain to secure the continuity of their projects. In

this regard, most of them highlighted the importance of blending the technical and social aspects of an intervention to make it sustainable (Researchers A, B, C, F, K and M), and to build long-term relations with the beneficiaries, even if they felt challenged by geographical accessibility barriers (Researchers B, C, K and M). Moreover, some researchers also indicated that they decided to carry on with their projects, even when the cost of doing it was to postpone their own research interests as explained by Researcher A (U1):

> "It would have been more elegant [for us] to start with an e-government project and increase the access to the government in areas where the State is barely present, but if you do that, you will be kicked out [by locals] or maybe they might collaborate with you while the project lasts, but it is likely they will abandon it. This didn't happen with us; what we've done is still going on." (Researcher A, U1)

A third element of researchers' beliefs was captured by the idea that *if they were not to engage in developing solutions for local problems, then who would?* Researchers A (U1), K and M (U2) explained that this choice often has a cost. Not only is international funding for projects that aim to tackle local problems limited, but they also felt that engaging in these types of projects entailed giving up recognition in international academic spheres. Researcher A's (U1) testimony captures this impression quite compellingly:

> "We've chosen 'hot' [complex and neglected] topics that have social significance, and we have stopped participating in the conferences that give us most exposure [...] There are not many opportunities to have top papers on topics like these in your discipline because the technological complexity, the mathematical models, the physics of the frontier are no longer in this, but the benefits and impact of the initiatives we are committed to are not relatable to this 'publishing rationale'." (Researcher A, U1)

He continued saying:

> "It is clear that it is difficult for us because it implies resigning to take part in the topics that generate you more national or international recognition. There are other groups that are at the level of any university in the world, but for the rest, it is clear what our *vocation* is." (Researcher A, U1)

Researcher B (U1) also made a similar comparison by referring to the growing interest of some universities in the country and the government to promote technology-based start-ups: "Nowadays, everyone is thinking about start-ups, but the technologies we developed to increase the room temperature of houses in the Andes have a social distinctive mark that is not of interest of many, and that only the government can adopt and replicate." (Researcher B, U1)

These testimonies show that researchers' decisions, commitments, and actions regarding knowledge production were driven by a particular rationale reflected on: *i)* their awareness of their privileged position; *ii)* their desire to make a tangible contribution to tackling local problems for disenfranchised communities; *iii)* their willingness to give up (one form of) status and recognition in their own academic disciplines; and *iv)* their predisposition to relinquish their intellectual property rights and even forgo any extra monetary compensation for their work.

This rationale stands against the one underpinning the competitive calls FINCyT-I and FIDECOM as these funds were created as part of an array of policy interventions designed to *improve the innovation climate* and *leverage private investment in innovation* by promoting a better articulation of research institutions and firms. The expected increase in the opportunities for diversification and productivity associated with the introduction of these funds was accompanied by the strengthening of the Competition and intellectual property rights (IPR) regimes in the country (OECD, 2011: 21). Thus, the incompatibility between researchers' expectations about what they could achieve with the funding and the overarching goals set by the Peruvian government when these policy instruments were created, triggered a contradiction that needed to be overcome so researchers could resume action (i.e., apply for funding).

To summarise, this section explained how normative and cultural-cognitive elements acted as the frames for interpretation. These frames were used by researchers to develop their initial sense of the new funding as an *opportunity* into a more coherent account that enabled them to make sense of what to do with and how to approach the funding scheme introduced by the Peruvian government.

Here, researchers' values and role expectations provided them with the 'substance' that guided their choices to produce knowledge that fed into R&D projects aimed at *tackling local problems* and *benefitting marginalised communities*, and to do so by *being sensitive to issues that are unfair and unacceptable* to them *while reflecting on the impact of their own research activities.*

The purpose of these interpretations is to guide action towards an effective response. However, we showed that researchers' beliefs made salient a contradiction between their intentions to produce a particular type of knowledge and the government's expectations regarding the new funding during the interpretation stage. This contradiction had to be overcome so that researchers could resume their activities; namely, apply for the funding and develop their research projects. Figure 5.2. summarises how the normative and cultural-cognitive elements described in this section entered researchers' sensemaking processes as priming, editing and triggering mechanisms.

Figure 5.2 Mechanisms relating institutional elements to sensemaking reflected in the interview data
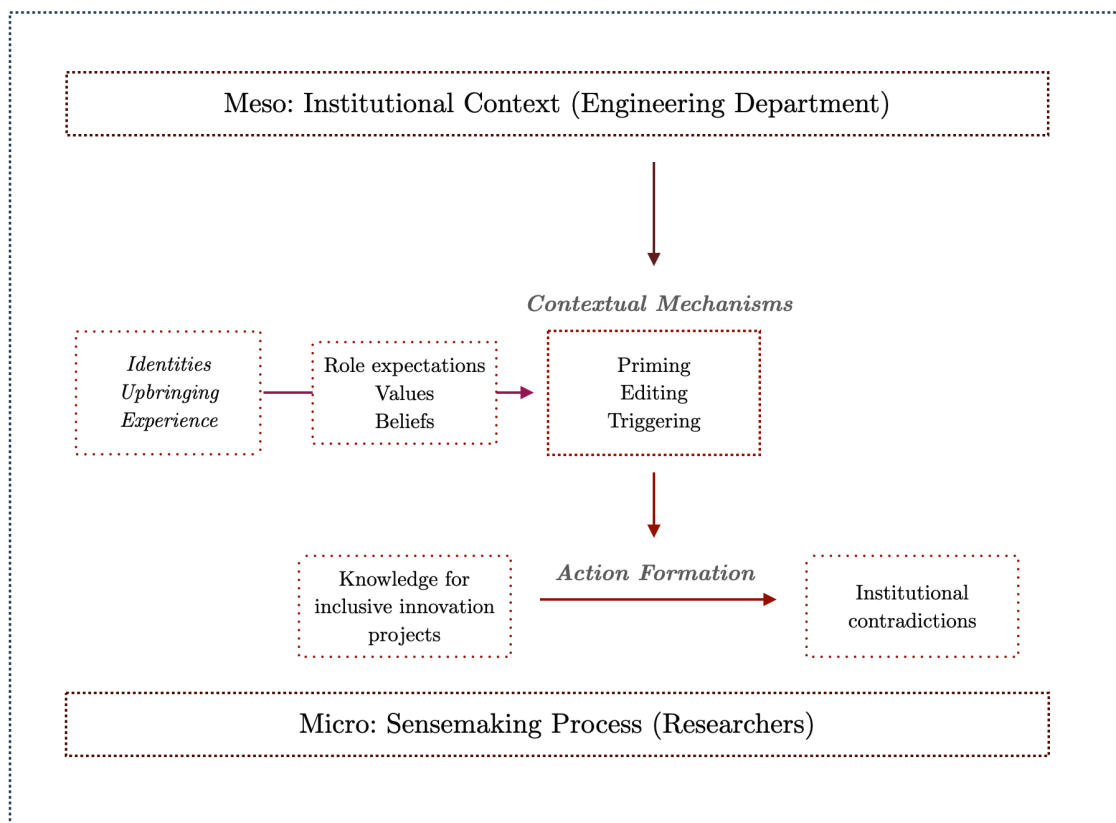
Source: Author's elaboration adapted from Weber and Glynn (2006).

The next section elaborates on the reciprocal influence between the contradiction made salient by researchers' beliefs and the actions that followed. Particularly, it explains how researchers repurposed these policy instruments to produce knowledge for inclusive innovation in a way that chimed with their own views on the role of research and innovation for development.

3.2. Sensemaking enactment: Knowledge creation and the defiance of taken for granted conventions

The analysis revealed that, in order to resume their activities and stay in action, researchers repurposed the top-down policy instruments introduced to *improve the innovation climate* and *leverage private investment in innovation*. More explicitly, they turned these policy instruments into a vehicle to develop innovation projects that *tackled local problems* and *benefited disenfranchised communities*. This repurposing enabled them to bridge the gap between their initial framing of the funding scheme and the outcomes they produced. In particular, the way in which they bridged this gap can be observed in the means and characteristics of the knowledge produced by researchers over the course of their projects.

The interview data showed that the normative and cultural-cognitive institutional elements described above shaped their practices of producing knowledge and enabled this knowledge to display some features that resonate with the 'Mode 2' knowledge production framework (Gibbons et al., 1994). In more detail, the accounts of the researchers interviewed revealed that they opted to produce knowledge in a *context of application* where they mobilised *practical methodologies* to solve local problems.

Some researchers highlighted that their projects were driven by a notion of *adaptability* that entailed *in situ experimenta*tion (Researchers A, B, C, E, K and F). Other researchers mentioned that their projects were built upon the notion of *reverse engineering* (Researchers H, J, L). The use of these means for knowledge

production granted these projects social accountability. That is to say, the opportunity to become more aware of the societal consequences of their work due to their exposure to the contexts where the knowledge they produced was mobilised.

These practical methodologies also helped them *co-produce* and *diffuse* the research results with and to the final beneficiaries. As shown in the previous chapter (Chapter 4), most of these projects were developed in mutual interaction with the final beneficiaries and users of these innovations. One feature associated with the co-production is that, besides encompassing several stages of trial and error, the practices that underpinned the production of knowledge entailed researchers' conscious efforts to create channels to incorporate the knowledge and expertise of other actors. For instance, researcher B (U1) explained:

> "The methodology we use implies learning by doing, and we have worked really hard in creating trust relationships between us and the community." He continued by saying "for instance, our project would have never been possible without the input of the community. For example, we thought about one of its key components while we were having lunch with them. One *comunero* [a community member] told us about what they used to do to isolate spaces, and we incorporated that into the project [...]. So, the idea of having a methodology that involves local actors is to develop outputs that respond to their needs and have certain characteristics that will allow them to appropriate the technology further down the line" (Researcher B, U1).

Moreover, as the production of knowledge was distributed among different parties, the practice of producing it was *heterogeneous*. This means that the sites for knowledge generation no longer included the university only but, in some cases, the communities where the innovation projects were implemented.

These features enabled researchers to engage in *dialogic* processes in which different voices were incorporated. In particular, these processes were sparked by the sensitivity to the social impact of the research, built-in before the projects started through a set of choices permeated by researchers' values and role expectations. Nonetheless, the continuous re-enactments of these processes had a lasting impact on researchers' knowledge production practices. Researcher A (U1),

for instance, explained that since the research team learnt about the demands of the communities with whom they worked, their research priorities shifted:

> "Since that encounter, our work became telemedicine and telehealth-related, and so far, we have not been able to 'shake these topics off'. We have added things based on our expertise, but as it is the first priority [because it was the communities' priority], it has been immovable. The relevance of end-users participation is there, in that they have decided the orientation of the project based on their priorities." (Researcher A, U1)

Finally, researchers' testimonies unveiled that the type of knowledge they produced was subject to alternative types of quality control. Most researchers regarded as insufficient and secondary the conventional metrics used by their universities to measure research impact (publications in three and four-star journals, written outputs in the form of books or book chapters and publications in proceedings from reputable conferences) compared to the social impact generated by their projects. For instance, Researcher D (U1) started publishing in Spanish. While this may sound counterintuitive, she claimed that researchers are often looking to publish papers in English, so their work is better rewarded by the university. In response, she sought to work with another researcher to make available basic materials in Spanish so researchers in other universities, particularly outside the capital of the country, could access this information.

Touching upon a similar issue, Researcher F (U1) said that he has a more critical approach to the research impact system, informed by a personal view of the academic world and the meaning of publishing a paper. He said:

> "For me, publishing and the academic work is about *networking*. I don't want to take away the significance, but if you publish in 'Nature', it means that you are in contact with the people who are part of that community. Publishing in 'Nature' or winning the Nobel Prize is about our social relations. To win it, you have to be within a certain community."

He continued:

> "Through my publications, I communicate to the people in my community what I am doing. I am not very compelled by publishing in 'Nature' because what I want is to receive feedback from my community, beyond the quartile

to which the journal belongs [referring to the number of stars] because if, in the end, I want these findings to be used in Peru, I have a better chance of achieving it by publishing in [names a journal from another local university]" (Researcher F, U1)

Figure 5.3. summarises the findings of this section by illustrating how institutional elements acted as contextual mechanisms priming, editing, and triggering sensemaking. Additionally, it highlights that the enactment of researchers' values, beliefs and role expectations not only enabled the repurposing of policy instruments but also shaped the means and characteristics of the knowledge they produced.

Figure 5.3 Institutional elements priming, editing and triggering meaning creation, interpretation and action in researchers' sensemaking processes
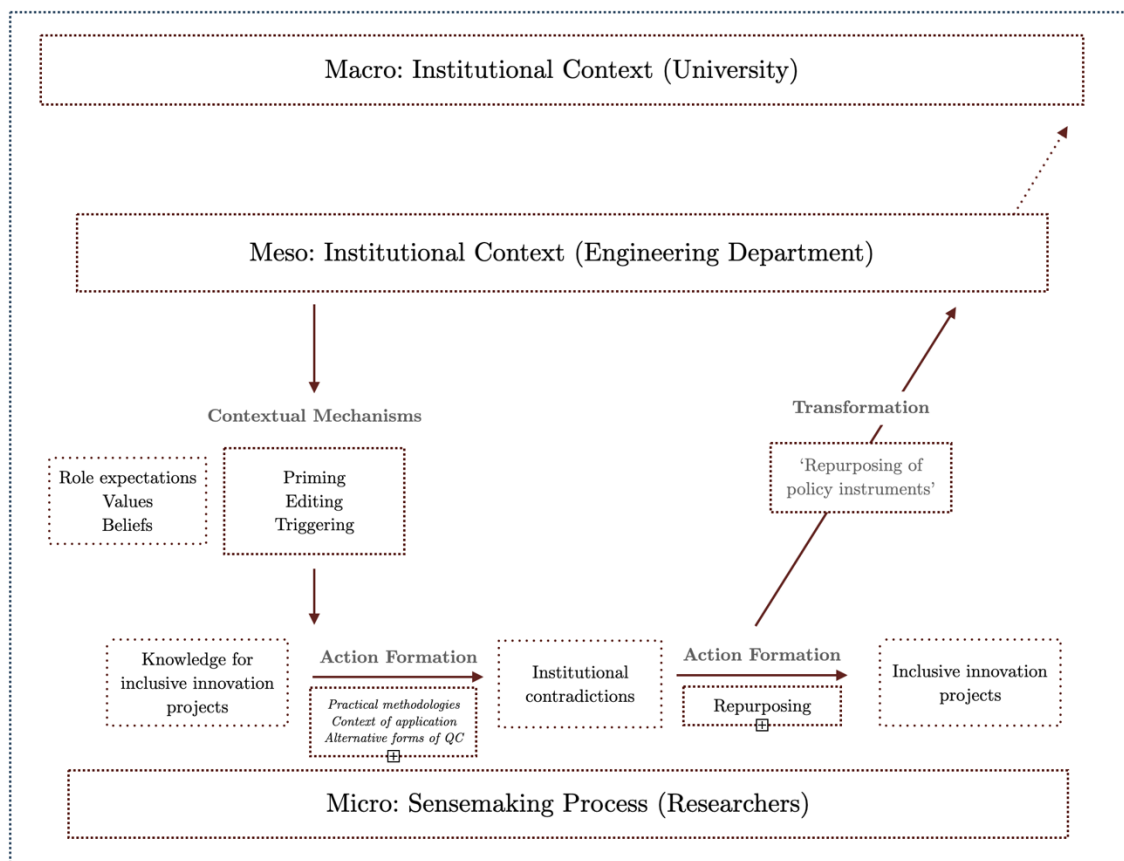
Source: Author's elaboration, adapted from Weber and Glynn (2006).

The findings presented in this chapter show that beyond the constraining character of institutional elements, they can also enable choices and actions. The

enactment of these normative and cultural-cognitive *in* and *through* processes of meaning creation, interpretation and action have shown to be a crucial element in knowledge production practices in the cases analysed. In these processes, research groups, collectives, and departments play an important role as spaces of signification where the meanings underpinning the development of inclusive innovations are produced and reproduced.

In more detail, the chapter explained how researchers created their own interpretations about the new funding scheme as an opportunity to have a more tangible social impact through their research activities. Here, researchers' values and role expectations provided them with the frames of interpretation to choose to produce knowledge for R&D projects aimed at *tackling local problems* and *benefitting disenfranchised communities*. Researchers' beliefs also played a key role during the interpretation stage by evidencing a gap between the government's expectations regarding the funds and researchers' desire to have a more tangible impact through their research activities. This contradiction led research teams to repurpose a policy instrument introduced in a top-down fashion into a vehicle to develop inclusive innovation projects. Finally, the findings of this chapter showed how the enactment of researchers' values, beliefs and role expectations transcended the mere act of reinterpreting these funding schemes shaping too the means and characteristics of the knowledge produced in their projects. More explicitly, prompting research teams to produce knowledge in a context of application and in mutual interaction, mobilise practical methodologies to incorporate different voices and expertise into the projects, and build non-conventional forms of quality control.

4. Chapter summary

This chapter painted a picture of how researchers in three developmental universities generated plausible meanings to rationalise their actions in response

to the introduction of a new funding scheme for STI projects, and how these meanings informed their choices to produce knowledge for inclusive innovation projects and subsequent actions. The sensemaking perspective allowed us to provide detailed descriptions of how researchers initially conceived a new funding scheme as an *opportunity* to have a more tangible impact through their research activities. In particular, it helped us describe how their channels of communication and socialisation (situated cognition), the formal and informal rules of academia in Peru, their identities and social relations, status, and resources shaped this initial framing.

The chapter also demonstrated that institutional elements – particularly researchers' values, role expectations and beliefs – acted as priming, editing, and triggering mechanisms during sensemaking. Here, normative elements entered researchers' sensemaking processes in the form of shared cognitive frames. These frames guided their interpretations and reassured them of their choices to produce knowledge for inclusive innovation projects. Conversely, researchers' cultural-cognitive elements made evident the incompatibility between their expectations and the overarching goals set by the Peruvian government for the policy instruments described in this chapter. This contradiction prompted the repurposing of these instruments into a vehicle to develop innovation projects that tackled local problems and benefited disenfranchised communities.

The choice of knowledge production as a domain to observe how agency unfolds through sensemaking allowed us to grasp how processes of meaning creation, interpretation and enactment facilitated interactive, dialogic and socially distributed practices of knowledge production. Furthermore, it illustrated how the mobilisation of practical methodologies and the use of non-conventional forms of quality control helped the knowledge produced in these projects to be mobilised in societal domains outside the confines of the university.

The combination of the sensemaking perspective with institutional theory also unveiled that a variety of sensemaking resources shape the terrain in which researchers interpret and enact practices related to inclusion, providing a richer

understanding of how the meanings around inclusion emerge and are taken up in universities. These results show that inclusion is socially constructed within spaces of signification, like research communities and academic departments, in a recursive process that entails both interpretation and action.

Finally, the chapter illustrated the recursive relationship between agentic behaviour and structure (discussed in Chapter 2) by showing that institutional elements have both a constraining and enabling character. This finding – exemplified by the repurposing of a policy instrument – has two key implications for understanding inclusion in existing systems. First, institutional elements (values, beliefs, and role expectations) are constantly enacted, and the way in which they are enacted will impact individuals' immediate environments. Second, individuals and groups assign meaning to a wide range of events, including the introduction of regulative frameworks and policy interventions. It follows that these events are not concrete realities with objective meanings but events subject to a panoply of interpretations contingent on contextual factors. The next chapter builds on the findings presented above to explain how sensemaking also enables the accomplishment of organisational processes, particularly those of organisational learning and change, to create more enabling environments for inclusive innovation in developmental universities.

Chapter 6

Sensemaking and change in universities: Explaining the creation of enabling environments for inclusive innovation

1. Overview

The **previous chapter** identified and explained some of the elements that influenced researchers' choices to produce knowledge for inclusive innovation in three Peruvian universities and how their agency was mobilised to develop such projects. The utilisation of the sensemaking lens shed light on how researchers framed the availability of two public funding schemes for R&D as an opportunity to develop innovation projects aligned to their values, beliefs, and self-perceived role expectations. Furthermore, the chapter showed how their channels of communication and socialisation, the formal and informal rules of academia in Peru, their identities, status, and resources allowed them to repurpose a policy instrument aimed at *improving the innovation climate* and *leveraging private investment in innovation* into a vehicle to develop projects that tackle local problems and benefit disenfranchised communities. These findings demonstrate that inclusive elements emerge in spaces of signification where a variety of sensemaking resources shape the terrain in which researchers, as members of an organisation (the university), interpret and enact practices related to inclusion.

 This chapter addresses the third subsidiary research question of this PhD: 'How collective action triggers endogenous processes of organisational change within universities, and to what extent do these changes create more enabling environments for inclusive innovation?'. To understand how collective action accomplishes the alteration of taken-for-granted organisational interpretative

schemes and, consequently, trigger changes in the governance structures of these universities, the chapter builds on the second stage of this PhD's conceptual framework: sensemaking as a form of institutional work.

Section 2 discusses what organisational processes can be accomplished through sensemaking, particularly learning and change, and describes the characteristics of the locus for these processes: the university. Here, the university is conceptualised as a richly contextualised arena prone to host free spaces (Polletta, 1999). In these spaces, researchers and staff interact, negotiate meanings and develop collective understandings related to inclusion, but also, managerial control and professional protocols assert themselves. Thus, this section pays particular attention to the university's historical construction and institutional missions, and the contradictions arising from universities' attempts to reconcile the former with market demands and performance pressures.

Section 3 focuses on the negotiation and resolution of these tensions: the altering of the current way of thinking and acting by universities' membership. More specifically, this section unpacks the mechanisms used by university workers to revise, develop, and alter interpretive schemes and explains the role of *free spaces* in these processes. In particular, the section unpacks how researchers used these spaces to build oppositional identities and a sense of oppositional efficacy and how they bolstered oppositional frames anchored in their values, beliefs, and role expectations to achieve these changes. The chapter concludes by showing how the mobilisation of these elements is consistent with a series of partial and prominent organisational changes observed in these universities.

2. The university: A contested locus for resistance and change

Weick's (1995, 1979) theory of organisational sensemaking focuses on how actors give meaning to experience and take action based on such meaning. This recursive process between meaning creation and action is regarded by Mikkelsen and

Wåhlin (2020) as the means by which organising occurs. The previous chapter showed that researchers negotiate and mutually construct meaning around inclusion and innovation-related activities and act in a way aligned to their values, beliefs, and self-perceived role expectations. However, sensemaking's accomplishments are not circumscribed to the network level; instead, they permeate other levels of the organisation fabric.

Sensemaking is a central activity for organisations because it enables the accomplishment of essential processes and outcomes such as strategic change (Gioia et al., 1994; Gioia and Chittipeddi, 1991; Nag et al., 2007) and organisational learning (Christianson et al., 2009; Colville et al., 2014; Haas, 2006; Kayes, 2004; Thomas et al., 2001). Change and learning in organisations involve the altering of the current way of thinking and acting by the organisation membership (Gioia and Chittipeddi, 1991). That is to say, it entails both the revision and development of *organisational interpretive schemes* and, at a basic level, any substantive change may lead to the alteration of value and meaning systems (Gioia, 1986).

Universities are characterised for being plurivocal and complex bodies where varied actors interact. These interactions lead to the development of collective understandings that are consequential for fulfilling universities' missions. So, how do the processes of revising, developing, and altering interpretive schemes occur in these settings? To answer this question, the following sub-section provides an account of this setting, the Latin American university, with a particular focus on public and private not-for-profit universities. While there are fine-grained differences among these higher education institutions across the region, they share a number of features – documented, for example, in the work of Arocena and Sutz (2005, 2001) – that differentiate them from other higher education institutions elsewhere.

In this regard, and bearing in mind that the processes of revising, developing, and altering collective understandings take place in richly contextualised spaces (i.e., arenas where various actors with different interests and goals interact)

(Wooten and Hoffman, 2016), the argument will be made that Latin American universities' historic construction and forms of governance generate conducive environments for the flourishing and consolidation of physical arenas where learning and alignment take place. We call these arenas *free spaces* (Polletta, 1999). The chapter makes the argument that it is in these spaces where new understandings and practices around inclusion emerge and are tested to see whether they challenge, comply with, or are accommodated to existing organisational rules and other pressures stemming from the demands to make universities economically useful actors in society.

2.1. The Latin American University and its historical construction: Legacies from the University Reform Movement

Universities became a relevant part of the Latin American political and cultural landscape in the 20th century. The University Reform Movement (1918) was described by Arocena and Sutz (2005) as a revolution *from below* and *from inside* the university. The movement subverted the established order that prevailed during the 19th century where universities in the independent Hispano-American countries combined the features of the colonial and republican university models prevalent in Western European countries[31]. This movement responded to an outdated model of the university – characterised by its incipient involvement with society – by promoting both the democratisation of the university and its transformation into a democratising agent (Arocena and Sutz, 2005).

The University Reform Movement (URM) captured the growing dissatisfaction of students with traditional forms of teaching and universities'

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[31] According to Arocena and Sutz (2005), colonial universities were imported institutions that were established in America in the 16th century after the arrival of Spain to the continent. This institution aimed to copy the *medieval model* of university, which originated in the 12th century following the increasing political and commercial importance of cities in Europe, was connected to the leading strata of society and the Church, and whose role was to reproduce the ideological and political status quo (Arocena et al., 2018). The republican university model, on the other hand, was inspired by the French 'Napoleonic' model of loosely connected professional schools, which in Latin America contributed to the wedding between science and technology due to its proclivity to cultivate links between different disciplines (Arocena et al., 2018; Tünnermann, 1998).

reluctance to engage with social problems in a period when modernisation waves were deeply changing the cultural and intellectual landscape in Latin America[32] (Halperín Donghi, 1993). The movement, originating in the University of Cordoba in Argentina, expanded rapidly to other Latin American countries, including Uruguay, Peru, and Mexico, where students voiced the concerns of popular sectors, groups of farmhands and industrial workers and demanded a profound reform of the university (Arocena et al., 2018; Halperín Donghi, 1993).

The movement demanded a new way to structure and govern the university to accomplish the new *social mission* of the university. This new structure entailed universities' right to self-determination and the implementation of a governance system comprised of representatives of the different constituencies of the university, including the student body. These changes led to the expansion of third-level enrolment and the free access to universities, the promotion of scientific research contributing to national development, and the creation of the 'university extension', thus re-defining the role of universities as *teaching, research* and *extension* institutions (Arocena and Sutz, 2005).

The extension mission (or social mission) of the university was predicated on the idea of *extending* the university's actions beyond academic boundaries. That is to say, it referred to the encouragement of both students and faculty to become familiar with the problems of its immediate environment, build a relationship with the community and create mechanisms of reciprocity through the provision of services (Tünnermann, 2003: 269). These premises give rise to a wide range of programmes orchestrated by students and academic staff in workshops, factories and union headquarters in countries like Argentina, Mexico and Peru (Drake, 2016).

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[32] According to Tünnermann (2008), the URM followed a broad and intense process of social upheaval, particularly concerning the ruling status of the oligarchy. The combination of changes in the international political and economic forces derived from the First World War, and internal changes linked to the expansion of capitalism in Latin America, the emergence of a working class with increased active participation in the political and social landscapes, and a notorious discontent from the proletariat felt in urban areas created a breeding ground for deepest transformations (Salazar Bondy, 1968: 40).

The ideas surrounding a still ill-defined *extension mission* were systematised for the first time in 1957 during the "I Latin American Conference of University's Extension" organised by the Latin American Universities Union[33] (UDUAL for its Spanish acronym). Here, the idea that the university's extension was the *mission* and *guiding function* of the contemporary university (Tünnermann, 2003) became paramount after its nature, content and procedures, and aims were defined. This definition enabled the incorporation of the extension missions in the day-to-day activities of the university. The social, intellectual and technical development of nations became universities' primary function, prompting these institutions to propose impartial and objective solutions to problems of general interest and open spaces for the public's participation in the university's culture, activities, and contributions to society (Tünnermann, 2003).

Accordingly, the university – conceived as an active system that is, at the same time, an expression of a particular historical moment (Tünnermann, 2003: 271-272) – had its primary functions set to benefit the society in which it was embedded. However, the idea of "vincular la Universidad al pueblo" (i.e., *connecting the university to the people*) was sternly criticised during the 1970s. The main criticism referred to the *paternalistic* and *hand-out mentality* that primed its conceptualisation and enactment.

In more detail, it was argued that the university, aware of its 'superior' status as a knowledge creation institution, attempted to compensate for its privilege by projecting its activities to disenfranchised and marginalised groups in society. However, both the nature and the means to promote them were exclusively determined by university actors, limiting the role of communities to passive receivers in a unilateral relationship where they were regarded as an 'uneducated

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[33] The Latin American Universities Union was created in 1949 during the I Congress of Latin American Universities in the San Carlos de Guatemala University. During this conference, a set of bylaws related to the concept of the Latin American university and its social mission was promulgated. Here, the *objective* and *mission* of the university were set to support everyone's right to a) participate in the cultural life of the university community, to enjoy the arts and share the benefits of the scientific progress; b) to direct their activities in accordance to the realities and problems of the national nucleolus; and c) to transform the university into an institution that not only accumulates culture and transfers knowledge, but overall serves and benefits the public (Tünnermann, 2008, 2003).

collective' to whom the knowledge and culture fabricated by the educators should be extended (Varela Fernández et al., 1981).

Furthermore, according to Tünnermann (2003), extension mission activities did not respond to a well-structured programme, which put in jeopardy their continuity over time. These activities also had a marginal nature as they were not related to other teaching and research-related activities. On the contrary, they were underpinned by middle class-biased academic work, where it is argued that extension activities were merely informative and charitable.

The "II Latin American Conference of University Extension" in 1972 addressed some of these critiques and acknowledged that education is not a neutral activity but a *normative, socially,* and *politically* oriented one (Salazar Bondy, 1972). This recognition prompted a fundamental reconceptualisation of the extension mission during the late 1970s. In this respect, the third mission's new formulation recognised the university as the central unit of a social subsystem that, while being reproduced in the practices and structures of the university, was prone to be changed due to this institution's autonomy and critical consciousness.

Here, the preceding notion of passively transferring knowledge from the university to the public was rejected and replaced by the idea of an *encounter* and a *dialogue* between two *equal* partners: the university and the community. In this relationship, the former collects the demands and cultural expressions of the latter whilst assuming and fulfilling its commitment to participate in social processes leading to the transformation of society (Tünnermann, 2003)[34].

The principles of the Latin American university's extension mission differ substantially from those that underpin *the third mission of the university* as

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[34] During the II Latin American Conference of University's Extension (1972), Darcy Ribeiro, one of the most prominent intellectuals of the past century in Latin America, claimed the university was called to turn towards the country, towards the understanding of its concrete problems through context-based research programs and broad debates that would prompt the mobilisation of all its constituencies. He argued that in societies beset by such dramatic scourges as those of Latin America, nothing is more instructive, conscientizing and even revolutionary than the study of reality, the diagnosis of major national problems, the survey of popular aspirations and the demonstration of the total incapacity of the current system to find viable and effective solutions to them within a foreseeable time frame. These claims shaped the consequent re-framing of the extension mission in the years ahead.

regarded in much of the Western literature. Although there are different definitions of the third mission of universities (see, for example, Brundenius et al., 2017; Göransson et al., 2009; Göransson and Brundenius, 2011; Molas et al., 2002)[35], they have in common an emphasis on the knowledge and research produced by the universities in relation to its use outside the academic environment (Haneef and Gregersen, 2018).

The *third* and *extension mission* programmes advocate for bringing together different stakeholders to generate rigorous and relevant outcomes that are academically and socially accountable. However, these programmes' main differences rest in the way in which universities' society-oriented, research and teaching activities are intertwined. Table 6.1 shows the five dimensions of the extension mission as seen from Latin America. These dimensions reflect a more holistic approximation to universities' activities than the offered by the third mission in relation to their immediate environments.

Table 6.1. Latin America University's Extension Mission Dimensions

Dimensions	Focus	Examples
Academic & Institutional	To promote a better quality of life, greater inclusion and social cohesion, and human and sustainable development through changes in the curriculum, prioritisation of research topics, the academic recognition of extension.	Foster the democratisation and social appropriation of knowledge, generate processes of dialogue between scholarship and other types of knowledge, and promote changes and transformations in the university's social, productive, and cultural environment, with special attention to the socially vulnerable sectors.
Communicative (in dialogical terms)	Engage university actors with reality. This means joining efforts in critical reflection with other actors outside the academic realm, considering each person as a subject of transformation.	All extension actions are communicative actions. Therefore, the 'extended' knowledge (that resulting from university's interaction with society) circulates in a common space in which all parties are knowledge subjects, and not mere recipients. This entails the creation of transactional spaces based upon inter and transdisciplinary teaching and research.

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[35] For instance, Molas et al., (2002: iii-iv) define the third mission of universities as "all activities concerned with the generation, use, application and exploitation of knowledge and other university capabilities outside academic environments. In other words, the Third Stream is about the interaction between universities and the rest of society." Göransson et al., (2009) and Göransson and Brundenius (2011) argue that the third mission is "a residual that includes all the activities of universities not covered by teaching and research towards a more visible contribution to the social, cultural and economic development" and "the extension of university activities in relation with their surrounding society". In a similar vein, Brundenius et al., (2017: 349) argue the third mission concerns "research and innovation aimed at developing and commercializing technical products rather than supporting more intangible and complex social innovation activities.

Social transformation	To catalyse transformations in the social, cultural, or productive environments.	The actions resulting from the interaction between society and the university should promote a better quality of life, greater inclusion and social cohesion, and sustainable development.
Pedagogy	To embed teaching and learning processes. Knowledge dissemination would be of greater relevance if it is situated and context dependent.	Deep changes in the curricula based on social practices associated to the extension activities. Here extension activities are transformed in a pedagogy resource based on the notion of 'learning in the setting' (*aprendiendo en la situación*).
Policy participation	To participate in the elaboration of policy interventions due its position as a social institution and transformational agent.	This dimension pertains to the relationship between the State and the university. University's legitimacy to participate in policy processes is rooted in its cultural and symbolic capital.

Source: Author's elaboration based on Menéndez (2017: 30-33).

Unlike the third mission of universities, the principles in Table 6.1. denote a hierarchy where the dialogical and symbiotic relationship with society precedes and shapes its other functions. This novel conceptualisation of the social mission of universities opened a new chapter in the understanding of their role in society. Here, the university is conferred the social obligation to open up spaces for inclusion and knowledge democratisation (Tünnermann, 2008). This social obligation is actualised by bringing to the fore a pedagogy that advocates for embedding teaching and learning processes in the national context, policy participation that promotes large-scale societal transformations, and the development of critical reflections that emerge from a dialogue between two parts with equally recognised interests and agency.

The heritage of the URM programme has shaped how the relationship between the university and society is framed in Latin America, even when the match between projects for transforming universities and real achievements vary considerably from country to country[36] (Arocena and Sutz, 2005). However, this

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[36] The ideas of the URM had a substantial influence in Colombia and Mexico, while in countries such as Peru, Argentina, Bolivia, Uruguay and Venezuela, their degree of influence is such that their Higher Education legislation is directly based on the programmatic agenda of this movement (Arocena et al., 2018). These ideas have overcome both internal and external political, economic and social jolts. According to Brunner (1990) and Arocena and Sutz (2005), the outcomes of the Reform Movement were compromised during the 1970s when Reformed Universities were treated as enemies by military governments at the same time market dynamics began to change quickly the Higher Education landscape in the region. Nonetheless,

relationship has been jeopardised by the increasing pressures on universities to accommodate market demands, new financial arrangements and accountability mechanisms (Torres and Schugurensky, 2002). Furthermore, these pressures have pushed universities to shift from professional to managerial governance models and adopt more hierarchical structures with top-down planning and reduced local autonomy (Martin, 2016).

A direct outcome of this shift is the increase in bureaucratic procedures as different governance styles are layered one on top of the other. More specifically, these procedures and governance styles create tensions between how universities envision themselves (given their historical construction and institutional values) and the performance requirements stemming from a global landscape that stresses research excellence and the production of economically useful knowledge. In consequence, universities have been pushed to adjust their social commitment to be more 'university-specific'. That is to say, to enact their social responsibility through the 'knowledge effect' of academic practice (Arocena and Sutz, 2001).

In addition to these pressures, Latin American universities have been dealing with changes that affect, among other areas, their knowledge production practices. First, Arocena and Sutz (2001) have documented, the stagnation of university budgets and the need to resort to competitive funds. Funding sources for Latin American scholars are less diversified and are often tied to the interpretations of what funders declare should be researched at a country level. These funds also have their own norms – to which universities are compelled to adapt – and often prioritise certain types of research over others. Hence, "research resources are more unevenly distributed than in the past, depending on the type of research, disciplinary orientation and the [individual and organisational] abilities to raise external funds" (Arocena and Sutz, 2001: 1230).

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during what Huntington (1993) called the third wave of democratisation in Latin America, the students movement principles were included in the platforms of the broad anti-dictatorial coalitions (Arocena and Sutz, 2005).

Second, the university discourse in Latin America has changed towards enabling more fluid relationships between university, industry, and government compared to past decades, when universities' commitment to social development and critical consciousness sparked strong confrontations between these and the ruling elites. This change in universities' discourse has been accompanied by a shift in universities' perception of their position in society. Here, social criticism has been replaced by a search for legitimisation guided by their specialised participation in knowledge accumulation and the solution of national problems. As a result, new patterns of social commitment have emerged; less clear and direct than before but enabling universities to play their part from 'within the system' (Arocena and Sutz, 2001).

Third, universities are experiencing the effects of what Arocena and Sutz (2001) describe as '*shorterism*' or the quest for rapid applicability of research results leading to the concomitant danger of putting universities directly at the service of private interests. Acute contradictions in the evaluation system accompany this *shorterism* in research practice. As an example, the increasing efforts to blurry disciplinary boundaries and promote epistemological cross-fertilisation are being jeopardised by research evaluation systems that reward the publication of academic papers in renowned outlets and create disincentives for research projects for which outcomes are hard to turn into publishable pieces for mainstream journals (Arocena and Sutz, 2001).

However, these growing pressures on universities and the experience of eroded control over their knowledge production activities are not experienced equally in all Latin American countries. The lack of diversified funding sources, the prioritisation of the entrepreneurship culture, the marketisation of education and *shorterism* in research practice are resisted and negotiated differently in each national context and higher education institution. The case of the three Peruvian universities studied in this PhD is illustrative of this point.

2.2. The higher education system and universities in Peru: Contradictions and tensions

Universities' right to self-determination is enshrined in Peruvian law. Despite significant transformations marked by growing pressures to adapt university systems to market trends, particularly in their governance and assessment, the current regulatory system recognises the state as the guarantor of the public service of university education. It ensures that quality education is provided in the necessary quantity. Therefore, it is entitled to regulate, supervise and correct competitive market failures in higher education (Benavides et al., 2019, 2016) without contravening universities' autonomy in five core dimensions described in Table 6.2. This means the state acts as an oversight body whose power is limited to designing a set of frameworks and broad policy objectives.

Table 6.2. University's Autonomy Dimensions in Peru's University Law No 30222

Dimension	Focus
Normative	The power of self-determination for the creation of internal norms (statutes and regulations) aimed at regulating the university.
Governance	The power of self-determination regarding the structure, organization, and leadership of the university, according to its nature, characteristics, and needs. It is formally dependent on the regulatory framework.
Academic	The power of self-determination to set the framework of the teaching-learning process within the university. This includes determining the curricula, research programs, and application and closure procedures. It is formally dependent on the normative regime and is the most complete expression of the university's raison d'être.
Administrative	The power of self-determination to establish the principles, techniques, and practices of management systems, such as the organisational structure of its teaching and administrative personnel, with the aim of helping the university reach its goals.
Economic	The power of self-determination to manage and dispose of institutional assets, as well as to establish criteria for the generation and use of resources.

Source: University Law No 30222, Government of Peru.

The current University Law's stress on self-determination in the realms of creating internal regulations; defining the university's structure, organisation, and leadership; setting the frameworks for teaching and research; managing and disposing of institutional assets; and establishing the criteria to generate and use resources embodies one of the prevailing legacies of the URM: *university autonomy.* Such autonomy allows universities to frame their mission and vision

statements according to the values of each higher education institution and, therefore, enables the preservation of elements pertaining to their historical construction.

According to the senior management staff interviewed, the processes of defining the mission and vision of the universities studied drew (directly or indirectly) on the legacy of the University Reform Movement. Their mission and vision statements echo the premise of creating dialogical spaces to catalyse social transformations embodied in the URM's idea of *the social obligation of universities.* By way of illustration, the Head of Academic Training and Research of the Academic Directorate of Social Responsibility (DARS) at the *University 1* mentioned that "the way in which the relationship between the university and society has been conceptualised is an inheritance from the University Reform Movement and is based on the desire to re-think the university" (HATR at DARS, U1).

Comparably, the Director of the Centre for Cultural Extension and Social Projection (CEPS) at *University 2* highlighted that "since its creation, the university has been committed to solving Peru's socio-economic problems through science, engineering and architecture. In that sense, the current policies that foster social responsibility [in the university] follow both the current situation and a historical tradition" (Director of CEPS, U2). Similarly, the Director of the University Directorate for Social Responsibility (DURS) at *University 3*, when asked about the relationship between the mission and vision of the university and the Latin American Reform Movement, explained that:

> "The premises of the University Reform Movement underlie the transformative approach of the university that we have, not with the avant-garde logic of that time [...], but the idea of a university that is committed with change and social transformation to move forward as a nation in terms of justice, solidarity, the acknowledgement of diversity, not in a mono-conceptual logic, but in one that embraces multiculturalism comes from there." (Director of DURS, U3)

These accounts reflect these universities' transformative imprint and the recognition that for it to be actualised, a self-reflective enquiry about how and to what extent they promote social processes that lead to a more *just*, *caring* and *diversity-aware* society is required. Additionally, the *dialogical* perspective between two equal parties (the university and the civil society) has been captured in how these universities have historically framed their teaching, research, and extension missions. Through a simple text mining exercise using the universities' Institutional Strategic Plans[37], an emphasis on development, the solution of national problems, and the generation of value for the community was identified as shown in Figure 6.1.

Figure 6.1 Most frequent words in the Universities 1, 2 and 3's Institutional Strategic Plans
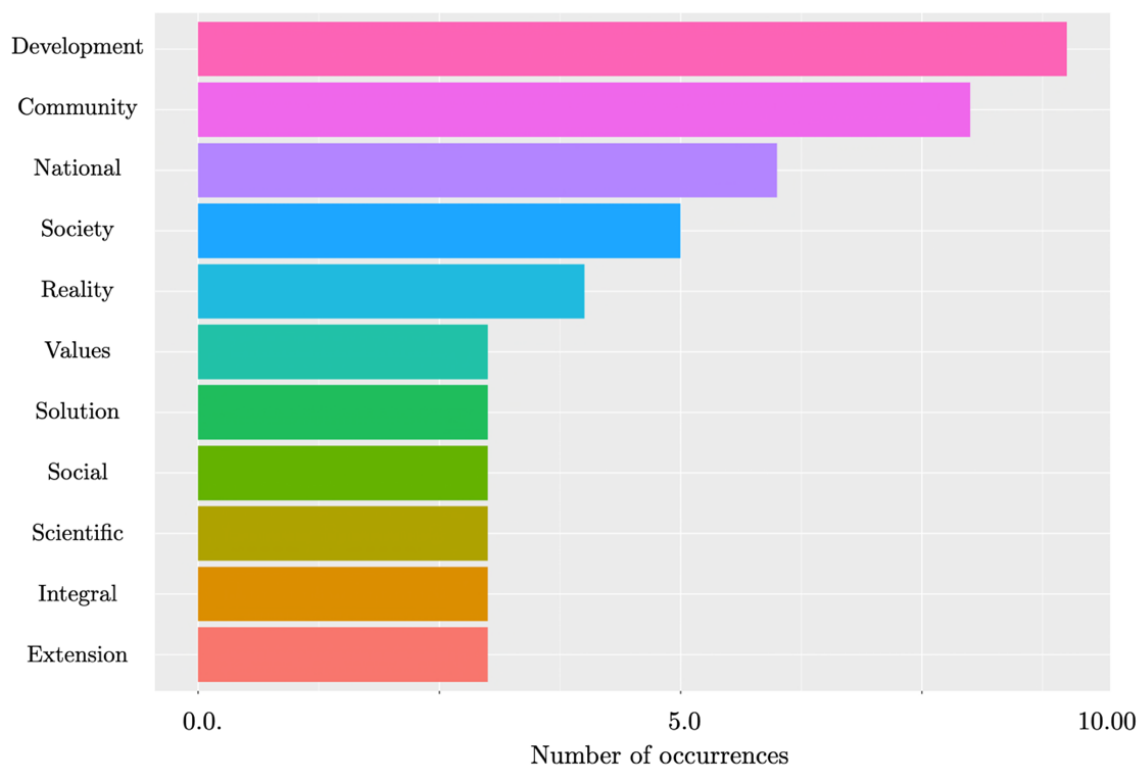
Source: Author's Elaboration based on the Institutional Strategic Plans of the Universities.

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[37] The Institutional Strategic Plan (ISP) is the planning instrument universities used to set out a strategic vision, priorities, objectives, targets, and resource requirements for a period of four to five years.

Table 6.3 Universities functions in the realms of teaching, research, and extension

	University 1	Public University 2	University 3
Teaching & training	▪ Fosters an integral and creative education, based on the constant improvement of educational methods and content, and permanently stimulated by the dialogue between the university community and the society.	▪ Promotes the integral formation of professionals, scientists, and humanists in various disciplines. ▪ Enables continuing education.	▪ Educates responsible citizens, humanists, scientists, professionals, and technicians of high academic and competitive level, endowed with an inquisitive and creative mentality, as well as a critical attitude towards the institution and the national reality, committed to serve society, and thus to contribute to the scientific and technological advancement required for the development of the country.
Research	▪ Investigates reality in all its aspects and particularly the national reality. ▪ Collaborates with society and its institutions in the study and solution of national problems.	▪ Carries out fundamental and applied scientific research, with particular focus on the development of technologies to promote the development of the country.	▪ Conducts and promotes research in the humanities, sciences, and technology, fostering intellectual and artistic creation. ▪ Assumes a global leadership role, promoting reflection on the reality and national and world problems, generating proposals for their study and solution and thus, contributing to the development of the country.
Extension	▪ Promotes the development of moral values and a vocation of service to the community in the students. ▪ Projects its action to the national territory and especially to the community in which it is embedded. ▪ Carries out university extension activities. ▪ Seeks the access and continuity in the University of students who can engage in university work, regardless of their economic capacity.	▪ Interacts permanently with society, through the extension, diffusion, and projection of the University to the country, and the examination of the country's problems in the university community.	▪ Contributes to the full realisation of man and the integral development of society, affirming democracy, the rule of law and social inclusion, orienting the work of the institution towards the person and the community. ▪ Provides professional, scientific, and technical services related to its activity, which were demanded by the community, according to the needs of the country. ▪ Assumes its social responsibility as an institution in charge of training future citizens, professionals and entrepreneurs of the country, and its commitment to create new knowledge necessary for the development and solution of the country's problems. ▪ Promotes moral values and the vocation of service to the community through activities of social projection and university extension.
Other	▪ Seeks the constant improvement of teachers and graduates.	▪ Contributes to human development. ▪ Fulfils other functions indicated by the Political Constitution of Peru, the present Statute, and its regulations.	▪ Preserves and increases knowledge, national values, and the ideals on which cultural diversity is based, to transmit them to the individual and the community. ▪ Promotes the entrepreneurial culture to contribute to the development of the country.

Source: Author's elaboration based on the Institutional Strategic Plans of Universities 1, 2 and 3.

These themes indicate that, in terms of institutional missions, these universities anchor their actions on the desire to sustain a permanent and effective relationship with their environment and participate in both the discussion and proposal of solutions to national problems. Table 6.3. shows these commitments in more detail.

The dialogical conception of the university as a space for the encounter between different parties in society, and its role in addressing prevalent local problems identified in the text analysis, was supported by the accounts of the senior management staff at these three universities. For example, the Pro-Vice-Chancellor of Research at *University 1* said:

> "Our mission is not just to be linked to society in the realm of training professionals and future leaders, but also to contribute to human development, and human development, as we understand it, is much more than GDP. It is thinking about social justice, it is thinking about inequalities...it is thinking about sustainability and gender inequality. In other words, it is really taking society as a space in which human beings should flourish [...], especially in a society as unequal as this one...so discriminatory in every aspect, so lacking in respect for diversity." (Pro-Vice-Chancellor of Research, U1)

Similarly, the Head of the Innovation Management Office at *University 2* indicated that "[...] there is a form of symbiosis in our mass of researchers with the reality of the country but, above all, with the *need* to work here [in the country]." (HIMO, U2). Also regarding the university's role in providing solutions to national problems, the Director of the Centre for Cultural Extension and Social Projection (CEPS) at the same university added:

> "I don't know why in Engineering, interestingly enough, from very early on, a social concern emerged, a social thinking, first in the form of social progressive thinking where the social purpose of engineering is conceived as a call to *build* a country...a prosperous society for its people. So, that is how we always assume it. [...] In that sense, we think an engineer should not take pride in the solidity of his bridges or the length of his roads, but rather in how many people his work is lifting out of poverty because, for us, the aim is to create roads to prosperity." (Director of CEPS, U2)

Lastly, on the same topic, the Pro-Vice-Chancellor of Research at *University 3* argued that:

> "We do research and carry out other activities, not with the idea that we can have interesting publications, nor that this will mean any income for the university, but that we are fundamentally interested in the prevalent problems affecting our population. There is a social aspect to everything we do. For instance, when our researchers design equipment for the early detection of the Mycobacterium Tuberculoso, they do it considering the type of illnesses that are either neglected or that the large part of the population [of Peru] has." (Vice-Pro-Chancellor of Research, U3).

These accounts convey a commitment to the development of solutions for national problems, a sense of responsibility in the transition to a more just society, and an explicit recognition of the social obligation of universities to create spaces for the participation of other societal actors in this quest. In this regard, these universities gather the features of what Arocena, Göransson and Sutz (2018) characterise as 'Developmental Universities'; that is to say, universities committed to social inclusion through knowledge democratisation in the exercise of their research, teaching and extension missions.

While these commitments and values chime with the historical legacies of the URM, particularly with that of the *social obligation* of the university, the analysis revealed important contradictions between the narratives of the senior management staff at these universities, and researchers' assessment of the enactment of these values in universities' day-to-day activities. The following section explains how these contradictions played out in practice and elaborates on the characteristics of the tensions that arose from these diverging interpretations.

2.3. The universities in Peru: Institutional tensions, professional groups, and conflicting understandings

The accounts of the senior management staff presented above indicate that these universities seem to be reluctant to yield to research excellence pressures[38] and that the values permeating their teaching, research, and extension missions are different from those underpinning the call to primarily make universities economically useful actors in society[39]. While these narratives are consistent with the statements in these universities' main planning instruments (i.e., their Institutional Strategic Plans), a different picture emerges from the testimonies of the researchers interviewed.

Three main themes were identified in the narratives of researchers at *Universities 1* and *2* regarding how the social mission of the university is actualised, particularly concerning research. These themes are *less diverse platforms and means for knowledge dissemination, a biased reward system,* and *inconsistencies in the furtherance of research's direction.* Regarding the first theme, most researchers did not oppose the requirements of the universities to publish in reputable journals or develop patentable devices. However, they stressed their disagreement with the little support they received from the university management to publish in other outlets that, for the PIs interviewed, are more consequential in terms of communicating their research results to audiences that are more familiar with the problems they aim to solve. Researcher B's (U1) testimony captures this dissatisfaction:

> "Because of our methods and the type of projects we have, we do not produce the outputs the university wants. The university wants papers and patents. We are completely against that because what we do is open technology. So,

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[38] For example, "we do research and carry out other activities not with the idea that we can have interesting publications." (Vice-Pro-Chancellor of Research, U3); "the social purpose of engineering [for our university] is conceived as the call to build a country...a prosperous society for its people." (Director of the Centre for Cultural Extension and Social Projection (CEPS), U2).

[39] For example, "we do research and carry out other activities not with the idea that [...] this will mean any sort of income for the university, but that we are fundamentally interested in the prevalent problems affecting our population" (Vice-Pro-Chancellor of Research, U3); "Our mission is [...] to contribute to human development, and human development, as we understand it, is much more than GDP" (Vice-Pro-Chancellor of Research, U1).

your [referring to the university's] indicators should be different, like how much impact your projects have on society. We shouldn't be measured by indicators that don't work in our reality because those standards have been made for different contexts." (Researcher B, U1)

This critique of the preferred outlets and outputs valued by conventional research rankings has been reported recurrently by the researchers interviewed. For them, there is little value in producing these types of outcomes because they see them disconnected from the conventional channels they use to disseminate research findings and connect with other Peruvian scholars, primarily in public universities outside the capital.

The second theme – *a biased reward system* – is closely linked to the first. Researchers expressed that they often experience a lack of recognition from the universities' management for research outputs other than publications in three- or four-star journals or the participation in renowned international conferences. The latter are, for instance, rewarded with monetary compensations in these two universities. The amount of money researchers receive varies depending on the journal's number of stars and the prestige of the conference[40]. Researcher C's (U1) testimony echoes this point:

> "I don't earn any points when I go to a conference in Cuzco or Chachapollas [cities in Peru's Andes and Amazon regions respectively], but I do earn points when I go to conferences in Tennessee, to the American Society of Engineering. So, since that doesn't give us any additional money, other researchers look abroad to see if they can attend those conferences and collaborate with other researchers from overseas." (Researcher C, U1).

The third theme highlights a contradiction between these universities' normative orientation to conduct research that addresses national problems and

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[40] According to the guidelines of the "Reconocimiento a la Investigación" (2020) (i.e., the Research Acknowledgement Scheme), launched by the Pro-Vice-Chancellorship of Research at University 1, researchers who publish in four-star journals can receive between S/. 6,500 and S/. 10,000 (the equivalent of US$ 1600 and US$2500 respectively) per publication depending on their seniority. Other publications in peer reviewed journals, as well as books, book chapters, and conference proceedings also receive monetary awards ranging from S/. 650 to S/. 8000 (the equivalent of US$ 150 and US$ 1,970 respectively) per output. For University 2, a public university, the monetary awards are more limited. According to the Plan Único de Investigación (2017) (i.e., the Unified Research Plan), researchers can receive a stipend that ranges between S/. 500 and S/. 2,000 (approximately US$ 123 and US$ 491) depending on the type and outlet of publication.

how researchers perceive the direction research takes in practice in their work environment. The idea of "looking inwards to the territory" (i.e., *mirar hacia el interior del país*), present in the narratives of most of the PIs interviewed, was often followed by a critique of their colleagues' apathy towards this precept. For instance, Researcher A (U1) explained that he reflected on this issue with other peers and concluded that most of their colleagues' research topics are not in touch with the national reality because the incentives of the system push researchers to seek collaborations with universities in the global north on topics that are of interest to reputable journals' readers. Researcher K's (U2) testimony also captures this shared dissatisfaction:

> "It is a shortcoming of Peruvian universities, I think, to look overseas, to look to other countries [...]. In my department [Engineering], we are approximately one hundred and fifty people, and thirty of them are senior professors. So, the productive capacity of the department should be substantial. However, only three or four people are addressing these topics...only a few are trying to push these ideas [those of the social impact of research] forward." (Researcher K, U2)

These themes show how university workers at different levels of the organisation envision research activities and incentives, normatively and in practice. On the one hand, many of the narratives of the senior management staff and the statements in the universities' planning instruments mirror the historical construction of a university called to address prevalent local problems while serving as a space for the encounter between different parties in society. That is to say, a university whose developmental characteristics should create enabling environments for developing innovations that cater to the needs of excluded populations through processes where their full agency and interests are recognised. On the other hand, researchers' testimonies indicate that the incentives put in place by the universities generate the opposite effect. They reward a limited set of research outcomes and mainstream knowledge dissemination outlets, whose importance increases if they reach international audiences.

How can these contradictions be explained? The analysis unveiled that these diverging interpretations emerge from the way in which universities manage the pressures stemming from the performance requirements of a global landscape that stresses research excellence, the production of "economically useful" knowledge, and the rapid applicability of research results. In this regard, while *the senior management staff* – Pro-Vice-Chancellors and the heads of academic management units – is able to maintain the narratives associated with the historical construction of these universities' missions, *the middle management staff* (working at innovation, research management, research evaluation, and technology transfer offices) is often confronted with the task of reconciling market and performance demands with the fulfilment of these missions, and *researchers,* with the challenge of making sense of these contradictions.

In more detail, these contradictions seem to be a consequence of the fundamental differences between *conducting* research – as envisioned by the researchers interviewed – and *managing* research – as an asset that universities can use to climb in ranking ladders and gain legitimacy in the national and global academic landscape. Conducting research and managing it are activities primed by two diverging sets of normative and cultural-cognitive elements: the occupational one – related to the *professional* codes that emerge from the socialisation of researchers with their peers – and the *administrative* ones – related to managerial principles that favour short term efficiency and the legitimisation of the role of universities from *within* the system.

However, reifying these tensions in terms of a clash between conducting and managing research seems insufficient to explain why inclusive innovation patterns recur in these universities, primarily because the elements that shape these patterns are enacted differently in various interaction arenas within these organisations. In this regard, Scarbrough (1999) offers an interesting approach to explain conflicts in organisations that can illuminate why these tensions emerge and how they get *resolved* to create more enabling environments for inclusive innovation. In more detail, by distinguishing between tensions at the institutional,

organisational, and individual levels, it is possible to explain how the enactment of these different normative and cultural-cognitive elements generate tensions at different levels of the organisation.

At the *institutional level*, conflicts derive from the differences between the institutional missions of the universities and the institutions that underpin the call to make universities economically useful actors in society. These institutions exert a powerful influence on how these universities incentivise and manage research. As previously explained, a feature of the Latin American university is that its teaching, research, and extension missions are built upon a dialogical relationship with society. However, the institutions underpinning the production of "economically useful" knowledge and the rapid applicability of research results are often at odds with this feature. They create hierarchical managerial structures, with top-down planning and less autonomy for academic units and departments. These structures hinder universities' capacity to bring together different stakeholders to generate rigorous and relevant outcomes that are both academically and socially accountable.

At the *organisational level*, the conflicts have to do with the demands that the occupational specialisation of researchers place on how research is carried out in these universities. These conflicts can be interpreted as tensions between autonomy and control when organic social relationships are tried to be maintained within the managerial structures of these universities. In other words, they arise from conflicts between the norms and standards pursued by professionals (i.e., researchers and their 'invisible colleges') and management goals (Scarbrough, 1999).

The analysis unveiled that the professional standards and norms standing in conflict with managerial prescriptions are reinforced by two assumptions about carrying out research held by the management staff at these universities. The first one is that research is amenable to managerial control and direction. Most of the researchers interviewed mentioned a growing dissatisfaction with the degree of intervention from the middle management in the development of their research

projects as Researcher E (U1) declared: "My impression is that the Innovation Office [at the university] most of the time wants to meddle in the content of the project. [...] They don't fully understand what we do and, therefore, only put in place control mechanisms that are convenient for them, not beneficial for us".

Similarly, Researcher A (U1) explained: "The university thinks that the breakthroughs we achieve belong to the university, and therefore they want to manage and appropriate them [...]. Since these offices were created [referring to the research evaluation and research management offices], we have had so many problems because they want to control our timeframes and resources". These concerns are also shared by one of their colleagues, Researcher D, who said: "What bothers me the most is the 'micromanaging' and that desire to exert control over how I manage the funds *I* brought to the university and my project" (Emphasis added).

The second assumption identified in the analysis is that research and development (R&D) involves *only* the mobilisation of cognitive capacities. This assumption builds upon the abstraction of the practice of carrying out research from its social context and neglects the processes of sensemaking (described in the previous chapter) that embody the subjective expression of researchers' interactions with that context. Most of the researchers interviewed claimed there is a complete disarticulation between the management staff ideas about their roles and activities and how these are carried out in practice. Researcher D's testimony reflects quite compellingly this second assumption:

> "What I think is that organisational cultures should come from the bottom up. All those ideas coming from the Pro-Vice-Chancellorship of Research and management offices seem absurd to me. If you really want to know how a researcher thinks, you should come and talk to us [...]. I think that all the prescriptions regarding research and social responsibility coming from the senior management are completely disjointed from our daily activities. I keep saying they should come and talk to us, and they just don't do it. All those guidelines and prescriptions should be agreed with us because most of the people 'managing research' in those offices do not have a career doing research". (Researcher D, U1).

These tensions, however, seem to be less acute when we look at the professional composition of these two different groups (i.e., researchers and middle managers). The case of *University 3* exemplifies this point as this university has only less than ten Schools (all focused on health sciences) compared to, for example, *University 1*, which is more diverse in terms of disciplines. All the Pro-Vice-Chancellors and directors of academic units either taught or conducted research in one of these schools, unlike the case of *University 1* and *2*, where professionals are in management roles that have not necessarily had science or engineering training.

Finally, at the *individual level*, there is a conflict between the individual and the wider organisation. Much of the conflict in this sphere arises from problems related to doing research within the constraints imposed by employment relationships (Scarbrough, 1999). The values, beliefs, and self-perceived role expectations of researchers described in the previous chapter steer their activities as university workers, but these norms and values are not shared widely among the body of researchers in these universities. In the cases analysed in this PhD, these elements sparked tensions that needed to be resolved to generate more conducive environments for inclusive innovations. The conflicts described in this section are represented in Figure 6.2.

This discussion underlines the point that research is a social practice nested within relations of employment, managerial control, and organisational missions in developmental universities. The outcome of these relationships often takes the form of tensions built upon two conflicting sets of principles: the occupational one (related to how researchers see their profession) and the administrative one (related to managerial practices) at the *organisational level*. At the *individual level,* these conflicts follow the encounter between the same administrative principles and occupational principles shaped by a particular set of values, beliefs, and role expectations (like the ones described in this research). Lastly, at the *institutional level*, conflicts emerge from the encounter between the institutions permeating the visions and missions of these universities, and the ones

underpinning the call to make universities economically useful actors in society (including the requirements of the calls for funding launched by the Ministry of Productions).

Figure 6.2 Institutional, organisational, and individual conflicts in universities
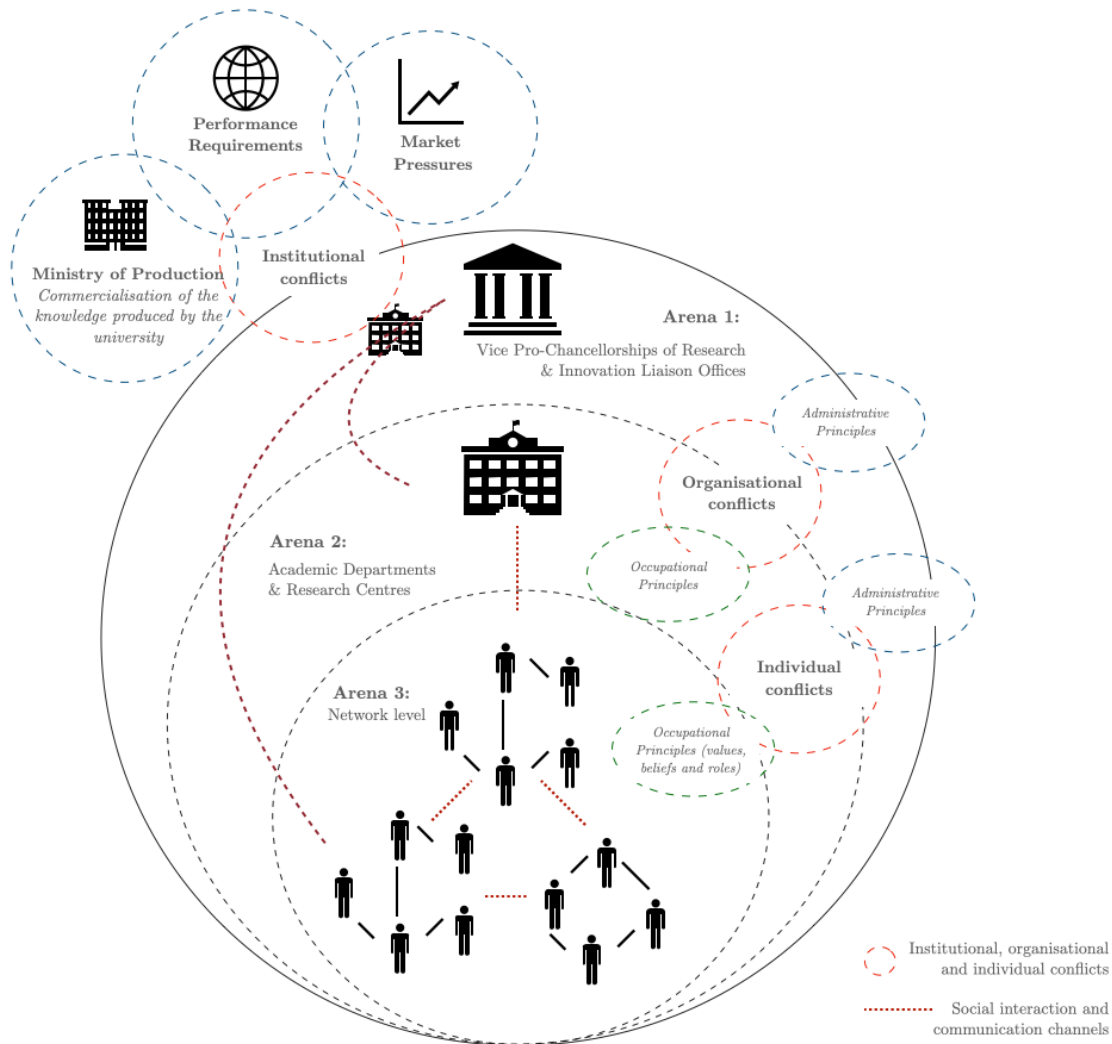
Source: Author's elaboration.

In the following section, the argument will be made that these tensions are confronted in *free spaces* and that the actions and resources that led to the alteration of value systems (which prompted organisational learning and change) were bred and mobilised within these spaces.

3. Sensemaking and change in the organisational environment

The previous section showed that universities are heterogeneous organisations comprised of different communities with multiple goals and nested decision-making processes, echoing the findings of Arocena and Sutz (2021), Cohen and March (1974) and Gioia and Chittipeddi (1991). In this regard, universities are polyphonic entities that host diverse, simultaneous and sequential narratives that variously interweave, harmonise or clash (Currie and Brown, 2003). This means that organisational changes that favour a research agenda that promotes social inclusion cannot be simply introduced from the top-down, even when these universities have developmental inclinations. Instead, changes in this direction seem to be the product of processes where the meanings around inclusion and research are revised and negotiated among different types of university workers.

At the beginning of the chapter, we explained that sensemaking (i.e., the intertwined processes of meaning creation, interpretation and action) is the means by which organising occurs. When these processes are purposively targeted at creating, maintaining, or disrupting institutions, they are regarded in the literature as institutional work (Weber and Glynn, 2016). In other words, when the revision of organisational interpretive schemes and the alteration of value systems within the organisation follows deliberate actions, sensemaking takes the form of institutional work. These processes do not take place in a vacuum. Instead, in complex organisations such as universities, the practices and narratives that underpin these processes are bred and mobilised in *free spaces.*

'Free spaces' is a concept employed to describe small-scale settings isolated from the direct observation of status-quo defenders (Polletta, 1999). This characteristic enables the interaction and the development of an identity and a set of frames that are mobilised to challenge existing rules and practices (Kellogg, 2009; Polletta, 1999). Due to their historical construction and institutional missions, the universities studied are richly contextualised arenas where disparate

actors involve themselves with one another to develop collective understandings that are consequential for the fulfilment of their institutional missions.

It is argued here that this 'relational' characteristic facilitates the emergence of free spaces, but their consolidation is contingent on the leeway agents have to mobilise resources and act. This leeway can be partly explained by the governance structure of these universities, namely, by how loosely or tightly coupled their subunits are. The following sections expound how these forms of governance enabled the consolidation of these spaces, and describe how actors mobilised resources to spark organisational processes of change that favour inclusive innovation.

3.1. The role of autonomy and constituents' leeway in the consolidation of 'free spaces'

The extent to which and how actors trigger processes of organisational change depend, partly, on how much agency (individual and collective) actors have and how much interdependency and differentiation exist in each organisation. That is to say, how loosely or tightly coupled this is (Maitlis and Christianson, 2014). While this differentiation is paramount in the organisational studies literature, these universities are not categorised as tightly or loosely coupled systems in this research. Doing so would be inaccurate and misleading as universities are comprised of interdependent elements that vary in number and strength of their interdependencies depending on what phenomenon is selectively attended.

For instance, these three universities have a long-lasting tradition as leading institutions training future labour force and developing human capital. They perform as tightly coupled systems in terms of curricula enforcement due to the underlying consensus among governing bodies and faculty members on the direction and the enactment of the teaching mission. Nonetheless, this is not the case in other realms of decision-making, such as research. Consequently, loose coupling is an accurate definition to explain how researcher's interdependency and

differentiation influenced how they collectively acted to alter value systems within these universities.

The accounts of the senior management staff at *Universities 1* and *3* indicate less interdependence among these universities' subunits regarding how the research and extension missions' activities are carried out compared to the guidelines put in place by these universities' governing bodies concerning teaching. In the specific case of *University 1*, how the university is governed (i.e., the heads of academic departments have a similar degree of power and authority as Pro-Vice-Chancellors) favours the loose coupling of its subunits as reflected in the testimony of the Head of Academic Training and Research of the Academic Directorate of Social Responsibility (DARS):

> "We as a university are [...] not a unitary entity [...]. Now, there is an important element here related to how the university has functioned historically. The university does not have clear dynamics for linking units and bodies. *The university is very much driven by intuition, beliefs, and individual commitments.* [...] In practice, for me, we are a feudal model that is moving towards a unitary state that is trying to be, at the same time, decentralised. For that reason, the Heads of Departments, the Deans, have no boss. They are the highest authority in their unit. Pro-Vice-Chancellors cannot, for example, give orders to them. They can only generate filters and provide support. They are at the same level of authority [of Pro-Vice-Chancellors] for all that has to do with their unit." (Emphasis added) (HATR at DARS, U1)

The loose coupling of this university is reflected in the difficulties the senior management staff encountered to consolidate a unifying vision of the university's social responsibility that could reshape research practices. These difficulties, according to the management staff at the Academic Directorate of Social Responsibility, followed researchers' different interpretations of the values underpinning this approach, which were reinforced by their beliefs and individual commitments.

In a similar vein, the Director of the University Directorate for Social Responsibility (DURS) at *University 3* highlighted that their attempts to consolidate and implement their university social responsibility approach have

been resisted, not by academic departments as in *University 1*, but by research clusters. His testimony illustrates the disconnection between what the university declares in terms of its social commitment in the realm of research and what happens in practice in each subunit:

> "To what degree is the university committed to what it declares is always the issue [...]. The university is not a homogeneous whole; it is very heterogeneous. There are groups and groups. [...] And look, here there is such a level of empowerment of the small but very strong core of researchers that sometimes they set the rules of the game and, for better or worse, many people have to 'look them in the face' [*please them*]." (Director at DURS, U3)

These accounts reveal that while the Engineering and Science Departments at *University 1* developed their own narratives and understandings regarding social responsibility, in the case of *University 3,* the research clusters were the ones that resisted the penetration of a top-down proposed approach in their daily routines. Therefore, in these universities, academic departments and research groups act as spaces that isolate themselves from the direct intervention of the management staff. This isolation is facilitated by how these universities have functioned historically: distributing more evenly the power to make decisions among their subunits.

The case of *University 2* presents a different scenario. As a public university, tight coupling (i.e., the strong interdependence of an organisation's subunits) tends to be the rule rather than the exception because the accountability mechanisms used in this organisation operate similarly as in any other public entity. However, despite having a mandate to implement regulations coming from the university's governing bodies (including those of university social responsibility), researchers were able to convince the authorities to maintain their independence by making their research centre an autonomous unit as the Director of the Centre of Renewable Energies explained:

> "Fortunately, what we have is independence. We had the risk of being integrated into that structure [the Pro-Vice-Chancellorship of Research] because, naturally, if it has to do with research, it must be there. We had

several meetings with [the Vice-Pro-Chancellor of Research], and we had a hard time convincing him that the centre needed independence." (Director of the Centre of Renewable Energies, U2)

This independence allowed the research centre to become an isolated space within the university structure, which impeded the penetration of research and social responsibility guidelines stemming from the governing bodies.

Loose coupling implies that organisational levels and components have limited influence on each other because of the presence of multiple (and often conflicting) goals (Murphy and Hallinger, 1984; Orton and Weick, 1990). The accounts presented show that these universities do have responsive components, but that these are decoupled in some respects as exemplified in the resistance of academic departments, research collectives and centres to the narratives around research and extension activities fostered by these universities' management staff.

Figure 6.3 Tight and loose coupling of Universities 1, 2 and 3
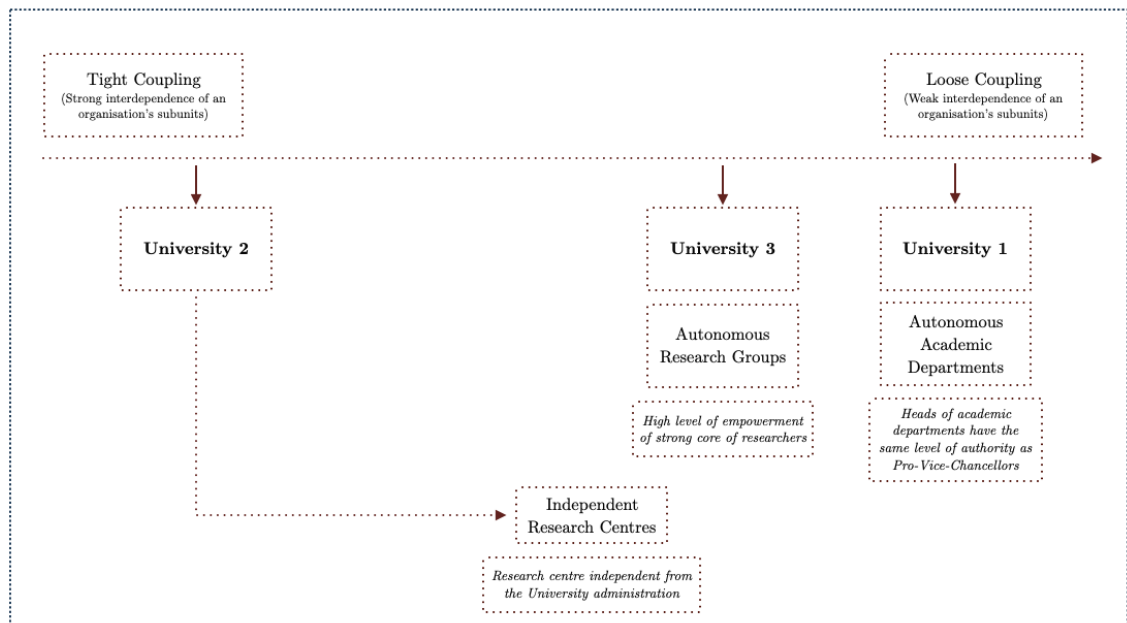
Source: Author's elaboration.

As coupling is a spectrum, the universities studied can be situated in a range that goes from tight to loose coupling depending on how isolated these *free spaces* are from the direct control of the management staff. That is to say, depending on

how autonomous these academic departments, research centres and groups are within the structure of the universities in the realm of research and social responsibility as shown in Figure 6.3.

The following section explains how these spaces enabled the development and mobilisation of the resources used by researchers at *Universities 1* and *2* to resolve the tensions deriving from the conflicts between *occupational principles* (related to their profession) and *managerial ones* described in the previous section. Additionally, it shows a correspondence between the resolution of these conflicts – through the alteration of organisational interpretive schemes – and the partial and prominent changes in the organisational structures of these universities. These results are used later to compare *University 3*, where no partial or prominent organisational changes were identified in the analysis.

3.2. Organisational sensemaking: Oppositional frames, identities and pathways for learning and change

a. Oppositional sense of efficacy, oppositional identities, and frames for organisational sensemaking

The loose coupling of academic departments and research centres in the cases of *Universities 1* and *2* enabled the development of an *oppositional efficacy,* an *oppositional identity* and the bolstering of a set of *oppositional frames* anchored in researchers' professional values. More specifically, the analysis showed that researchers built *oppositional efficacy* – a sense that their collective-action efforts against the management staff's prescriptions around research and social responsibility could trigger changes at the organisational level – because they received support from the heads of department and the directors of their research centres. For instance, Researcher A at *University 1* explained that all the Heads of the Engineering Department with whom he worked supported researchers' views around the nature and aim of their research activities, even when their outcomes did not help the university to climb in ranking ladders:

"All the Heads of Department, without having the obligation or the mandate, thought that this has to be done in this way [supporting research projects that seek to benefit disenfranchised communities]. None of the six or seven I worked with during the last twenty-nine years has broken the mould or the pattern [...]. For example, when the Civil Engineering researchers asked for their support with their 'adobe' project[41], they backed them instead of asking them to work on topics related to big construction and its new technologies. They have always supported them to continue with their line of work, not to abandon it. The same with us." (Researcher A, U1)

In the case of *University 2*, the Director of one research centre advocated for the promotion of research and social responsibility practices aligned with the researchers' values, beliefs and role expectations described in the previous chapter. Interestingly, in both universities, this *endorsement* is the result of the double role the departments and research centres leaders' hold within the structure of the universities. More specifically, while they engage in management tasks due to their leadership responsibilities, they carry the professional values distinctive of the 'researcher' as a type of university worker with them. Researcher B's testimony echoes the leaders' interiorisation of these professional values, and comprehensive understanding of the practice of carrying out research (compared to managing it):

"As the leader of the department, they internalise the same values and principles that we have. This means that the willingness and intention to support us is there; it is palpable. In that sense, there is no Head of Department who hasn't got our back". (Researcher B, U1)

Furthermore, the *oppositional efficacy* built in these spaces also followed a rooted idea in the collective mind of researchers: the notion that their actions, even when they stand against the prescriptions of the senior management, are beneficial for the university. By means of illustration, Researcher F said: "If the people working within the university would only follow what the administration

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[41] Adobe is a mixture of earth and straw made into bricks and dried in the sun that is widely used to build houses in poor rural areas in Peru. The project to which the interviewee refers sought to modify this material to make it more resistant to earthquakes.

of the university [referring to the senior and management staff] says, I think we would have achieved far less than we have." To this, he added that, according to his and colleagues' views, "the university accomplishes more through informal mechanisms and practices than through formal ones. This is very particular of Latin America; in Germany, this would never happen". (Researcher F, U1).

In a similar vein, researchers at the University 2 anchored the sense that their collective action could be successful (i.e., *oppositional efficacy*) in previous experiences. Particularly, Researcher K highlighted that although their centre lacks university funding (because of its autonomy), they managed to continue producing outcomes that are both valued by them and beneficial for the university:

> "This centre has no budget from the university, not one *sol* [Peruvian currency], and we have survived for thirty years. The only support they have given us has been administrative, but despite this, we have done what we thought was good for the university and us." (Researcher K, U2).

Lastly, the interview data showed that a crucial element in the construction of this sense of *oppositional efficacy* was that leaders in both research centres and departments made a conscious effort to communicate their views on research and its role in development to the universities' management staff. For instance, Researcher E (U1) said that the head of the Engineering Department was always eager to make their observations known in the meetings he held with the senior management staff at this university. Similarly, the Director of the Centre for Renewable Energies (U2) explained that he is constantly communicating to the senior management staff the importance of the type of research they carry out and trying to convince them that other centres and departments in the university should apply their concept of research and social impact.

The endorsement researchers received from the heads of departments and directors of research centres has been consequential for providing legitimacy to these spaces. In this regard, these spaces are shielded from managerial pressures that otherwise might have affected the direction research takes in these

universities. Thus, this endorsement not only helped to reinforce the idea that collective action could be successful but also facilitated the reproduction researchers' narratives and practices regarding research and its role in development in these spaces.

In addition to building a shared sense of assurance that their collective action could prompt changes in how the university manages research and advocates for social responsibility, researchers developed an *oppositional identity* by drawing boundaries between "them" (the senior and middle management of the universities and researchers at other academic departments) and "us" (researchers in these spaces who are similarly situated and like-minded). In the case of *University 1*, they did this by differentiating their work from the one carried out in other academic departments and identifying that the narratives and practices promoted by the senior management served better their colleagues in other disciplines.

Most of *University 1* researchers claimed that these practices and narratives are *unrepresentative* and *non-useful.* Some of them specifically argued that the framing does not capture the day-to-day activities and understandings of engineers and that these approaches suit better the research undertaken in the Social Sciences and Humanities academic departments. The testimony of one of the researchers interviewed reflects quite compellingly the opinions gathered from their colleagues:

> "The university social responsibility that we developed is different from the one that our colleagues in the Social Sciences and Humanities (and other Departments like Law, Education and Psychology) developed. Their logic is different from ours. For example, the fact that I work on issues related to [natural] disasters means to me that I am doing something socially relevant, but they [the senior management] don't see it that way. [...] Also, in several meetings of the Engineering Department, several colleagues have felt that the sense of social responsibility in the university has more a vision of Social Sciences than an Engineering one." (Researcher I, U1)

As *University 2* is a Science, Engineering and Architecture-focused university, the *oppositional identity* researchers built in these spaces was not predicated on a differentiation between them and researchers in other disciplines. Instead, they

referred to the extent 'politics' guide the actions of other university workers. In this regard, the boundaries they drew between "them" (the management staff at the university) and "us" (like-minded researchers in these spaces) were built upon rejecting the exchange of favours and other political dynamics. This is mainly because they rejected compromising their research activities to favour individual agendas. The testimony of the Director of a research centre (U2) reflects this view:

> "In the university, everything is political: posts are fought over, and as the Vice-Chancellor is elected, people are always trading favours to get votes. If you vote for me, then I can help you. That is the motto. So, to avoid this, we became independent. Precisely, that has allowed us to act with more freedom because when you belong to an academic department, you are subject to what the dean on duty says. Deans are also elected, so everything runs based on favours. So, some people in power positions do not really have the knowledge or skills for the post, and it is sad, it is terrible because the university is the one that loses" (Director of a research centre, U2)

Finally, in addition to building a sense of *oppositional efficacy* and developing an *oppositional identity*, researchers at *Universities 1* and *2* found in these spaces the means to bolster their *oppositional frames* – which highlight problems with the traditional system. Earlier in the chapter, we showed that researchers believe there are inconsistencies in the furtherance of research's direction, a biased reward system, and a preference for a limited number and type of platforms for knowledge dissemination in their universities. These narratives reflect researchers' frames around research and social responsibility and show how these are rooted in the norms and standards of their occupation but shaped by a particular set of values, beliefs, and role expectations. These frames are deeply intertwined with their sense of efficacy and identity because all these elements are embedded in what these researchers see as their *profession.*

Interestingly, these frames not only highlight differences between university workers (i.e., the ones who carry out research and the ones who manage it) but also prescribe collective-action solutions for those challenging the *status quo* (Snow et al., 2006). In the cases of *Universities 1* and *2*, these solutions had to do

with putting in place mechanisms to reward unconventional research outputs; ensuring better coherence between the mission of the universities in the realm of research and the direction it takes in practice; and supporting the dissemination of knowledge through platforms that are more relevant in the national context.

The case of *University 3* presents a different scenario. Although the analysis revealed that an *oppositional identity* and *oppositional frames* were built and bolstered in this university's free spaces, researchers did not see the need to collectively act to change *the status quo*. Consequently, no sense of *oppositional efficacy* was developed, and no shielding for these spaces was needed. As explained earlier, research groups in this university have enough power to set 'the rules of the game' in the realm of research. One of the testimonies from a senior manager is quite revealing in this regard. The Director of the University Directorate for Social Responsibility (DURS) said that because of his close relationship with the Pro-Vice-Chancellor of Research (mentioning that he is one of his best friends), he told him that the management staff have no power over the research groups, and, in response, the Pro-Vice-Chancellor acknowledged he indeed had several limitations enforcing top-down guidelines in this realm.

Another element reinforcing the lack of development of a sense of *oppositional efficacy* in this university is that most of its research centres, and therefore groups, are located in different parts of the country. Besides this physical decentralisation, they attract their own funding and have unique governance structures. This means that despite being affiliated *de jure* to the Pro-Vice-Chancellorship of Research, *de facto*, they are autonomous entities as explained by the Pro-Vice-Chancellor of Research (U3):

> "We also have six research centres that depend to some extent on the Vice-Pro-Chancellorship of Research, but these centres are autonomous. In other words, they generate their own resources and have their own ways to organise and govern their activities." (Pro-Vice-Chancellor of Research, U3).

Consequently, while researchers drew boundaries between "us" (who carry out research) and "them" (who hold an administrative role in the university) based on

the meaning they constructed around research impact, they did not collectively mobilise their agency to alter organisational value systems. They did not need to act from within these free spaces because the value systems operating in the university do not represent a barrier to enact their values, beliefs and role expectations though their research activities as opposed to the cases of *Universities 1* and *2.*

To summarise, despite the fine-grained differences among these three universities, we explained how the isolation of free spaces from these universities' governing bodies enabled the bolstering of *oppositional frames* and the development of an *oppositional identity* among similarly situated and like-minded researchers. However, the sense that researchers could push for organisational changes that would reflect their narratives and expectations was observed only in *Universities 1* and *2.* Researchers in *University 3* did not see in the *status quo* any barrier to carry out their research activities, which prevented the development of a sense of *oppositional efficacy.* The following section shows a correspondence between the development of these identities, frames, and oppositional sense of efficacy with the organisational changes that took place in these universities, and explains how organisational learning took place in these settings.

b. *Partial and prominent organisational reconfigurations: Two pathways for organisational learning and change*

The previous sections showed how researchers' alternative value systems found fertile ground in shielded environments (i.e., free spaces) within these universities. This section argues that there is a correspondence between the mobilisation of these alternative value systems (through oppositional identities, frames, and a sense of oppositional efficacy) and the partial and prominent organisational changes observed in these universities. In the cases of *Universities 1* and *2*, the mobilisation of these oppositional identities, frames and sense of efficacy led to comprehensive and partial organisational reconfigurations that allowed: *i)*

rewarding unconventional research outputs; *ii)* better coherence between the mission of the universities in the realm of research and the direction it takes in practice; and *iii)* support for the dissemination of knowledge through platforms that are more relevant in the national context.

In more detail, *University 1*'s governance structure (loose coupling) and the combination of these identities and frames provided the members of the Engineering Academic Department with the means to reconfigure the Department's governance structure. This reconfiguration entailed the creation of an internal structure that mimics the one currently in place for the governance of the entire university. This is the only academic department in *University 1* that has directions for teaching, research, continuous training, and social responsibility, as indicated by Researcher A:

> "We are replicating the university [governance structure] within our *fortress*. We are working on that by creating a space to build our own support units, not only for research, but also for continuing education and social responsibility. Of course, because if what it is outside [referring to the university governance structure] doesn't help you or only works for other interests or other departments [such as those of the Departments of Social Sciences and Humanities], if it cuts you off in what is critical, you can't put your trust in that." (Researcher A, U1)

This account was confirmed by the Pro-Vice-Chancellor of Research, who, despite arguing that it was good to see a new model of governance in this department, showed some concern regarding how this new design would affect the current relationship between the Engineering Department, and the Pro-Vice-Chancellorship of Research and the Academic Direction of Social Responsibility:

> "The Engineering Department has realised its full potential, the enormous potential it has...and not only its potential but they are aware of results they are having. Their rate of publications and research products has grown exponentially, and the number of grants they attracted from funding agencies such as Concytec [The National Council for Science, Technology, and Innovation], PRODUCE, and other international organisations is huge. So now they have their own units to support innovation, research, and social responsibility, which I think is very good. However, the question that remains is whether this will mean that in the long run, each department will

have its own mini–Vice-Pro-Chancellorship and its own innovation office."
(Vice-Pro-Chancellor of Researcher, U1)

Furthermore, the sense of oppositional efficacy of the faculty members
(primarily the one predicated on communicating their interpretive schemes
around research to other university stakeholders) enabled them to reach other
management units in this university like the Innovation Office. According to the
Head of this office, their interactions with the researchers interviewed pushed
them to create a new division for 'social innovation' within the office. This
initiative followed the realisation that not all the R&D projects developed in the
university catered to the innovation for productivity and competitiveness
paradigm but that, instead, they were underpinned by a community-oriented
rationale:

> "We realised that not all technologies produced in the university can have a
> commercial end. So, a new stage is beginning for us where we are moving
> towards promoting social innovation. And social innovation for us has to do
> with those technological developments that are not intended to be
> commercialised but are very important for other populations." (Head of the
> Innovation Office, U1)

In the case of *University 2*, the independence achieved by the research centre
from the central administration and the resources mobilised by researchers
allowed them to make changes that favoured their preferred ways to organise
research activities, target beneficiaries, apply for external funds and disseminate
their research results. These changes are moderate compared to the depth and
scope of the ones achieved in *University 1* (i.e., restructuring an academic
department and changing the structure of the university's innovation office).
However, the freedom they obtained not only allowed them to carry out changes
within their subunit but also to scape political dynamics that favour individual
agendas as remarked by the Director of the Centre of Renewable Energies (U2):

> "We have done interesting, important things. Some people are happy with
> what we have done, but that was because we left and were independent.
> Precisely that has allowed us to act with more freedom because when you are

in the faculty, you are subject to what the dean on duty says." (Director of the Centre of Renewable Energies, U2)

Finally, in the case of *University 3*, the autonomy of research groups and the little influence the senior and middle management staff exerted on them indicates that researchers did not require to alter current value systems to organise research activities in a way that is coherent with their values, beliefs and role expectations. Unlike *Universities 1* and *2*, the degree of decoupling of *University 3*'s subunits and the position of research collectives in the organisational structure created a *status quo* that did not need to be subverted. Hence, no prominent or partial reconfigurations took place in this university. Table 6.4. summarises the findings presented in this section.

Table 6.4 Oppositional frames, identities and change in universities

	University 1	University 2	University 3
Coupling	Loose Coupling	Tight Coupling (with achieved independence)	Loose Coupling (in practice)
Oppositional identities	Yes (differentiation based on disciplines and roles)	Yes (differentiation based on interests and behaviours)	Yes (differentiation based in roles)
Oppositional frames	Yes (built upon their values, beliefs and role expectations)	Yes (built upon their values, beliefs and role expectations)	Yes (built upon their values, beliefs and role expectations)
Oppositional sense of efficacy	Yes	Yes	No
Organisational reconfigurations	Prominent	Partial	Non-existent

Source: Author's elaboration.

According to Crossan et al.'s (1999) model for organisational learning, there are four processes through which learning occurs in organisations. As a multilevel process, these processes connect the learning taking place at the individual, group,

and organisational levels. These processes are intuiting, interpreting, integrating, and institutionalising.

Intuiting is the "recognition of the patterns and/or possibilities inherent in a personal stream of experience" (Crossan et al., 1999: 525). This process takes place at the individual level as individuals develop novel insights based on their experience and their ability to ascertain underlying or potential patterns in that experience (Lawrence et al., 2005). Interpreting entails "the explaining, through words and/or actions, of an insight and idea to one's self and to others" (Crossan et al., 1999: 525). Thus, interpreting while beginning at the individual level, moves on to include other individuals through conversation and dialogue. Through this process, ideas are made explicit, named, and incorporated into cognitive maps that allow to relate these new ideas to external domains.

The third process, integrating, is the first that takes place at the group level. It entails "developing shared understanding among individuals and taking coordinated action through mutual adjustment" (Crossan et al., 1999: 525). The focus of this process is the accomplishment of coherent, collective action (Lawrence et al., 2005). Institutionalising is the final process; it signals that learning has occurred among individuals and groups, and it is now embedded into organizations through "systems, structures, procedures and strategy" (Crossan et al., 1999: 525).

The evidence presented indicates that *intuiting* and *interpreting* took place in these three universities. Researchers, as explained in chapter 5, developed insights around research and social inclusion based on their experience, identities, and status. These insights were turned into more coherent accounts in sensemaking processes where their values, beliefs, and role expectations acted as priming, editing, and triggering mechanisms that led them to repurpose two policy instruments and develop their research projects. Interpreting took place when these insights and ideas were explained using researchers' channels of communication and socialisation to other similarly situated and like-minded researchers within their research groups, centres and academic departments,

shaping the values systems and cognitive frames around research and inclusion of these groups of researchers.

However, while these two processes took place in all three universities, different patterns started to emerge regarding *integrating* and *institutionalising*. The chapter expounded that not only is there a shared understanding among the members of the Engineering Department and research centres at *Universities 1 and 2,* but that researchers engaged in coordinated action to change organisational interpretive schemes, sparking prominent and moderate changes in these universities' organisational structures. These processes of sharing common understandings with other members and their department and centre's leaders signals *integration* in these two organisations, and the changes observed indicate *institutionalisation.*

In more detail, in the case of *University 1*, the changes observed evidence the institutionalisation of researchers' views on research and inclusion. This is exemplified in the incorporation of a 'social innovation' division in the university's Innovation Office and the creation of a University Social Responsibility Direction within the Engineering Department. The moderate changes observed in *University 2* indicate that only integration took place, as the limited scale of the changes did not allow for the institutionalisation of a research culture that mirrored researchers' values and beliefs around inclusion outside the research centre.

In the case of *University 3,* researchers did not engage in collective action (i.e., mobilising their oppositional frames and oppositional identities) to create enabling environments at the organisational level where inclusive innovation patterns could recur. This means that neither integration nor institutionalisation took place in this university. Figure 6.4. captures the differences between these universities.

Figure 6.4 Organisational learning in Universities 1, 2 and 3
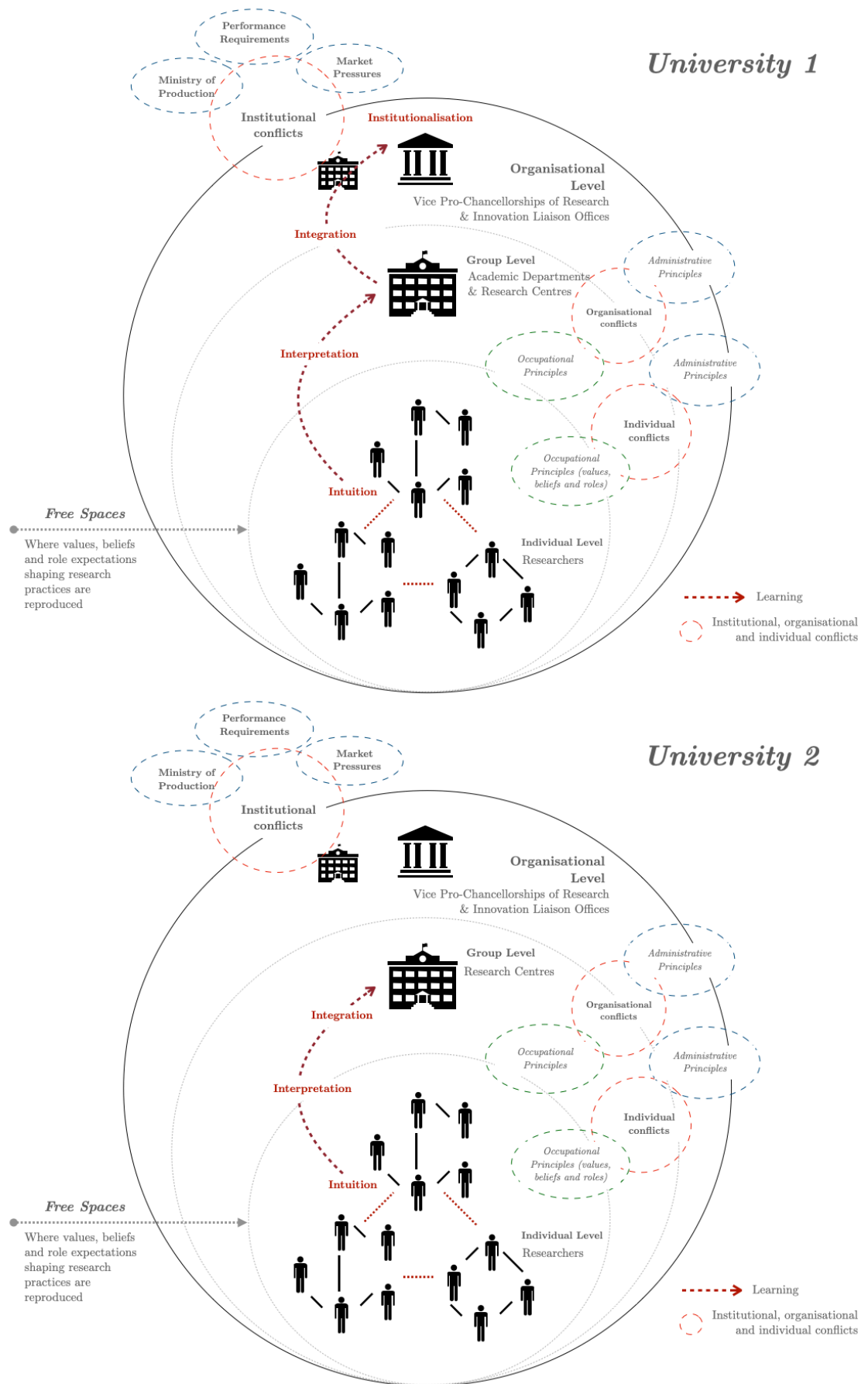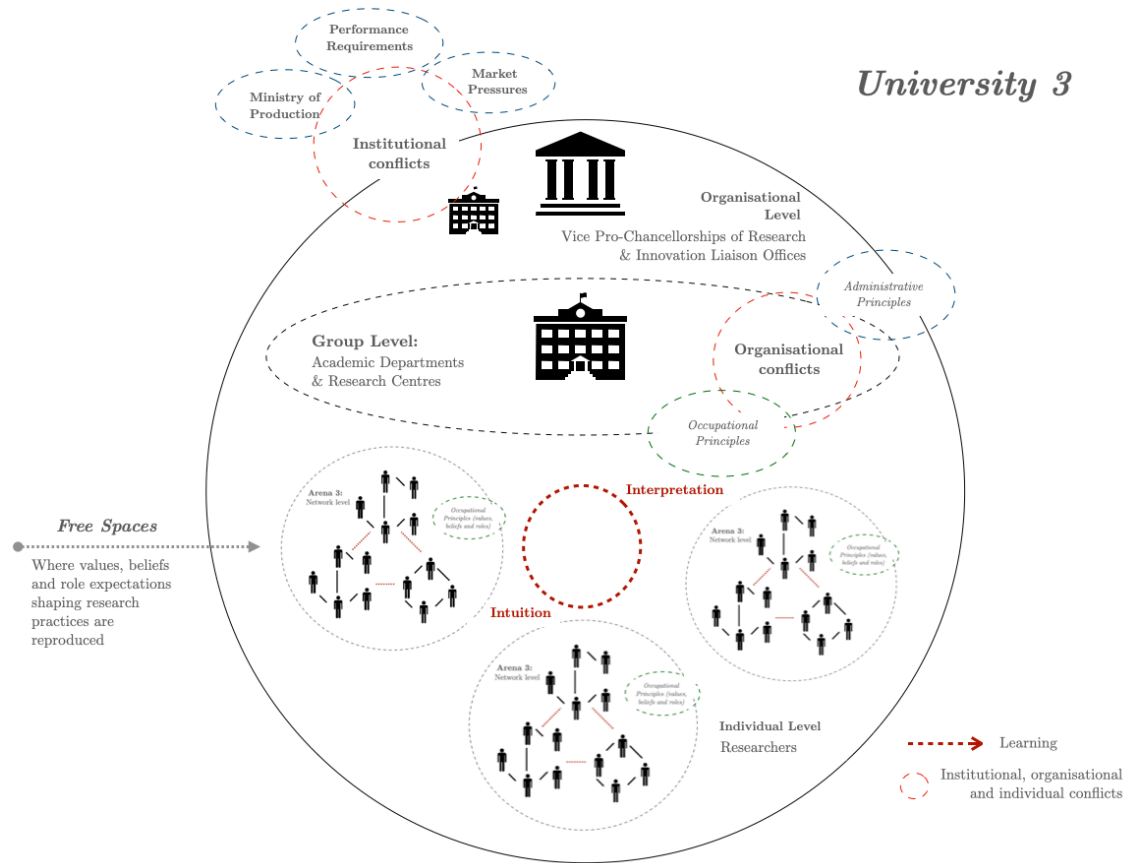
Source: Author's elaboration.

The results presented in the chapter indicate that universities host different types of university workers who construct meanings around activities that are consequential for fulfilling universities' missions based on their positions, interests, and backgrounds. Furthermore, the chapter showed that these differences are further influenced by tensions arising from institutional (institutional missions *versus* market and performance pressures), organisational (professional *versus* managerial ways to organise research) and individual conflicts (specific sets of values, beliefs and role expectations permeating research's direction and management). These differences prompt university workers to constantly revise, negotiate and develop new meanings around these initiatives, and show, at the same time, that research and inclusion activities are embedded within relationships of employment, managerial control, and organisational missions.

This finding indicates that the developmental inclination of the universities studied in this PhD only partly explains why they act as environments in which

inclusive innovation can emerge. In this regard, their historical construction and institutional missions enable them to act as richly contextualised spaces where researchers can choose to produce the knowledge that underpins inclusive innovations. However, market and performance pressures and the different ways in which management deal with these constraints hinder universities' capacity to provide an organisational environment that fully supports research endeavours guided by a social inclusion agenda.

Therefore, at the *network level*, researchers have the autonomy to produce research aligned to their values, beliefs, and role expectations and mobilise their agency to repurpose policy instruments accordingly. Nonetheless, at the *organisational level*, the chapter demonstrated the importance of having shielded spaces where *oppositional identities, frames* and *a sense of oppositional efficacy* can be constructed and bolstered. Lastly, although we are not establishing causality between the mobilisation of these elements and the changes observed in these universities, there is a clear correspondence between the mobilisation of these elements and comprehensive and partial organisational reconfigurations in these universities.

The evidence presented in the chapter allowed us to distil that this correspondence is mediated by the alteration of organisational interpretive schemes beyond the boundaries of these free spaces, but also shed light on show how organisational learning took place in these cases. More specifically, *University 1* displays all the basic elements of organisational learning (i.e., intuiting, interpreting, integrating, and institutionalising), which means that sensemaking and collective action changed values systems, structures and procedures in this organisation. Given that the collective action of researchers did not transcend their research centre, only the processes of intuiting, interpreting and integrating were observed in the case of *University 2*. This means that the values, beliefs and role expectations that shape research practices within this subunit are not embedded in the university as an organisation. Finally, as researchers in *University 3* did not need to alter the *status quo* to organise research activities in

a way that is coherent with their values, beliefs and role expectations, only intuiting and interpreting took place in this organisation.

4.   Chapter summary

The chapter painted a picture of how researchers altered organisational interpretative schemes and explained how these alterations – fuelled by the construction and mobilisation of *oppositional identities, frames,* and *senses of efficacy* – are consistent with the organisational reconfigurations observed in these universities. In this regard, the theoretical elements stemming from the institutional, organisational, and social movements' literature allowed us to unveil how meanings around research and inclusion are revisited and negotiated in developmental universities.

More specifically, these elements helped us demonstrate that while the historical construction of the universities studied makes them fertile arenas where inclusive innovations can emerge, performance and market pressures and managerial structures prompted researchers to create strategies to shield and protect their research agendas around inclusion. In this regard, the broad term "*developmental university*" explains only partially how research – as a university mission – is coupled with the overarching goal of social inclusion. The cases analysed showed that the *purposive action* of researchers is also necessary to understand how research agendas and supportive structures for inclusive innovation become institutionalised and recur despite the tensions arising from the encounter of different logics (at the institutional level), principles (at the organisational level) and values (at the individual level) in these universities.

Finally, the cases analysed in this PhD illustrate how bottom-up processes led to the alteration of organisational interpretative schemes, and how these changes are related to the non-existent, partial, and prominent organisational reconfigurations observed in these universities. Furthermore, the evidence

presented shows that not all these bottom-up processes can lead to embedding learning in the organisation. In other words, while these results confirm that sensemaking sparks processes of intuiting, interpreting, and integrating, other contextual variables (including the coupling of the organisations' subunits, and the way in which oppositional frames, identities and oppositional senses of efficacy are mobilised) may affect whether institutionalising (i.e., when the learning is embedded into the organisation through systems, structures and procedures) and, hence, learning occurs at the organisational level. In the next chapter, we discuss in detail the contributions of the thesis to this body of literature.

Chapter 7

Discussion and Conclusions

1. Overview

This chapter brings together the findings of the three empirical chapters to answer this thesis's overarching question, and reflects on the implications of this study. Section 2 begins by recalling the gap addressed in this research and restating the research's findings for each subsidiary research question. These findings are used to refer back to the relevant literature discussed in Chapter 2 and to build up the thesis's contributions to the literature on inclusive systems of innovation. Section 3 reflects on the thesis's methodological approach and limitations. Subsequently, this section gives consideration to the scope for generalising this study's findings and suggest three areas for future research endeavours. Section 4 outlines the research implications for policy and extends these reflections to senior management staff, researchers at universities and communities and community leaders. The last section presents the concluding remarks that emerged from this work.

2. Contributions to the literature

The double challenge of achieving sustainable and inclusive development has intensified scholars' interest in revisiting the national systems of innovation framework and in particular to address the negative externalities of innovation-related activities (Johnson and Andersen, 2012). In this regard, a substantial amount of literature focusing on Global South countries has paid particular attention to the role of social relations and institutions in enabling innovation

practices that benefit excluded communities. This literature, systematised under the concept of *inclusive innovation*, has moved away from depictions of innovation focused on research and development in high-tech activities to engage in a more nuanced discussion of the interactions between social institutions, financial and education systems, and market (and non-market) conditions in the development of innovations (Gu and Lundvall, 2006), creating a new line of enquiry through the *inclusive systems of innovation* framework.

This shift reinvigorated a wider debate about innovation's direction, particularly in respect to the role of institutions in enabling or hampering the democratisation of knowledge, the broadening of people's participation and the redistribution of innovation benefits. While this literature has yielded important insights to understand how systemic interactions may enable change in this direction, the arguments examined in Chapter 2 draw primarily on the *ex-ante* dimension of the national systems of innovation framework. This means that rather than using the systems of innovation framework as a 'focusing device' to organise and explain stylised facts underpinning innovation processes (Lundvall, 2007), they build on the framework's *normative* and *evaluative content* to chart routes towards innovation systems where 'inclusiveness' stands as a central feature.

In more detail, this literature proposes to modify systems' core structures and processes components (namely, innovation, actors, learning, relations, and institutions) to allow for particular features of inclusive innovation (Foster and Heeks, 2013), and to identify and incorporate excluded actors and institutions so "the operation of the system, as a whole, can be modified and improved" through systemic instruments (Grobbelaar et al., 2017: 9). Other arguments suggest that, in contexts where the market is not the main institution inducing and diffusing innovation, systems of innovation can promote and make visible the demands of disenfranchised groups in society by leveraging the social commitment of the developmental university (Arocena et al., 2018, 2015). Here, the articulating role of the university can be mobilised to enable the expansion of advanced knowledge

capabilities and solve collective problems, primarily in Global South countries (Arocena et al., 2018, 2015; Arocena and Sutz, 2014, 2005, 2001).

While, conceptually, the first set of arguments propose coherent avenues to prospectively guide policy interventions towards the overarching goal of social inclusion, these contributions have reinforced what could be considered a mechanistic view of systems as a 'whole' that can be governed and manipulated through the modification of its components and functions. The implication of this framing is twofold: not only does it gloss over ongoing debates around the limitations of conceptualising systems of innovation in terms of a fixed set of components and functions (Edquist, 2005, 1997; Lundvall, 2016, 2007), but also risks further over-simplifications in policy interventions, a concern previously raised by Arocena and Sutz (2020), and Lundvall (2007).

The second set of arguments incorporates more deliberately the role of contextual features and the particularities displayed by systems of innovation when looked at them from the South. However, while this research is in full agreement with the idea that the developmental university – as an articulating actor and system builder – can meet and promote social demand for knowledge and innovation to prompt wider changes at the system level, there is little evidence on how complex and polyvocal entities such as universities coordinate efforts to articulate this demand in existing systems (Arocena et al., 2018, 2015). Furthermore, despite the thorough documentation of the trends and pressures faced by universities in the Global South (see Arocena et al., 2018; Arocena and Sutz, 2005, 2001), the different ways in which developmental inclinations materialise, and how the aforementioned trends and pressures are negotiated and reconciled with universities' institutional missions and governance structures are still a largely unexplored area of inquiry, certainly from the innovation literature.

Therefore, in an attempt to complement existing *functionalist* contributions and to explain how the social demands for knowledge and innovation are interpreted and met by articulating actors such as universities, this PhD used the NSI framework as an ex-post 'focusing device' and zoomed into the *university* to

address these queries. More specifically, this thesis brought to the fore the complex relationship between institutional set-ups, organisations' missions, structures, and agency to expound how actors chose to produce knowledge to cater to societal needs and prompted changes in organisational interpretive schemes to create more enabling environments for inclusive innovation.

It follows that the overarching research question for this study was concerned with understanding *how agency in universities unfolds to create favourable environments for inclusive innovation in existing systems of innovation.* Universities are not homogenous or coherent bodies with seemingly straightforward decision-making processes. Hence, the research turned to the sensemaking literature and incorporated additional ideas drawn from social movements and institutional theory to identify the elements that shaped researchers' choices to produce knowledge for inclusive innovation and explain how they collectively acted to alter organisational interpretive schemes that gave way to observable changes in these universities' governance structures. The choice for exploring these elements followed the lack of explicit incentives to engage in the development of inclusive innovations in both these universities and in the policy instruments that funded the R&D projects examined in this study.

Three subsidiary questions were proposed to answer this PhD's overarching question. The following subsections restate the findings of the three previous empirical chapters to subsequently discuss the three main contributions to knowledge made by this research.

2.1. Inclusive innovation: More than intentions, processes, and outcomes

The first empirical chapter was concerned with explaining *what inclusive innovation is* and *what are the characteristics of innovations that cater to developmental aims.* The chapter began with a critical discussion of the extant definitions of inclusive innovation, particularly of those formulated around outcomes (George et al., 2012; Guth, 2005), processes (Bryden et al., 2017;

Cozzens and Sutz, 2014), and the combination of the two (Chataway et al., 2014; Onsongo and Schot, 2017). More specifically, by problematising the envisioning of inclusive innovation as a *ladder* comprised of different levels in which users can take part and benefit from the innovation process (Foster and Heeks, 2013), the analysis shed light on two main issues. First, some of the ladder's *levels,* like *intention, consumption,* and *impact,* are susceptible to be used to cover corporate-centric framings, in particular those emphasising market-readiness, affordability and participation to seek profit generation by selling goods and services to low-income groups. Second, some of the ladder's *steps* (e.g., informed and consulted), and associated roles (like production and distribution) painted a fuzzy picture of inclusion that does not guarantee the incorporation of the final beneficiaries' interests and needs as steering elements in the innovation process.

This discussion enabled us to identify that the normative underpinnings of the concept needed to be reformulated and coupled with an evaluative framework in order to *i)* develop inclusive innovation's conceptual strength; and *ii)* reflect more comprehensively the concerns that gave origin to this construct (i.e., how innovation affects or may be affected by underprivileged people) (Arond et al., 2010; Bryden et al., 2017; Cozzens and Sutz, 2014; Kaplinsky, 2011). To address this problem, the chapter extended the definitions of two normative principles of inclusive innovation introduced in the work of Papaioannou (2014a, 2014b), namely, *equity* and *participation.* The concept of *equity* (primarily concerned with the material aspect of redistribution) was reformulated in terms of *recognition* and *redistribution* to encompass a symbolic dimension, and the concept of *participation* was reformulated in terms of *parity of participation* to reflect more accurately how innovations' beneficiaries can shape innovation processes that would improve their life quality and wellbeing.

The evaluative content of the framework was later introduced by coupling these two principles with that of *basic needs* (Wolff, 2009). The basic needs approach has been widely used as a tool to understand and assess interventions in development. However, as inclusive innovation relates to the position of the

final beneficiaries, a more context-sensitive approximation to the disadvantages experienced by the beneficiaries was required to ensure that recognition and parity of participation are reflected in innovation processes. Thus, as a means to reflect better individuals' personal valuations regarding what they consider are their basic needs, the latter was combined with a subjective approach to wellbeing.

The coupling of the *perceived basic needs* approach with the principles of *equity* (recognition and redistribution) and *participation* (parity of participation) gave the framework the normative and pragmatic grounds to assess innovation in terms of inclusiveness. Based on this framework, the chapter proposed a redefinition of *inclusive innovation* as those innovations that: i) enable the alteration of social and physical environments through a rearranged distribution of material resources that cater to the perceived needs of excluded populations; ii) recognise these populations' cultural practices, traits, knowledge, and identities as steering elements in the process; and iii) incorporate them as equal partners in these innovation endeavours.

This redefinition not only reflects more comprehensively the concerns that gave origin to this construct, but also addresses Chataway et al.'s (2014) concerns about inclusive innovation's multiple conceptual roots and little synthetic analysis, and Bryden et al. (2017) and Jiménez's (2019) warnings about the concept's susceptibility to being used as a catch-all tool to explain innovation's positive spillovers in developmental backgrounds.

This redefinition also enabled us to differentiate between two concepts recurrently conflated in this literature: 'innovations for inclusive development' and 'inclusive innovations'. More specifically, *innovations for development* refer to those innovations addressing poor and marginalised communities, particularly in Global South countries (Iizuka, 2013), through processes in which these groups take part and benefit regardless of their gender, ethnicity, age, sexual orientation or disability (Aluko and Okuwa, 2019). Contrary to these definitions' stress on 'being benefited from' and 'taking part in' the innovation process, the chapter

established that inclusive innovation foregrounds beneficiaries' full agency and interests as *steering* elements in any inclusive innovation endeavour.

This proposition chimes with Cozzens and Sutz's (2014) argument that inclusive innovation can contribute to economic development, sustainable development and *inclusive development*. This means that there is a fundamental difference between 'harnessing science, technology and innovation "know-how" to address the needs of lower-income groups', a definition of innovation for inclusive development proposed by Paunov (2013: 9), and having the interests and full agency of the beneficiaries directing these efforts.

The findings of this chapter also allowed us to tell apart *innovation models for inclusive development* from *inclusive innovation models.* We established that while most of the models systematised in the literature – i.e., grassroots innovations (Gupta, 2013; Seyfang and Smith, 2007); bottom of the pyramid (Prahalad, 2009; Prahalad and Hart, 2002); inclusive business (Gradl and Knobloch, 2010; Wach, 2012); appropriate technologies (Jequier, 1976); below the radar innovations (Kaplinsky et al., 2009); pro-poor innovation (Chataway et al., 2010; Hanlin and Muraguri, 2009); and social innovations (Dagnino, 2009) – have the potential to be inclusive, the degree to which they incorporate *equity* and *participation of actors* varies. This means that while all these models have the potential to contribute to a social inclusion agenda, only some of them can leverage the symbolic and material aspects of equity and participation to promote true inclusive processes that expand the capabilities of the final beneficiaries.

This finding supports Fressoli et al.'s (2014) argument that models are a necessary step in building pathways to alternative knowledge production and sustainable (and inclusive) development, but those pathways are not univocal and, consequently, these models are not a definitive solution. Instead, they need to be considered as devices for opening spaces and processes of experimentation, empowerment, and alternative ways of knowledge production, warning us against the assumption that inclusive innovation, and the other associated categories discussed in the chapter, can assume a neutral connotation when used in the

broader discourse of development (Levidow and Papaioannou 2018; Pansera and Owen, 2018; and Papaioannou's, 2014b, 2014a).

Finally, although the concept of inclusive innovation, and the field of innovation for development more broadly, stand on highly contested grounds, this chapter provided some tools to navigate the complexity of bridging the concept of *inclusion* with that of *innovation* in order to prevent the concept to become an "ideological term, permeated with implicit assumptions" (Bryden et al., 2017). With this, we responded to Bryden et al.'s (2017) call to pursue a concept of inclusive innovation that would allow us to demarcate more clearly the boundaries of the research undertaken in this respect.

2.2. The role of values, beliefs, and role expectations in researchers' choices for knowledge production

The second empirical chapter of this thesis was concerned with identifying *what elements explain researchers' choices for knowledge production in inclusive innovation projects* and *how researchers mobilise their agency to develop such projects.* By introducing the lens of sensemaking (i.e., the process by which individuals give meaning to experience and take action on the basis of such meaning), we explained that researchers' choices to produce knowledge for inclusive innovation do not follow a straightforward and rational decision-making process as perhaps official evaluation of projects at times portray. Instead, the availability of two new funding instruments for R&D projects represented a disruption in researchers' activities, who were used to develop small-in-scale R&D projects or struggled to obtain funding to develop projects that entailed other stages beyond prototyping.

This disruption was framed initially as an *opportunity to have a more tangible social impact through their research activities.* This framing was informed by a series of elements including, first, researchers' channels of communication and socialisation, which emerged organically due to their proximity with similarly

situated and like-minded colleagues. Second, their identities, particularly personal stories of migration and practical knowledge of poverty conditions in rural areas. Third, their social relations and the sense of belonging to a broader collective with similar interests. Fourth, their status within their groups, centres, and departments; and, finally, their resources, particularly human capital – in the form of research teams –, experience and trajectories.

While this framing enabled them to develop an initial sense of 'what to do with' and how 'to approach' the calls for funding, the chapter showed that researchers' values and self-perceived role expectations prompted the development of this initial sense into a more coherent account, which was used later to guide their actions. More specifically, the values that permeated researchers' understanding of their roles as university workers (i.e., a privileged position that needed to be leveraged to address situations that are *unfair and unacceptable to them*) reinforced their decision to produce knowledge to *tackle local problems* and *benefit disenfranchised communities.*

Furthermore, the chapter demonstrated that researchers' beliefs (and, therefore, choices and agency) increased the salience of a contradiction between their choice to produce knowledge for inclusive innovation projects and the government's expectations regarding the new funding available. These funding instruments followed a market rationale that emphasised the commercialisation of the knowledge produced in universities to improve the country's innovation climate and leverage private investment in innovation. This rationale was at odds with researchers' beliefs, particularly those of not profiting from their inventions, giving up academic recognition in international spheres, and carrying out research that would not lead to commercially attractive products. Thus, to reconcile this contradiction, researchers mobilised their agency to repurpose these top-down introduced policy instruments into a vehicle to develop innovation projects that *tackled local problems* and *benefitted disenfranchised communities.*

The choice of 'knowledge production', as the domain to observe the unfolding of researchers' agency, allowed us to grasp how these processes of meaning

creation, interpretation, and enactment, underlie researchers' choices in this realm. More specifically, it enabled us to demonstrate that normative and cultural-cognitive institutional elements (in the form of values, beliefs, and role expectations) fulfilled three pivotal roles in these processes. First, they acted as priming mechanisms by shaping an initial sense of the funding mechanisms as an opportunity. Second, they acted as editing mechanisms by reinforcing that initial sense. Finally, they acted as triggering mechanisms by enhancing the salience of institutionalised contradictions (stemming from conflicting yet co-existing rationales) and guiding researchers' actions towards the reconciliation of these contradictions.

The implication of these findings is twofold. First, they show that different understandings around the role of research and innovation for development exist within polyvocal organisations such as universities and that the meanings behind these understandings are in constant flux. This means that they are created, modified, and reproduced in spaces of signification such as research groups, centres, and departments, making it more difficult for market logics guiding policy interventions to penetrate and shape practices in these spaces. Second, they show that individuals and groups assign meaning to a wide range of events, including the enforcement of regulations and policy interventions, challenging the pre-conception that such events are concrete realities with objective interpretations. Therefore, policy instruments glossing over researchers' choices and actions when it comes to mobilising the production of knowledge into other societal domains might have limited results regarding the overarching goals they were designed to achieve.

Furthermore, by showing how a variety of sensemaking resources shape the terrain in which researchers (as members of the university) interpret and enact practices related to 'inclusion', the chapter's results extended Grobbelaar et al.'s (2016) argument that enabling spaces for developing inclusive innovations demand new ways of understanding and positioning the role of research regarding researchers' ingrained ways of thinking and doing. More specifically, the chapter

showed that these 'new ways of understanding and positioning' already exist and, in fact, shape research outcomes in other universities in the Global South. Moreover, these 'understandings and positionings' are, in some cases, ingrained enough in researchers' day to day activities that they can be mobilised to challenge top-down implemented policy instruments.

Finally, the chapter showed that normative and cultural-cognitive institutional elements not only precede processes of meaning creation and enactment but also shape their outcomes (Weber and Glynn, 2006). This means that the practices and characteristics of the knowledge produced in research projects are affected by how values, beliefs, and role expectations are weaved into these processes. In this regard, we showed that researchers placed a higher value on other means for producing knowledge that included the mobilisation of practical methodologies and the creation of knowledge in a context of application and regarded societal pertinence and local relevance as more consequential than conventional metrics to measure 'research impact'.

These findings support Arocena et al.'s (2018) argument that the social processes of interactions underpinning learning and innovation shape the strength and orientation of the production and use of knowledge by elucidating how normative and cultural-cognitive elements substantiate these social processes. Moreover, researchers' attention to alternative means for knowledge production and metrics for *success* confirms Arocena et al.'s (2018) idea that universities need to allow a counter-hegemonic prestige regime to seek a proactive connection with neglected stakeholders.

Finally, the findings of the chapter brought to the forefront the dual nature of the university as an *actor* and an *arena* in which the central role of the academic communities and the nature of their identities and interests play a fundamental role (Arocena et al., 2018; Enders et al., 2013). The centrality of this role does not only concern deciding what knowledge is produced, for whom, and who gets to participate in these processes but also what is considered consequential in the exercise of their profession as researchers.

2.3. Collective action and change in universities: What can agency accomplish for inclusive innovation?

The third empirical chapter of this thesis was concerned with *explaining how collective action triggers endogenous processes of organisational change within universities* and *to what extent these changes create more enabling environments for inclusive innovation.* By introducing theoretical tools from institutional and social movements theories, we explained that in complex organisations such as universities, disparate narratives around research and inclusion variously interweave and clash. These disparate narratives reflect how different types of university workers construct and negotiate meanings based on their positions, interests, and backgrounds when trying to fulfil universities' research and extension missions.

The chapter started by explaining that the historical construction of the universities studied in this PhD makes them fertile arenas where inclusive innovations and innovations for inclusive development can emerge. These universities' historical construction, captured in the enactment of some of the normative principles of the University Reform Movement (URM), partly lent researchers their sense of self and the tools they used for their transformative action, showing that the structures in which they are embedded also have empowering aspects.

The constraining nature of structures was reflected instead on performance demands and market pressures stemming from the calls to make universities economically useful actors in society. These pressures hindered universities' capacity to provide coherent organisational structures to support inclusive innovation-related endeavours. It follows that grasping researchers' *purposive* and *collective actions* was also necessary to explain how research agendas and supportive structures for inclusive innovation become institutionalised and recur despite the administrative isomorphic pressures exerted by these universities' middle-management staff.

In this respect, the chapter showed that, to reconcile institutionalised expectations (from policy and universities management) with their values, beliefs and self-perceived role expectations, researchers' purposive actions were directed towards altering organisational interpretive schemes (predominantly guided by *managerial principles*). To achieve changes in these schemes, researchers mobilised, first, *oppositional frames,* set against their perception of inconsistencies in the furtherance of research's direction, a biased reward system, and a preference for a limited number and type of platforms for knowledge dissemination in their universities. Second, they mobilised their *oppositional identities,* which distinguished them from other university workers, particularly senior and middle-management staff. Lastly, they leveraged a sense of *oppositional efficacy,* built upon the idea that their collective-action efforts against the management staff's prescriptions around research and social responsibility could be successful. These elements were bred in isolated spaces (i.e., *free spaces*) from the direct managerial control.

Importantly, while it was not possible to establish a cause-effect relationship between the mobilisation of these elements and the changes observed in the governance structures of these universities, a clear correspondence between the two was identified. Thus, the changes observed in the governance structures of *Universities 1* and *2* but not in that of *University 3,* were explained by how learning occurred in these organisations. In other words, these changes responded to whether the modification of organisational interpretive schemes accomplished by researchers were 'integrated' and 'institutionalised' in their universities.

More explicitly, in the case of *University 1*, changes in the university's organisational structure followed the *institutionalisation* of new values systems, structures and procedures that chimed with researchers' understandings of the role of research for development *within* and *outside* the Engineering Department. In *University 2*, these understandings were only *integrated* at the level of the research centre, enabling the accomplishment of only moderate changes in this university's structure. Lastly, in the case of *University 3,* the level of

empowerment of the research groups and the degree of decentralisation of research practices facilitated *intuiting* and *interpreting* (the first two processes through which organisational learning occurs) but not the *integration* and *institutionalisation* of the values systems, structures and procedures underpinning researchers' activities outside their research groups.

The chapter, therefore, helped to open further the black box of the 'developmental university' by shedding light on how the enactment of universities' commitments to social inclusion through knowledge democratisation is mediated by a series of tensions at the institutional, organisational, and individual levels. These tensions required the purposive action of researchers to get resolved, but these actions were only made possible by the enabling features of the structures in which researchers were embedded. This feature of the developmental university highlights the complementary nature of agency and structure as two mutual dependencies with ongoing interaction and shows that the agency of individuals (researchers), collectives (research groups, centres, and departments) and organisations (the university) are shaped by the roles they fulfil in a broader institutional context.

This finding chimes with Aksnes and Rip (2009) and Dahler-Larsen (2012) arguments that most universities' activities are characterised by a tension between administrative needs and researchers' requests in the *research assessment* realm. However, the chapter demonstrated that research is also a social practice nested within relations of employment, managerial control, and organisational missions, hence showing that these tensions extend to the realms of *research management* and *direction.* Two main implications arise from this finding. First, developmental universities (as organisations) have agency in emerging innovation systems. However, despite having a clear mission, universities are not coherent institutions but spaces where different narratives and discourses can be mobilised to respond to the demands for knowledge and innovation of disenfranchised groups in society. This means that their developmental character (at the discursive level) explains

only partially why they can act as articulating actors in the quest of democratising knowledge and achieving social inclusion through innovation.

The second implication, closely linked to the first, is that further attention needs to be paid to the gradual endogenous changes taking place through strategic agency in universities when we address the issue of inclusion in systems of innovation. Social inclusion and inclusive innovation are not a direct result of these universities' developmental inclinations, but an outcome shaped by the complex relationship between institutional set-ups, organisational missions, and actors' choices. It follows that identifying regularities in how meanings around inclusion, knowledge democratisation and the social impact of research are created, negotiated, and co-exist with other features of contemporary universities is required to empirically substantiate the routes towards inclusive systems of innovation charted in the literature discussed in Chapter 2.

Lastly, the chapter's findings extend Brennan and Naidoo's (2008) proposition that cultural change within the academic profession and new forms of relationship with the communities is required to achieve equity and social justice by providing a first glimpse of how this cultural change and new forms of relationships look like in practice. In particular, the chapter showed how normative and cultural-cognitive elements are mobilised to produce changes in values systems and enable new forms of relationships. Nonetheless, the findings of this thesis are relevant for universities that share similar characteristics. Since there is not a single 'Global South' but multiple ones, the complex interplay between agency and structure, and how they enable cultural change and new relationships, need to be understood against the backdrop of other geographical locations. In this regard, a great deal of empirical work remains to be done to understand how national institutions and other historical, cultural, and contextual features, shape developmental universities' outcomes in this regard. The theoretical elements and evidence put forward in this thesis offer a starting point to the how.

2.4. Binding it all together: The thesis's contributions to the issue of inclusion in innovation systems

This thesis makes three contributions to the literature of inclusive systems of innovation. First, the evidence put forward in this work allowed us to extend extant conceptualisations of *inclusion* in *innovation* by proposing a normative and evaluative framework to assess innovation in terms of inclusiveness. This framework brings to the forefront beneficiaries' interests, knowledge, and skills as constitutive elements of any inclusive innovation endeavour. In this regard, the thesis provides useful tools to navigate the complexity of bridging the concept of inclusion with that of innovation while considering a more encompassing view of the role institutions, networks, individuals, and other related dynamics play in shaping processes and outcomes that improve the life quality of marginalised groups. Furthermore, this proposed framework can be applied to different empirical contexts and, hence, provides an opportunity for 'theory extension'. That is to say, the framework can be taken out of the empirical context of this research and applied into fresh terrain in future research endeavours.

Second, as recounted in Chapter 2, much of the literature on inclusive innovation systems provides insights and chart routes towards enabling system's change by modifying core components and functions but fails to provide insights on the dynamic processes underpinning these change projects. While this gap has been addressed partially by the groundbreaking work of Arocena et al. (2018, 2015), this thesis has provided an alternative ex-post and retrospective view on change. This showed that inclusive features in systems are constructed through relational dynamics that are shaped by the meanings agents construct in spaces of signification. These meanings are enabled by the wider institutional context in which these agents are embedded, but they are transformed and entrenched through social relations and collective efforts. These meanings guide actions towards a goal. Thus, when they are directed towards altering interpretive schemes and organisational values' systems, and succeed, they create new

supportive structures that allow inclusive practices to recur and institutionalise despite other pressures.

In this connection, the thesis demonstrated that the different ways in which these meanings arise, are taken up and coexist with other features of the contemporary university shape: i) how this articulating and system-builder actor meets the knowledge and innovation demands of disenfranchised groups in society, and ii) how knowledge production practices and research outcomes are brought into existence in these polyvocal organisations. This ex-post view of inclusion in innovation systems underscores that prospective avenues for change cannot be proposed without considering *what* these meanings are, *how* they shape collective actions, *what* types of changes they can prompt in organisations, and *what* type of relations they can inform and sustain over time.

Third, this thesis contributes to overcoming the structuralist problem of insufficient agency within the national systems of innovation framework, a hurdle that has been reproduced in the inclusive systems of innovation literature. Having examined the role played by agency in enabling the institutionalisation of research agendas and supportive structures for inclusive innovation, a novel conceptual framework that considers *agency* and *structure* as mutual dependencies with ongoing interaction was proposed.

This dynamic framework allows grasping the choices and purposive actions of agents and, hence, thick descriptions that support theorisation at the level of individual action. The incorporation of elements stemming from institutional theory gives the framework a historical, cultural, and institutional grounding to account for theorisation at the organisational level of action. Thus, the fine-grained concepts from sensemaking and institutional theory, combined in a symbiotic way, foreground network and organisational dynamics to understand different pathways for knowledge production and organisational change that can be applied to the issue of inclusion in existing systems. Hence, the framework's contribution lies in its capacity to bridge the micro and meso levels of analysis, relating the individual to the collective, to explain how structures enable actors'

choices while being recreated and transformed by the same actions they lent actors possible.

3.   Reflections on the methods, limitations, and avenues for future research

3.1. Reflections on the method and scope for generalisation

This research project was underpinned by a critical realist (CR) ontology (which asserts that phenomena exist independently of our knowledge of them) and epistemology (which states that human knowledge is socially produced, historically transcendent and fallible). This means that the study acknowledged that reality is independent of our observations as researchers and, consequently, only more or less truthful knowledge about this reality can be acquired through the use of theoretical tools and observations. Following these ontological assumptions and epistemological commitments, the research assumed that there are rational grounds for preferring some explanations about social phenomena over others and, in consequence, that there are no unequivocal interpretations of the subject matter of this PhD.

It follows that the conceptual tools chosen to explain the role of agency in creating conducive environments for inclusive innovation in existing systems are only a subset of a wider pool of other legitimate concepts and theories that could have been weaved with other methodological approaches and sources of information to explain this phenomenon. Nonetheless, throughout the course of this research, efforts were directed to test the suitability of these conceptual tools against other competing explanations (e.g., the research participants accounts, researcher's own activity, and findings in the extant literature). In particular, to determine their relevance in providing nuanced descriptions of researchers' choices for knowledge production and the change projects they embarked on to ingrain research agendas and supportive structures for inclusive innovation in their universities.

The research strategy adopted in this PhD was informed, first, by the methodological implications of doing CR-based research; namely, the acknowledgement that there are competing explanations for an observed phenomenon, which are influenced by contextual elements. Second, this choice was predicated on the need for empirical research to advance our understanding of how evolving systems can incorporate inclusion as a central feature beyond rhetorical statements in policy discourses. Accordingly, a qualitative methodology coupled with a case study was chosen to *i)* describe a social phenomenon and produce situated analytical explanations; and *ii)* weave together the perspectives of those whose views and behaviours were of interest in this study.

Case studies form an intrinsic basis for social science research (Byrne and Ragin, 2009). In this regard, case studies offer multiple opportunities for theorising whilst retaining thick descriptions to explain causal mechanisms (Flyvbjerg, 2006). Nonetheless, the research acknowledged that there are limitations in using case study analysis, for example, possible biases in case selection, a lack of representativeness in the cases selected and difficulties in evaluating the extent to which particular effects are determined by contextual variables (George and Bennett, 2005). In response to these limitations, the selection of the case followed a clear sampling rationale that would allow representativeness and minimise the biases.

An exploratory and embedded single case study has been sufficient for the purposes of this research. First, because, whilst there is scope for adopting a different methodology and making different judgements on a range of matters (including the boundaries of the research in the form of incorporating other actors and explaining surrounding dynamics), a refined approach to the single-case study design enabled the research to acknowledge the voices of diverse organisational actors and to maximise variation through within-case comparison. Second, by distinguishing between three embedded sub-cases (or sub-units), this refined approach allowed the research to address the concerns that a single case design

will not allow scope for generalising the study's results as the sub-cases facilitate theorisation across different levels of analysis (Yin, 2009) and organisations.

Consequently, the three embedded sub-cases – and a wide range of voices captured in the testimonies of researchers, middle and senior management staff, and government officials – have yielded rich empirical material on how agency unfolds and is mobilised in universities to prompt changes that favour a social inclusion agenda. The aim of producing this empirical material was not to generate universal laws but a precedent to inform future research on the topic. In Chapter 3, we explained that this thesis' methodological fit falls within the 'nascent' archetype of field research (Edmondson and Mcmanus, 2007) due to the state of prior theory and knowledge about inclusive systems of innovation. This means that despite the existence of seminal works on the topic that concerned this research (see Arocena et al., 2018, 2015; Arocena and Sutz, 2016, 2014, 2021), the goal of data analysis, and this research more broadly, has been the identification of patterns and the production of suggestive explanations to stimulate future research on this issue.

The rounds of proto-explanation during the coding cycles described in Chapter 3, and the consequent feeding back of the lessons of those failures into a loop of retroductive analysis (Flyvbjerg, 2006), enabled us to produce those suggestive explanations via the identification regularities underpinning knowledge production and organisational learning in the three universities studied. These explanations' reliability and internal validity were justified against three criteria: structural corroboration, consensual validation and referential adequacy (Angen, 2000; Eisner, 1991).

Regarding structural corroboration, these explanations were built upon a variety of data sources and relied on *triangulation* (which took place by locating evidence to document the codes and themes used in different sources of data) and *negative case analysis* (which helped refine the codes and themes that emerged during the data analysis) to breed the credibility of the arguments presented in this thesis. Second, regarding consensual validation, the research relied on

strategies such as *peer review* and *debriefing* to ensure that the data description, interpretation and evaluation were compelling and satisfactory. Third, two main strategies were employed to achieve referential adequacy and substantive validation. Namely, *rich and thick description* (Lincoln and Guba, 1985; Merriam, 1998; Creswell, 2003) in chapters 4 to 6, and self-reflection of my own biases as a former research manager and the disclosure of this information to all the participants interviewed for this research.

3.2. Limitations and avenues for future research

As the thesis embodies a single-case study with three embedded subunits, it is limited in its ability to claim what knowledge it has produced to move our field forward. For instance, the boundaries drawn around this research project have left outside elements for the analysis that hinders its capacity to make claims beyond the ones described in the previous section. These elements fit in three domains: actors, dynamics, and systemic features. First, this thesis does not include an analysis of the role played by formal and informal supply-side organisations in industrial sectors and other intermediaries. Other scholars in the field have devoted resources to understanding the role of these actors in the production and diffusion of inclusive innovations. In particular, they have focused on the different ways in which they shape the nature of the innovations, their importance in the retailing aspect, and the enabling roles played by (formal and informal) micro-enterprises in these processes (Foster and Heeks, 2013; Iizuka, 2013; Kraemer-Mbula and Wamae, 2010).

Second, the research was not concerned with understanding the stages involved in the development and diffusion of the innovations that resulted from the projects studied. More explicitly, the analysis deliberately glossed over practicalities regarding their conception, development, production, delivery, use, and recycling. However, the analysis shed light on some of the elements that

shaped their conception, development and delivery insofar as they substantiated the discussion around inclusion presented in Chapter 4.

Lastly, limited time and resources prevented this thesis from producing claims regarding systemic change. In other words, investigating whether or not the changes experienced in these universities were registered by policymakers would require the mobilisation of resources that were not contemplated in the original design of this research project. However, strong indications are emerging from the interview data of early stages of deinstitutionalisation that followed the creation of inter-organisational configurations favouring alternative directions for innovation in the Peruvian Innovation System.

In light of the limitations described above, we suggest three avenues for future research. First, future research efforts could be directed to understanding *if* or *to what extent* the micro and meso-institutional work undertaken by researchers in these three universities sparked broader inter-organisational changes that are helping alternative views of innovation gain traction in the Peruvian Higher Education subsystem.

Second, future research efforts could be directed at examining how sensemaking processes around innovation-related activities occur in other system actors, including private firms and government organisations. Furthermore, resources could be channelled to investigate how these processes encompass, challenge or accommodate competing logics (not only a market one but also the logics underpinning public administration efforts), and how the latter are harnessed towards enabling the institutionalisation of alternative directions for innovation in these organisations.

Third, it is left to future research efforts to investigate whether or not these processes could result in the deinstitutionalisation of a dominant narrative about innovation strongly guided by market logics and commercial aims. Consequently, these future efforts can explore if they also lead to the re-institutionalisation (through regulations, norms, and practices) of an alternative rationale that would allow 'social inclusion' to become a system feature. In this connection, it is argued

that there is value in testing whether this particular way to approach the issue of inclusion in existing systems 'holds water' to explain similar dynamics in other Latin American countries. For that, the author expects that the reflections presented in this thesis would prompt the exchange of ideas among Latin American scholars, and Global South ones more broadly, to continue advancing our understanding of the role of universities in inclusive systems of innovation.

4. Implications for policy and universities – Take away messages for policymakers, and academic and non-academic actors

This thesis addressed a real-world problem: how can actors create more enabling environments for inclusive innovations in existing systems. Thereby, it finishes by providing some recommendations – for both academic and non-academic audiences – to turn this work's results into concrete actions. These recommendations revolve around one theme: *how to mobilise innovation efforts in universities to address social exclusion.* The first subsection presents two take-away messages for practitioners regarding how to leverage university actors' innovative efforts to cater to the needs of excluded populations. The next subsection introduces two recommendations for universities' senior management staff about how to consolidate existing (and incentivise further) efforts to connect research activities with the overarching goal of social inclusion. The third subsection speaks to communities and community leaders' capacity to mobilise structures to address the systematic absence of desired research; in this case, research and development efforts aimed at catering to the basic needs of excluded populations. The last subsection leaves one take-away message to other fellow researchers in Latin America devoting time and resources to address this issue.

4.1. Two 'take-away' messages for practitioners

This thesis demonstrated that policy implementation processes and policy outcomes are shaped by actors' expectations. The ways in which these actors interpret and enact policy instruments can give way to results not anticipated in the design of these instruments. Unanticipated results are not always a negative outcome of policy implementation; rather, they can be seen as concrete realities that foreground diverging interests and understandings of the problems that policy interventions aim to resolve. In the cases analysed, these unanticipated results mirrored universities' commitments to address a pervasive problem in Latin America, namely social exclusion, through the institutionalisation of research agendas and supporting structures that favour inclusive innovation.

Therefore, one pathway to start addressing more emphatically the need to bridge universities' innovative activities with the aim of social inclusion would be to rethink how innovation policies are designed. More specifically, the results put forward by this thesis indicate that policymakers should embrace an appraisal for *a)* defining the direction of these interventions; *b)* anticipating the distribution of their benefits; and *c)* identifying the diversity of backgrounds in which they can be implemented that allows for the incorporation of these varied perspectives. This is of paramount importance in systems predominantly oriented towards the promotion of innovation for competitiveness and productivity (like the case of Peru and other Latin American countries), where top-down decision-making that often neglects these existing variabilities are the norm and not the exception.

Second, any suggestion for policy interventions cannot gloss over countries' priorities and resources. In countries such as Peru, there is still a great deal of work to be done to convey the message that investing in science, technology, and innovation can, in fact, contribute, to various streams of development, including sustainable, economic, and inclusive ones. While charting routes towards a *de facto* reconciliation of innovative activities with these development prospects might demand the mobilisation of resources that governments in Global South

countries cannot do without, this thesis presented three empirical cases in which this divide has been bridged. This evidence can be considered as a precedent to inform more encompassing strategies towards this goal. Leverage points can be distilled from the cases analysed to prospectively set up support mechanisms and stimulate similar research endeavours in other universities through policy interventions. With this recommendation, we do not suggest that a one-size-fits-all mechanism can be drawn from the thesis's results; rather, these findings can be used to lay the ground for future interventions that respond to the contextual features of the spaces in which they will be implemented

4.2. Two 'take-away' messages for universities' management

The thesis demonstrated the central role played by universities in inclusive innovation processes. However, when the goal is to mobilise research activities towards the overarching goal of social inclusion, alternative reward systems and incentives need to be put in place. This is a proposition that features in the extant literature addressing the contributions of universities to development (see, for example, Arocena et al., 2018; Lundvall, 2018). However, the results presented in this thesis suggest that, beyond creating alternative metrics to assess research impact, these metrics would need to reflect the different ways in which academic departments (and researchers within them) understand their roles as university workers. In this regard, a system to incentivise and reward research outcomes needs to be more attuned to the outputs, stakeholder engagement activities and goals pursued by these groups. This refined approach to building such a system can enable noteworthy results in terms of fostering research practices that contribute to an inclusive development agenda.

Second, this thesis has demonstrated that the historical construction of the Latin American university has shaped its institutional missions and attuned their roles to the contexts in which these universities are embedded. The three cases analysed in this research mirror a phenomenon that can be extrapolated to other

countries in the region; namely, the *soft power* these institutions have in policy-making activities in their countries. In this connection, public universities often hold a privileged position when it comes to informing policies in the region. Thus, if the goal of universities is to play a role in development processes, they can devote resources to shape innovation policy that leverages their roles as system-builders and intermediaries articulating the demands of disenfranchised groups in society. Promoting these policies may help to face up to what Arocena et al. (2018) call 'a renewed hierarchy of stakeholders', in which private interests have the upper hand and, hence, the power to transform the roles universities play in innovation systems. As suggested by The Group of Eight "Innovation is not something that industries do, or firms do, or governments do. It is something that the people within those organisations do" (The Group of Eight, 2011: 8). The same applies to the university. Consequently, as with any other organisation in a system, their patterns of knowledge production and the dynamics underpinning the innovations they produce hold the potential to inform broader changes at the system level. That is to say, to nudge systemic interactions towards entrenching the explicit mandate of orienting the production and use of knowledge towards social inclusion (Arocena et al., 2018).

4.3. Three 'take-away' messages for communities and community leaders

Change cannot be one-sided. Nudging systemic interactions towards entrenching more democratic and socially inclusive processes of knowledge production in existing systems cannot be a task performed by policymakers or university workers only. Therefore, the close relationship between *meanings*, *structure* and *agency* evidenced in this research needs to be examined too from the perspective of the intended beneficiaries of these innovations. While a more comprehensive analysis of the position and actions of these communities exceeds the scope of this thesis, I propose to look at the notions of *meanings* (obtained through deliberation), *structures* (as organisational and institutional boundaries) and

agency (enacted through collective action) through the prism of Hess' (2016) *counterpublics* to substantiate the recommendations outlined below.

Counterpublics is a construct that refers to the use of various repertoires of action by networks of individuals and organisations to achieve a social change goal. In this regard, the concept brings to the fore these networks' potential to challenge incumbents and redirect efforts to address the systematic absence of desired research, like the one showcased in the twelve research projects analysed in this thesis. These networks are comprised of heterogeneous actors that aim to exercise their capacity (with varying degrees of skill) to influence outcomes such as other stakeholders' agendas, social structures and other agents' strategies.

This thesis presented examples in which networks of actors (with contrasting systems of meanings) formed around innovation projects to alter the material and symbolic environments of the intended beneficiaries. While these networks are in an embryonic stage and cannot yet be compared to movements, they are a testament to the idea that change is predicated on collective action, and collective action is shaped by *meanings*. In this regard, the remaining challenge for intended users and communities in order to continue articulating their demands through these networks is to nurture the conditions that allowed them to become part of a 'unit' despite the contrasting systems of meaning of these networks' members. One way to do so is cultivating spaces for deliberation that, in a similar fashion to the *free spaces* found in universities, can enable the careful consideration of issues such as whose voice is deemed as legitimate in the process, who facilitates and controls these processes of deliberation, who determines the empirical focus of potential future projects, and how the knowledge of different parties is accommodated or integrated during the innovation process[42].

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[42] Important reflections around the challenges of participation can be found in the work of Chilvers and Kearnes (2016) on the definition of the object of participation, who gets to participate and how participation unfolds. A more recent work from de Hoop, et al. (2020) complements Chilvers and Kearnes' (2016) approach to participation in science and democracy by adding a temporal dimension related to when participation takes place and how the place and scale also shape these processes by analysis smart urbanism initiatives.

Second, meanings and actions, and by extension change, occur within the context of an existing set of social and institutional *structures.* In this regard, intended beneficiaries, communities and community leaders engaged in these networks would need to be aware that the alliances and partnerships they formed would not remain the same as institutional and organisation boundaries may pose some challenges to their continuation as time goes by. Furthermore, other pressures exerted by the temporality of the projects and negotiations with other stakeholders (e.g., research funders, government agencies, etc.) can lead to the reconfiguration of the symbolic (meanings) and material (resources) composition of these networks, which can discourage engagement in the long term. However, sustained participation in these networks, and their associated deliberative spaces, can lead to the generation of new forms of expertise that challenge incumbent ways of thinking about and carrying out research. The institutionalisation of these new ways to engage with research activities may allow the emergence of new paradigms of research directed towards the goal of social inclusion. In the long run, these paradigms can inform activities oriented to prioritise, stimulate and support 'doing the (locally relevant) undone science', which is a pervasive characteristic of Global South countries.

This leads us to the third recommendation for this constituency. While these alliances and partnerships' composition may change over time, these networks' *agency*, enacted through collective action, have the potential to open up otherwise *scientised* and closed research and policy processes. Their actions can help build supporting conditions to stimulate the development of capabilities – in both community members and researchers – to engage in participatory and transdisciplinary research activities and leave a precedent for the different roles researchers and communities can perform in other constituents' spaces. Researchers can develop capabilities to support the dissemination and appropriation of scientific knowledge in extra-academic spaces and engage in policy processes as communities' spokespersons. At the same time, community

leaders and members can build skills to leverage their experiential knowledge of the benefits of taking part in research underpinned by participatory methodologies and developed in contexts of application to prompt wider changes by gaining the support of university authorities and decision-makers in policy spheres.

4.4. A final 'take-away' message for fellow Latin American scholars

This thesis demonstrated that different understandings around the role of research and innovation exist and are constantly reproduced in spaces of signification within universities. These understandings are often at odds with the logics underpinning policy instruments designed to support innovation activities that increase firms' productivity and competitiveness. This finding is of particular importance for Latin American countries, as there is a substantial amount of evidence pointing to the similarities in the design of policy instruments aimed at promoting the development of innovation capabilities in the region (see, for example, Aguiar et al., 2017; Galdos, 2017). These policy instruments often emulate other instruments designed and implemented in high-income countries that were not conceived as having distributive goals (Zehavi and Breznitz, 2017). This means that there is room to explore whether similar dissonances are experienced by researchers in other universities in the region that share similar developmental inclinations.

In this connection, other cases extensively documented in the literature exhibiting similar traits to the ones described in this thesis – like the case of the University of La República in Uruguay (see the work of Rodrigo Arocena and Judith Sutz) or the Universidad Mayor de San Simón in Bolivia (see the work of Carlos Acevedo) – can become a fertile terrain to explore this issue. In other words, they might offer rich empirical grounds to investigate if similar processes of meaning creation, interpretation and enactment are taking place in these universities. Moreover, these comparable traits may render it possible to explore if researchers are responding to conventional innovation policy instruments in

rather unconventional ways, either repurposing them or prompting more ad-hoc responses from policymakers in this realm. These potential responses would be, for us as researchers, both an invitation and an opportunity to contribute to the development of more sound narratives around the role of research and innovation in achieving social inclusion in our region.

5. Concluding remarks

This thesis investigated how agency unfolds to create enabling environments for inclusive innovation in developmental universities. Growing concerns over social inclusion in innovation have given way to the emergence of inclusive innovation as an important overarching concept, guiding funding programs of multilateral agencies to direct innovation towards specific aims such as poverty alleviation and welfare improvement for low-income groups. These concerns have rendered the question of how inclusion can become a central feature of innovation systems.

Extant approaches in the literature have emphasised the role of structures in enabling change, particularly by suggesting the incorporation of systems' excluded components and the stimulation of neglected functions (Arocena et al., 2018, 2015; Foster and Heeks, 2013; Grobbelaar et al., 2016; Grobbelaar and van der Merwe, 2016). Whilst these approaches have yielded many valuable insights to chart routes towards inclusive systems of innovation, the ways in which the interdependence between agency and structure shape inclusive practices in existing innovation systems has been a missing piece in extant explanations. In this connection, this PhD sought to shed light on the complex relationship between institutional set-ups, organisations' missions, structures, and agency by answering the question of '*how agency in universities unfolds to create favourable environments for inclusive innovation in existing systems of innovation?*'.

This thesis chose knowledge production and organisational learning as two domains to grasp how agency unfolds in developmental universities, and examined twelve research projects developed across three Peruvian universities. To expound

how actors chose to produce knowledge to cater to societal needs and triggered changes in organisational interpretive schemes to create more enabling environments for inclusive innovation, the thesis first proposed a redefinition of inclusive innovation and a normative and evaluative framework to assess innovation in terms of inclusiveness in Chapter 4. This framework was then applied to the twelve research projects studied in this PhD to show how some of these projects leverage the symbolic and material aspects of equity and participation to promote inclusive processes that improve the life quality of the final beneficiaries. In Chapter 5, the thesis explained how researchers' values, beliefs, and role expectations acted as the cognitive frames that guided their choices to produce knowledge for these projects. Furthermore, the chapter showed that these normative and cultural-cognitive elements not only led researchers to repurpose a policy instrument so they could develop these projects but also shaped the practices and characteristics of the knowledge produced in these projects. Chapter 6 showed that these normative and cultural-cognitive elements were mobilised into other domains of these universities' organisational fabric, prompting wider changes in the governance structures of these universities. In doing so, the thesis showed that researchers mobilised their agency not only to develop these projects, but also to create more coherent organisational environments to support research endeavours that chimed with their values, beliefs, and role expectations.

The evidence put forward in this thesis allowed us to propose three main contributions to the literature on inclusive systems of innovation. First, a framework to navigate the complexity of bridging the concept of inclusion with that of innovation that can be applied to different empirical contexts, and a redefinition of the concept of inclusive innovation that foregrounds the interests and agency of innovation beneficiaries as steering elements in the innovation process. Second, this thesis extended the *ex-ante* view (predicated on the evaluative and normative content of the NSI framework) offered by the extant literature on inclusive systems of innovation by demonstrating that bottom-up

collective processes directed towards changing interpretive schemes and organisational values systems play a pivotal role in enabling inclusive practices to recur in system-builder organisations such as universities. Finally, the thesis contributed to overcoming the structuralist problem of insufficient agency within the national systems of innovation framework by proposing a novel conceptual framework that foregrounds network and organisational dynamics to understand different pathways for knowledge production and organisational learning in existing systems. This framework would allow producing more nuanced explanations of how institutions influence and shape organisations and the different ways in which organisations embed and develop institutions when social inclusion is at stake.

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Appendixes

Appendix A-1 – Information sheet (original language)

US
University of Sussex

Hoja de información para participantes

Por favor, lea con atención este documento antes de firmar el Protocolo de consentimiento informado. Si usted lo desea, puede conservar este documento para futuras referencias.

Título del proyecto: Repensando la dinámica entre sistemas nacionales de innovación emergentes y la innovación socialmente inclusiva
Este proyecto ha sido aprobado por el Comité de Ética para la Investigación en Ciencias Sociales y Humanidades de la Universidad de Sussex, Reino Unido [Número de referencia: ER/MG505/1. Fecha de aprobación: 22/03/2019]

Investigator principal: Melina A. Galdos Frisancho, PhD in Science and Technology Policy Studies. Science Policy Research Unit, Jubilee Building, University of Sussex, Brighton, BN19RH, United Kingdom

Supervisores: Dr Matias Ramirez (SPRU) y Professor Johana Chataway (UCL)

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¿Cuál es el propósito de este estudio?

El propósito de este estudio es explicar los factores que subyacen al desarrollo innovaciones socialmente inclusivas en contextos institucionales donde las lógicas de mercado son dominantes; es decir, donde el andamiaje institucional se orienta a la innovación para la productividad y competitividad. Para lograr este objetivo, esta investigación propone una aproximación distinta para entender la relación entre los sistemas de innovación y la innovación socialmente inclusiva analizando

el caso peruano a profundidad. Así, elaborando sobre los hallazgos en la literatura académica a la fecha, proponemos un análisis de la evolución de los actores del sistema, la construcción de los vínculos entre ellos y sus interacciones empleando una mirada basada en expectativas normativas, creencias, valores, y cómo estás le dan forma a los procesos de producción, uso y difusión del conocimiento y del aprendizaje interactivo.

El propósito de las entrevistas es obtener mayor detalle acerca de los valores, creencias, expectativas normativas de los actores involucrados en el desarrollo de innovaciones socialmente inclusivas en el marco de dos fondos administrados por el Ministerio de la Producción del Perú: FINCyT I y II, y FIDECOM.

¿Por qué he sido invitado a participar de este estudio?

Usted ha sido invitado porque consideramos que su conocimiento y experiencia son invaluables para entender mejor las creencias, valores y prácticas que influencian el proceso de desarrollo de innovaciones dentro de su organización. De este modo, la información que nos pueda brindar nos ayudará a proveer una descripción más acertada de cómo la innovación es entendida y puesta en práctica por la organización a la que pertenece, y así contrastar esta información con otras formas de entender a la innovación en otras organizaciones.

¿Quiénes forman parte del equipo de investigación?

El Dr Ramirez y la Prof Chataway son investigadores en el campo de estudios de políticas públicas de ciencia, tecnología e innovación en SPRU, Universidad de Sussex y STEaPP, University College London respectivamente. Ambos investigadores están acompañando el proceso de desarrollo de la tesis de doctorado de Melina Galdos, la investigadora principal.

¿Puedo retirarme del estudio en cualquier momento?

Sí. Participar de esta investigación a través de entrevistas es completamente voluntario. Si decide formar parte de este estudio, puede retirarse del mismo o parar la entrevista en cualquier momento que lo desee sin necesidad de proveer ninguna justificación o explicación. Asimismo, en caso de que esto suceda, esta información no será compartida con nadie más allá de la investigadora principal.

¿Qué ocurrirá cuando el estudio termine?

Los resultados serán analizados y compilados en una tesis doctoral. Esta tesis estará disponible en la Biblioteca Británica (British Library) y puede solicitar una copia a la investigadora cuando la tesis sea terminada.

<u>Confidencialidad</u>

Toda la información será recogida y guardada siguiendo las pautas del UK Data Protection Act 1988. Esto significa que toda la información a la que accederá la investigadora será anonimizada y tratada de manera confidencial. Esta información no será utilizada para ningún otro propósito más que el de la presente investigación, y las notas de campo y los archivos de audio serán destruidos al finalizar la investigación.

<u>Consentimiento informado</u>

A partir de la información en este documento, nos gustaría consultarle si estaría de acuerdo en participar en este estudio a través de una entrevista. Si la respuesta es positiva, por favor responda directamente a este correo. Asimismo, si desea más información o tiene alguna duda, por favor, no dude en comunicarse con la investigadora.

Muchas gracias por amable predisposición y por su tiempo.

Atentamente,

Melina Galdos-Frisancho
Investigadora Doctoral
Science Policy Research Unit (SPRU)
University of Sussex

Appendix A-1 – Information sheet (translated to English)

US

University of Sussex

Interviewee Information Sheet

Please read this document carefully before signing the Informed Consent Protocol. If you wish, you may keep this document for future reference.

Project title: Rethinking the dynamics between emerging national innovation systems and socially inclusive innovation

This project has been approved by the Social Sciences and Humanities Research Ethics Committee of the University of Sussex, UK [Reference number: ER/MG505/1. Date of approval: 22/03/2019].

Principal Investigator: Melina A. Galdos Frisancho, PhD in Science and Technology Policy Studies. Science Policy Research Unit, Jubilee Building, University of Sussex, Brighton, BN1 9RH, United Kingdom

Supervisors: Dr Matias Ramirez (SPRU) and Professor Johana Chataway (UCL)

Emails: galdos.melina@pucp.edu.pe or m.galdos-frisancho@sussex.ac.uk

What is the purpose of this study?

The purpose of this study is to explain the factors that underlie the development of socially inclusive innovations in institutional contexts where market logics are dominant. That is to say, where policy instruments are mainly oriented towards supporting innovation for productivity and competitiveness. To achieve this objective, this research proposes a different approach to understanding the relationship between innovation systems and socially inclusive innovation by analysing the Peruvian case in depth. Thus, building on the findings on the academic literature to date, this study proposes an analysis of the evolution of the actors in the system, the construction of the links between them and their interactions using a view based on normative expectations, beliefs, values, and how these shape the processes of production, use and diffusion of knowledge and interactive learning.

The purpose of the interviews is to obtain more information about the values, beliefs, normative expectations of the actors involved in the development of R&D projects funded by FINCyT I and II, and FIDECOM that resulted in inclusive innovations.

Why have I been invited to participate in this study?

You have been invited to take part in this study because we consider that your knowledge and experience can help us better understand how beliefs, values and role expectations shape innovation processes within your organisation. In this connection, the information you can give to us might help us to produce more accurate descriptions of how innovation practices unfold in your organisation, and to compare them with similar practices in other organisations.

Who is on the research team?

Dr Ramirez and Prof Chataway are researchers in the fields of science, technology and innovation policy studies at SPRU, University of Sussex and STEaPP, University College London, respectively. Both researchers are accompanying the PhD thesis development process of Melina Galdos, the principal investigator.

Can I withdraw from the study at any time?

Yes, participating in this research through interviews is completely voluntary. If you decide to take part in this study, you may withdraw from the study or stop the interview at any time you wish without providing any justification or explanation. Also, should this happen, this information will not be shared with anyone other than the principal investigator.

What happens when the study ends?

The results will be analysed and compiled in a doctoral thesis. This thesis will be available from the British Library and you can request a copy from the researcher when the thesis is completed.

Confidentiality

All information will be collected and stored in accordance with the UK Data Protection Act 1988. This means that all information accessed by the researcher will be anonymised and treated as confidential. This information will not be used for any purpose other than this research, and field notes and audio files will be destroyed at the end of the research.

<u>Giving informed consent to take part</u>

Based on the information in this document, we would like to ask you whether you would agree to participate in this study through an interview. If the answer is yes, please respond directly to this email. Also, if you would like more information or have any questions, please do not hesitate to contact the researcher.

Thank you very much for your time.

Yours sincerely,

Melina Galdos-Frisancho
Doctoral Researcher
Science Policy ResearchUnit (SPRU)
University of Sussex

Appendix A-2 – Consent form (original language)

US
University of Sussex

CONSENTIMIENTO INFORMADO PARA PARTICIPANTES DE
INVESTIGACIÓN

Título del proyecto: Repensando la dinámica entre sistemas nacionales de innovación emergentes y la innovación socialmente inclusiva

El propósito de esta ficha de consentimiento es explicar a los participantes de esta investigación las implicaciones de su rol en ella como participantes.

Si usted accede a participar en este estudio, se le pedirá responder preguntas en una entrevista, la cual tomará aproximadamente entre 45 y 50 minutos de su tiempo. Lo que conversemos durante estas sesiones se grabará si usted lo permite, de modo que el investigador pueda transcribir después las ideas que usted haya expresado.

Esta investigación es conducida por la Sta. Melina Galdos Frisancho, estudiante de doctorado en la Unidad de Investigación sobre Políticas Públicas de Ciencia (SPRU) de la Universidad de Sussex, Reino Unido. El objetivo de este proyecto es entender cómo las percepciones, creencias y valores de los actores de un sistema nacional de innovación dan forma a los procesos de generación de conocimiento y de aprendizaje interactivo a partir del análisis de innovaciones inclusivas en el Perú.

Si usted decide brindar su consentimiento informado, por favor, asegúrese de haber leído y entendido la 'Hoja de información para participantes', la cual podrá conservar como respaldo del compromiso de la Srta. Galdos con respecto al tratamiento de la información que recoja durante las entrevistas.

De este modo, al brindar su consentimiento informado, usted confirma estar al tanto que:

1. Su participación en este proyecto como entrevistado es estrictamente voluntaria. En ese sentido, usted puede retirarse o parar la entrevista en cualquier momento si lo ve por conveniente. Si decide dejar de participar definitivamente en el estudio, no habrá ningún registro de este suceso.

2. Si se siente incómodo en algún momento de la entrevista, tiene total libertad de comunicárselo al entrevistador, así como de decidir no responder a cualquier pregunta.

3. La información que se recoja será confidencial y no se usará para ningún otro propósito fuera de los de esta investigación. Sus respuestas a la entrevista serán codificadas usando un número de identificación y, por lo tanto, serán anónimas. Una vez trascritas las entrevistas, los archivos con las grabaciones se destruirán.

4. Este estudio ha sido revisado y aprobado por el Comité de Ética para la Investigación en Ciencias Sociales y Humanidades de la Universidad de Sussex, Reino Unido. Si tiene más preguntas respecto al protocolo ético seguido por esta investigación puede contactarse con representantes del comité en el siguiente correo rgoffice@sussex.ac.uk

Desde ya le agradecemos su participación.

Yo_____ doy mi consentimiento para participar en el estudio y soy consciente de que mi participación es enteramente voluntaria.

Al firmar este protocolo, reconozco que la información que yo provea en el curso de esta investigación es estrictamente confidencial y no será usada para ningún otro propósito fuera de los de este estudio sin mi consentimiento. He sido informado de que puedo hacer preguntas sobre el proyecto en cualquier momento y que puedo retirarme del mismo cuando así lo decida, sin que esto acarree perjuicio alguno para mi persona.

Entiendo que una copia de esta ficha de consentimiento me será entregada, y que puedo pedir información sobre los resultados de este estudio cuando éste haya concluido. Para esto, puedo contactar a Melina Galdos Frisancho en el correo m.galdos- frisancho@sussex.ac.uk o galdos.melina@pucp.edu.pe

Nombre del participante	Firma	Fecha
Nombre del investigador	Firma	Fecha

Appendix A-2 – Consent form (translated to English)

US
University of Sussex

CONSENT FOR PARTICIPATION IN INTERVIEW RESEARCH

Project Title: Rethinking the dynamics between emerging national innovation systems and socially inclusive innovation

The purpose of this consent form is to explain to the participants in this study the implications of providing information for this research project.

If you agree to participate in this study, you will be asked to answer questions in an interview, which will take approximately 45-50 minutes of your time. What we discuss during these sessions will be recorded (if you allow it) so that the researcher can later transcribe the ideas you have expressed.

This research is being conducted by Ms Melina Galdos Frisancho, a PhD student at the Science Public Policy Research Unit (SPRU) at the University of Sussex, UK. The aim of this project is to understand how the perceptions, beliefs and values of actors in a national innovation system shape the processes of knowledge generation and interactive learning through the analysis of inclusive innovations in Peru.

If you choose to provide informed consent, please ensure that you have read and understood the 'Participant Information Sheet', which you may keep to support Ms. Galdos' commitment to the treatment of the information she collects during the interviews.

Thus, by providing your informed consent, you confirm that you are aware that:

1. Your participation in this project as an interviewee is strictly voluntary. In that sense, you may withdraw or stop the interview at any time if you consider it necessary. If you decide to stop participating in the study for good, there will be no record of this event.

2. If you feel uncomfortable at any point during the interview, you are free to let the interviewer know, and you are free to decide not to answer any question.

3. The information collected will be kept confidential and will not be used for any purpose other than this research. Your interview responses will be coded using an identification number and will therefore be anonymous. Once the interviews have been transcribed, the files with the recordings will be destroyed.

4. This study has been reviewed and approved by the Social Sciences and Humanities Research Ethics Committee at the University of Sussex, UK. If you have any further questions regarding the ethical protocol followed by this research, please contact representatives of the committee at rgoffice@sussex.ac.uk.

Thank you in advance for your participation.

I_____ give my consent to participate in the study and I am aware that my participation is entirely voluntary.

By signing this consent form, I acknowledge that the information I provide in the course of this research is strictly confidential and will not be used for any other purpose outside of this study without my consent. I have been informed that I may ask questions about the project at any time and that I may withdraw from the project at any time without personal harm to myself.

I understand that a copy of this consent form will be given to me and that I can ask for information about the results of this study when it is completed. For this, I can contact Melina Galdos Frisancho at m.galdos- frisancho@sussex.ac.uk or galdos.melina@pucp.edu.pe.

Name of the interviewee   Signature   Date

Name of the
Principal investigator   Signature   Date

Appendix B-1 – Interview guides' main topics

Example of interview guide for researchers (original language)

Guía de entrevista 0XX –UX– DATE

Participante:
Universidad:
Proyecto:
Año:
Fondo:

Información preliminar o relevante:

Muchas gracias por acceder a esta entrevista.

1. ¿Me podría comentar desde hace cuánto se dedica a la actividad de investigación?
    - ¿Desde cuándo trabaja en la [nombre de la universidad]? ¿Trabajó en otras universidades del país?

2. ¿De dónde surge la idea para desarrollar [nombre del proyecto]?

    - ¿Cómo surge el interés para trabajar temas relacionados a [tema del proyecto]?

3. ¿Qué tipos de alianzas generó este proyecto?

4. Esta es una investigación directamente relacionada con un problema estructural, que es el acceso al agua, que es aún más evidente cuando se piensa en relación al lugar (Arequipa) donde se ha desarrollado. Es claro que el proyecto tiene un <u>impacto social</u>. ¿Fue el impacto social de esta investigación una motivación o una consecuencia del proyecto?

5. Si fue una motivación, ¿de dónde surge esta?

    - Historia de vida, experiencias previas, trabajo previo.
    - ¿Tiene otros proyectos que reflejan un sentido de responsabilidad?

6. ¿Considera que la investigación debería tener un rol en la generación de mejores condiciones de vida para poblaciones vulnerables, en particular la investigación orientada a desarrollos tecnológicos? ¿Por qué?

7. Según su experiencia ¿es el impacto social de la investigación un tema relevante entre sus colegas investigadores en el Departamento de Ingeniería?

8. Según su percepción, ¿considera que la [nombre de la universidad] promueve la investigación que contempla algún tipo de impacto social? ¿Podría por favor decirme cómo? – (incentivos, bonos, soporte administrativo).

9. ¿Y el Departamento de Ingeniería?

Quisiera que volvamos de nuevo a conversar sobre su proyecto.

10. ¿Podría contarme cuál fue el rol de los potenciales usuarios de esta innovación en el desarrollo del proyecto? Por ejemplo, en la fase de prueba y retroalimentación.

11. ¿El desarrollo de este proyecto influyó de algún modo el desarrollo de proyectos posteriores?

12. ¿Al momento de formular su proyecto, conocía usted de los fondos de [nombre del fondo]? ¿Cómo se enteró de ellos?

13. ¿Considera que los fondos gubernamentales son indispensables para desarrollar proyectos de innovación? Si no, ¿cuál cree usted que es su relevancia?

14. ¿Cómo fue la relación con el Estado durante el desarrollo del proyecto? (Experimentó trabas burocráticas, tensiones – visiones distintas sobre el proyecto).

15. ¿Recibió algún tipo de apoyo administrativo por parte de la universidad durante el desarrollo de su proyecto? ¿Por ejemplo, de parte de [nombre de la oficina]?

16. ¿Después de obtener el financiamiento para este proyecto, ¿volvió usted a postular a fondos de investigación otorgados por el gobierno? – Si sí, ¿su aproximación a ellos cambió de alguna manera? (por ejemplo, buscó apoyo para manejar la parte administrativa, buscó otros recursos como, por

ejemplo, vincularse con empresas u otras universidades, obtuvo información sobre otros fondos además de aquellos para investigación aplicada, etc.).

17. ¿Cuáles cree que son las ventajas de la universidad en materia de investigación con respecto a otras universidades del país? Y en materia de extensión?

18. Cuál es el papel del rectorado y vice-rectorados en la generación de esas ventajas.

19. ¿Y las desventajas?

20. La universidad cuenta con una dirección académica de responsabilidad social. ¿En su trabajo de investigación, alguna vez tuvo la oportunidad de dialogar con este centro?

21. ¿Considera usted que investigar sobre estos temas ha representado algún costo?

Otros proyectos similares:

[Lista de proyectos]

Example of interview guide for researchers (translated to English)

Interview Guide 0XX -UX- DATE

Participant:
University:
Project:
Year:
Fund:

Preliminary or relevant information:

Thank you very much for agreeing to this interview.

1. Could you tell me how long have you been a researcher?
    -   How long have you been working at [name of university]? Have you worked at other universities in the country?

2. Where did the idea to develop [name of project] come from?
    -   How did you become interested in working on issues related to [project topic]?

3. What kind of partnerships have this project generated?

4. This is a research project directly related to a structural problem, which is access to clean water (this is an example of one of the projects). Thus, the project has had an important impact in the region where it was developed. Was the social impact of this research a motivation or a consequence of the project?

5. If it was a motivation, where does it come from?
    -   Life history, previous experiences, previous work.
    -   Do you have other projects that reflect a sense of responsibility?

6. Do you consider that research should have a role in generating better living conditions for vulnerable populations, in particular research oriented towards technological developments? Why?

7. In your experience, is the social impact of research a relevant issue among your research colleagues in the Department of Engineering?

8. According to your perception, do you consider that the [name of university] promotes research with some kind of social impact? Could you please tell me how? - (incentives, bonuses, administrative support).
   - What about the Department of Engineering?

I would like to talk to you again about your project.

9. Could you tell me what was the role of the potential users of this innovation in the development of the project? For example, in the testing and feedback stages.

10. Did the development of this project influence the development of subsequent projects in any way?

11. At the time of formulating your project, were you aware of the [name of fund] funds, and how did you find out about them?

12. Do you consider that government funds are indispensable for developing innovation projects? If not, what do you think is their relevance?

13. How was the relationship with the government during the development of the project? (Did you experience bureaucratic obstacles, tensions - different views on the project?)

14. Did you receive any administrative support from the university during the development of your project, e.g. from [name of office]?

15. After obtaining funding for this project, did you re-apply for government research funding? - If yes, did your approach to applying to these funds change in any way (e.g., did you seek support to handle the administrative side, did you seek other resources, e.g., link with companies or other universities, did you get information about other funds besides those for applied research, etc.)?

16. What do you think are the advantages of the university in terms of research compared to other universities in the country? And in relation to outreach and extension?

17. What is the role of the Vice-Chancellorship and Pro-Vice-Chancellorships in generating these advantages?

18. And the disadvantages?

19. The university has an academic unit for social responsibility. In your research work, have you ever had the opportunity to dialogue or collaborate with this unit?

20. Do you consider that doing research on these issues has been costly? Have you let go of other opportunities?

Other similar projects:
[List of projects]

Example of interview guide for university management staff (original language)

Guía de entrevista 0XX –UX– FECHA

Participante:
Universidad:
Dependencia:
Cargo:

Muchas gracias por acceder a esta entrevista.

1. ¿Cuándo empezó a trabajar en esta oficina y qué otros cargos, además de responsable de [cargo] ha ocupado?

2. ¿Podría contarme cuándo se funda la Oficina [dependencia] y cuál fue el motivo de su creación?

3. ¿Cuál es el rol que cumple la oficina actualmente? ¿Cómo se articula su rol con el plan estratégico de la universidad?

4. ¿Antes de la existencia de la [dependencia], existía alguna otra oficina o dirección encargada de la administración de los fondos externos de investigación y desarrollo tecnológico de la Universidad [nombre]? ¿Cuál y cuándo fue fundada?

5. ¿Qué tipo de decisiones puede tomar la Oficina [dependencia]?
   - Gobierno de la universidad. ¿Qué tanto llegan a permear las decisiones que se toman en esta Oficina los otros niveles de gobierno en la universidad?
   - ¿Cómo es la relación con los departamentos académicos, en particular con el Departamento de Ingeniería?

6. ¿Conoce usted de dónde surge la motivación de la [nombre de la universidad] para desarrollar estrategias de innovación y transferencia tecnológica?

La universidad contempla dentro de su misión el "Formar profesionales líderes en interacción permanente con la sociedad peruana... con una clara conciencia de nuestro país como realidad multicultural, con criterios de calidad, pertinencia y

responsabilidad social... para impulsar el desarrollo del país" (página web del Rectorado).

En relación a estos elementos de su misión como universidad:

7. ¿Cómo cree usted que se reflejan estos elementos en la actividad de investigación dentro de la universidad? – qué tipo de investigación se hace en la universidad.

8. ¿Cómo cree usted que se reflejan estos elementos en la actividad de formación dentro de la universidad? – qué tipo de investigación se hace en la universidad.

9. ¿Cómo cree usted que se reflejan estos elementos en la actividad de extensión dentro de la universidad? – qué tipo de investigación se hace en la universidad.

10. ¿Cree que la misión de la universidad está socializada entre sus colegas investigadores?

11. Por qué cree que hay investigaciones en la Universidad [nombre] que sí parecen alinearse con la visión de la universidad. Por ejemplo, la que realiza el Centro [nombre] o el grupo [nombre].

12. ¿Cómo se definen las áreas prioritarias de investigación en la Universidad [nombre]?
    - ¿Cada cuánto cambian?
    - ¿Qué factores cree usted que las hacen cambiar?

13. ¿Cómo se vincula esta oficina con otras unidades dentro de la universidad?

14. ¿En qué medida la Oficina [nombre] ha facilitado la colaboración/diálogo entre diversos actores dentro y fuera de la universidad (por ejemplo, entre investigadores, el sector productivo peruano y los usuarios finales de estas innovaciones)?

15. ¿Alguna vez ha percibido algún tipo de tensión entre estos actores? (tensiones también entendidas como puntos de vista divergentes).
    - Si es así, ¿podría brindarme ejemplos?

16. A su juicio ¿Cuáles son las principales causas de esas tensiones o diferencias?

17. ¿Tiene la Oficina [nombre] estrategias concretas para promover la investigación y la innovación al servicio de la sociedad y desarrollo del país en particular? – (orientación del quehacer institucional - misión).

18. La Universidad [nombre] ha obtenido varios fondos de vinculación empresa-universidad-Estado en el marco de FINCyT y FIDECOM ¿Cuáles considera usted que son los factores fundamentales que le han llevado a la Universidad [nombre] a ganar varias de las convocatorias lanzadas por FINCyT y FIDECOM?

19. ¿Cuáles cree que son las ventajas de la Universidad [nombre] en materia de investigación con respecto a otras universidades del país?

20. ¿Tuvo la Oficina [nombre] algún rol en la obtención de estos fondos?

21. ¿Tuvo la oficina alguna participación en la gestión de los fondos de Fincyt y Fidecom? ¿Cómo fue la mediación en la relación investigador-fondo?

22. Ley Universitaria y el enfoque de RSU. ¿Cómo se relaciona el enfoque de RSU con el trabajo de su oficina?

Example of interview guide for university management staff (translated to English)

Interview Guide 0XX -UX- DATE

Participant:
University:
Unit:
Position:

Thank you very much for agreeing to this interview.

1. When did you start working in this office, and what other positions, apart from [name of the post], have you held?

2. Could you please tell me when the office [name] was founded and what was the reason for its creation?

3. What is the current role of the office and how is its role linked with the university's strategic plan?

4. Before the existence of the [name of the office], was there any other office or directorate in charge of the administration of external research and technological development funds of the university? Which one and when was it founded?

5. What kind of decisions can this office make?
    -   To what extent do you consider that the decisions taken in this office permeate the other levels of government in the university?
    -   How is the relationship with the academic departments, in particular with the Department of Engineering?

6. Do you know where the motivation of the [name of the university] to develop innovation and technology transfer strategies comes from?

The university's mission is to "train leading professionals in permanent interaction with Peruvian society... with a clear awareness of our country as a multicultural reality, with criteria of quality, relevance and social responsibility... to promote the country's development" (Rector's Office website).

In relation to these elements of its mission as a university:

7. How do you think these elements are reflected in the research activities of the university? - What type of research is done at the university?

8. How do you think these elements are reflected in the teaching activity of the university? - What type of research is done at the university?

9. How do you think these elements are reflected in the outreach and extension activities of the university? - What type of research is done at the university?

10. Do you think that the mission of the university is socialised among your colleagues? among the researchers at the university?

11. Why do you think there is research at the university that seems to be aligned with the vision of the university (despite the pressures researchers face). For example, that carried out by the [name] Centre or the [name] group.

12. How are the priority areas of research at the university defined?
    - How often do they change?
    - What factors do you think cause them to change?

13. How does this office link with other units within the university?

14. To what extent has this office facilitated collaboration/dialogue between various actors within and outside the university (e.g., between researchers, the Peruvian productive sector and the end-users of these innovations)?

15. Have you ever perceived any kind of tension between these actors? (tensions understood as divergent points of view).
- If so, could you give me some examples?

16. In your opinion, what are the main causes of these tensions or differences?

17. Does this office have concrete strategies to promote research and innovation in the service of society and the country's development in particular? - (orientation of institutional work - mission).

18. The university has obtained several business-university-state linkage funds within the framework of FINCyT and FIDECOM. What do you consider to be the fundamental factors that have led the researchers at this

university to win several of the calls for proposals launched by FINCyT and FIDECOM?

19. What do you think are the advantages of this university in terms of research compared to other universities in the country?

20. Did this office have any role in obtaining these funds?

21. Did this office have any participation in the management of the Fincyt and Fidecom funds? How was the mediation in the researcher-fund relationship?

22. University Law and the USR approach: How does the USR approach relate to the work of your office?

Example of interview guide for government officials (original language)

<div align="center">

Guía de entrevista 0XX – FECHA

</div>

Participante:
Institución:
Unidad:
Rol:

Información preliminar y otras notas sobre el puesto.

Muchas gracias por acceder a esta entrevista.

1. ¿Cuándo empezó a trabajar en la [nombre de la institución pública] y desde cuándo ocupa el [nombre del cargo]?

2. ¿Cuáles son las principales tareas que desempeña en [nombre de la institución pública]?

3. ¿Podría contarme cómo se crea el programa Innóvate Perú en el 2014?

4. ¿Podría decirme a qué se debe que Innóvate Perú tenga autonomía económica, administrativa, financiera y técnica?

5. ¿Podría contarme un poco más sobre los antecedentes, particular sobre FINCyT (2007)? ¿Por qué y cuándo pasó de pertenecer a la Presidencia del Consejo de Ministros a PRODUCE?

- Tengo entendido que Fincyt (1-2007, 2-2013 y 3, 2016) se crea con recursos provenientes del BID. ¿Tuvo el BID otra participación en Fincyt, por ejemplo, en la creación de instrumentos de política, en el monitoreo o en la evaluación de los resultados del fondo?
- ¿Con qué recursos se crea FIDECOM? ¿Tuvo la creación del fondo, así como sus instrumentos de política, algún tipo de acompañamiento de organismos internacionales?

6. ¿Quién o qué entidades empujaron la agenda de innovación en el Perú? En la web del programa se explica que la necesidad de crear el programa se basa en la incipiente formación y bajo dinamismo del mercado de innovación para el incremento de la competitividad del país. ¿Conoce cómo se llega a ese diagnóstico?

7. ¿Conoce cómo define el Innóvate Perú la innovación?

8. ¿Quiénes considera Innóvate que deberían ser parte de este proceso?

9. ¿Cómo es la relación entre Innóvate Perú y las universidades y centros de investigación?

10. Es claro que Innóvate Perú ha **facilitado la colaboración/diálogo** entre diversos actores del ecosistema de innovación. ¿Alguna vez ha percibido algún tipo de **tensión entre estos actores**? (tensiones también entendidas como puntos de vista divergentes).
    - Si es así, ¿podría brindarme ejemplos?

11. A su juicio ¿Cuáles son las principales causas de esas tensiones o diferencias?

12. Me queda claro que el objetivo del programa es incrementar la productividad empresarial a través del fortalecimiento de los actores del ecosistema de innovación. Teniendo eso en cuenta, ¿de dónde surge la iniciativa para crear el **Concurso de Proyectos de Innovación Social** con el MIDIS?

13. ¿Conoce qué entidad se encarga de la evaluación de las propuestas?

    a. Criterios de evaluación figura la pertinencia de las propuestas respecto de los retos planteados, el impacto socioeconómico esperado en el sector y en el país y la coherencia y viabilidad de la estrategia de escalamiento

14. ¿Conoce cómo se está evaluando el impacto socioeconómico esperado?

15. ¿Existen otras iniciativas de promoción y fortalecimiento de la innovación social?

16. Cómo ha evolucionado Innóvate Perú en el tiempo. Si tuviese que rescatar lecciones ¿cuáles serían estas?

17. Durante su gestión se desarrollaron proyectos como la silla especial para niños, o el tele-ecógrafo, el proyecto de confort térmico para casas a más de 3,000 msnm. Estas son innovaciones con un impacto social más tangible en perspectiva comparada. ¿A raíz de qué considera que surgieron estos proyectos? ¿su desarrollo influyó de algún modo la creación del concurso para innovaciones sociales?

18. A su juicio, ¿cuáles cree que son los principales retos que enfrenta el programa en materia de fomento de productividad a través de la innovación?

19. ¿Cree usted que el gobierno impulsará el desarrollo de innovaciones inclusivas en el futuro?

Example of interview guide for government officials (translated to English)

<div align="center">Interview guide 0XX - DATE</div>

Participant:
Institution:
Unit:
Role:

Preliminary information and other notes about the position.
[Notes here]

Thank you very much for agreeing to this interview.

1. When did you start working at [name of public institution], and how long have you been in [name of position]?

2. What are the main tasks you perform at [name of public institution]?

3. Could you tell me how the Innóvate Perú programme was created in 2014?

4. Could you tell me why Innóvate Perú has economic, administrative, financial, and technical autonomy?

5. Could you tell me a little more about the background, particularly about FINCyT (2007), why and when did it go from belonging to the Presidency of the Council of Ministers to PRODUCE?

   - I understand that Fincyt (1-2007, 2-2013 and 3, 2016) was created with resources from the IDB. Did the IDB has any other participation in Fincyt, for example, in the creation of policy instruments, in monitoring or in the evaluation of the fund's results?
   - Who funded FIDECOM created? Did the creation of the fund, as well as its policy instruments, have any kind of support from international organisations?

6. Who or which entities pushed the innovation agenda in Peru? The programme's website explains that the need to create the programme is based on the incipient formation and low dynamism of the innovation market to increase the country's competitiveness. Do you know how this diagnostic was elaborated?

7. Do you know how Innóvate Perú defines innovation?

8. Who does Innóvate Perú consider should be part of this process?

9. How is the relationship between Innóvate Peru and universities and research centres?

10. It is clear that Innóvate Peru facilitated collaboration/dialogue between different actors of the innovation ecosystem. Have you ever perceived any kind of tension between these actors? (tensions understood as divergent points of view).
   - If so, could you provide examples?

11. In your opinion, what are the main causes of these tensions or differences?

12. It is clear to me that the objective of the programme is to increase business productivity by strengthening the actors of the innovation ecosystem. With that in mind, where did the initiative to create the Social Innovation Project Competition with MIDIS come from?

13. Do you know which entity is in charge of evaluating the proposals?
   - Evaluation criteria include the relevance of the proposals with respect to the challenges posed, the expected socio-economic impact on the sector and on the country, and the coherence and viability of the scaling-up strategy.

14. Do you know how the expected socio-economic impact is being evaluated?

15. Are there other initiatives to promote and strengthen social innovation?

16. How has Innóvate Peru evolved over time? If you had to rescue lessons, what would they be?

17. During your administration, projects such as the special chair for children, or the cloud-based health technologies, the thermal comfort project for houses at more than 3,000 metres above sea level were developed. These are innovations with a more tangible social impact comparatively. Why do you think these projects came about? Did their development influence in any way the creation of the competition for social innovations?

18. In your opinion, what do you see as the main challenges facing the programme in terms of promoting productivity through innovation?

19. Do you think the government will encourage the development of inclusive innovations in the future?

Appendix B-2 – Sample NVIVO codes

Codes	Sensemaking				
	Selective attention (cues)	Meaning creation	Meaning interpretation	Enactment	
	Newness **Opportunity**	**Structural determination** - Experience - Human Capital - Novelty of the topic - Seniority **Situated cognition** - Collegiality	**Pre-existing cognitive frames** **Incorporating new information**	**Spread of good practices** **Building intra-organisational bridges** **Applying for funds** **Redirecting the funds**	
Codes	**Institutional Work**				
	Toolkit (Resources)	Degree of Incumbency	Free spaces	Organisational Change	Change in interpretive schemes
	Narratives **Rhetoric** **Situated practices** **Teams**	**Tightly coupled systems** **Loosely coupled systems**	**Oppositional identity** - Pursue of personal wellbeing - Politics - Shared 'vocation' **Oppositional efficacy** - Lack of resources - Rhetoric **Oppositional frames** - Concerns about rankings - Lack of support	**Prominent changes** **Partial reconfigurations** **No change**	**Barriers** - Bureaucracy - Challenging dominant narratives - Narrow vision - Politics - Senior staff **Enablers** - Different understandings of the USR - Shared understanding of their profession - Support from department leadership

Codes	Institutional Elements				
	Beliefs	Values	Role expectations	Regulative pillar (Government)	Normative pillar (Universities)
	Continuity **Determination** **Fairness** **Giving up status and recognition** **If not us, then who?** **Rejection of populist/ political measures**	**Vocation to help others** **Treating others as equals** **Keeping your word** **Integrity**	**Responsibility** **Directionality of one's actions** **Complementarity** **Creating your own opportunities**	**Competitiveness and productivity** **Dependency relations** **Lack of insitutionality** **Lack of resources for monitoring and evaluating**	**Social Responsibility** **Extension** **Contributing to development**
Codes	Domains (Knowledge production)				
	Collaboration	Context of application	Dialogic	Mobilisation of practical methodologies	Non conventional forms of quality control
	Valuing other's knowledge	**Adaptability** **Transforming how public services reach users**	**Appropriate technologies** **Impact** **Mutual interaction** **Rethink and redesign**	**In situ experimentation** **Reverse engineering** **Yachachiq**	**Publishing as a networking practice** **Rejecting conventional metrics**
Codes	Domains (Organisational				
	Intuition	Interpretation	Integration	Institutionalisation	
	Pre-existing frames	**Socialisation of interpretations**	**Change in practices in the department** **Changes in practices in research centres**	**Changes in the organisation of the academic department** **Changes outside the academic department** **Changes in research practices and management (Centre)**	