MAKING KNOWLEDGE WORK DIFFERENTLY

The politics of knowledge in inclusive development and innovation

David Ludwig, Cees Leeuwis, Birgit K. Boogaard, and Phil Macnaghten

While knowledge has a privileged and even definitive role in addressing societal challenges and in realising sustainable development goals (SDGs), there is less clarity pertaining to 'what knowledge?', 'whose knowledge?', 'knowledge in what form?', and even 'why knowledge?'. This book invites students, scholars, and professionals to engage critically with such questions. Our starting point is the observation that 'knowledge for development' is a concept embraced by a plethora of actors and institutions ranging from United Nations organisations and global research establishments, to national governments and local non-governmental organisations. Similarly, critical perspectives on development also commonly emphasise the importance of knowledge by highlighting indigenous and local knowledge and epistemologies that have remained marginalised in dominant institutional discourses of knowledge for development.

Why is the concept of knowledge such a central issue in debates on development and change? And is all this attention justified? One could argue that there are other issues and concepts that merit more attention than knowledge when the goal is to foster sustainable development. What about creating a 'level playing field' in international relations and politics? What about preventing 'negative externalities' by establishing a fairer way of organising and regulating local and global markets? What about addressing the 'underlying causes' of violent conflict and abject poverty? While these issues are indeed of major concern, they are intertwined with the contested role of knowledge in development. First, there are questions about how and by whom concepts like 'sustainable development,' 'underlying causes,' 'negative externalities,' or 'abject poverty' are defined and given meaning in specific settings. Scientists from different disciplines approach such concepts differently, and, in addition, societal stakeholders and local communities think differently about such matters as well. For example, while a sociologist might argue that 'assimilation into market economies' constitutes the

root problem of a development project, an economist might regard 'insufficient liberalisation of markets' as the key obstacle, while a local community might propose the main constraining factor as a 'lack of political autonomy.' Second, it clearly matters which of these differential bodies of knowledge and understanding is used to guide the development of solutions and underpin development interventions. After all, interventions aimed at 'bypassing capitalism' are likely to be highly different from those aimed at 'liberalising markets' or 'fostering autonomy.'

The brief example above makes clear that knowledge is not a neutral phenomenon, but that it has a performative character (Richards, 1989; Leeuwis, 2013). In other words: the concepts and understandings we have about the world around us orient and allow us to discuss, negotiate, and work towards particular courses of action (or 'performances') that make a difference and that have 'positive' or 'negative' consequences, depending on what, and whose values and standards one considers. This performativity is not only inherent to the practical application of knowledge (e.g. the design of a technology or intervention to address a certain challenge), but also to the creation and production of knowledge. When researchers, for example, set out to develop knowledge about the management of agricultural pests and diseases, it makes a difference whether they ask: 'what chemical agent is most effective for killing a newly emerging harmful insect'? or 'what natural enemies and inter-cropping systems are most effective for controlling a newly emerging harmful insect'? While such research questions may be addressed empirically, the questions themselves are not neutral as they allow the development of very different future pathways of action (e.g. large agrochemical companies promoting chemical pesticides versus extension organisations promoting biological pest-control). Similarly, locations where such research are conducted (laboratory or field, large or small farms, highlands or lowlands) are likely to influence the answers and their relevance for particular segments in society. Even the methods used to collect data may have important implications: when data on crop damage are collected and analysed by farmers during field inspections as part of a citizen science project this is likely to give rise to different discussions and impacts in society than when data are collected by means of a drone equipped with sensors that can detect specific types of crop damage. This example demonstrates that the generation of knowledge too has performative implications, and thus that we cannot make a strict separation between the 'production' and the 'application' of knowledge. The type of knowledge generated and the process of knowledge production can have immediate societal consequences, and hence already includes forms of 'application' to and in society. This performativity not only applies—as the example illustrates—to research and knowledge production, but clearly also to processes that are linked more directly to making knowledge count in society, such as knowledge exchange, education, technology design, and efforts to integrate or bridge knowledge from different communities of actors.

The performative character of knowledge makes clear that knowledge is intricately intertwined with the politics and dynamics of inclusion and exclusion: which outcomes and values are being pursued wittingly or unwittingly through the generation, exchange, and application of knowledge, and which not? The phrase '*making knowledge work*' in the title of this chapter refers to this performative character and reflects that 'making knowledge' and 'putting knowledge to work' are two sides of the same coin. The addition '*differently*' suggests that there may be good reasons to alter and redirect the ways in which knowledge is made and put to work in the context of inclusive development, a view to which many of the authors in this book subscribe.

While questions about the production and application of knowledge are deeply entangled, they have often been separated into expert-driven approaches that employ linear and top-down models of development and innovation. According to such models, the production of knowledge falls primarily in the domain of science in the sense that academic experts produce knowledge that is later applied by innovators who take scientific insights into development practice. While such a simple division of labour between the production and the application of knowledge has been widely criticised in development and innovation studies (Briggs, 2005, Mawdsley et al., 2002, Sillitoe, 2007), it remains often implicitly assumed in the organisation of development projects that, we argue, are in need of novel perspectives on the dynamic interactions between the production and use of knowledge.

By integrating insights from epistemology and development practice, we highlight three dimensions that require reconsideration in the debate about knowledge for development. First, there is the domain of formalised knowledge production in academic research. Research for development is too often misunderstood through outdated clichés of value-freedom and context-independence. Rather, what needs to be analysed is its constant interaction with the performativity of knowledge, from the formulation of questions to the negotiation of research methods to the choice of field sites. A second dimension for reconsideration is the diversity of different forms of experiential, indigenous, local, and traditional knowledge, all beyond institutionalised academic knowledge, and all too often marginalised in the top-down organisation of development projects that appeal exclusively to the epistemic authority of academic research. Local communities are not only experts about local ecological and social dynamics, but their knowledge is also intertwined with practices, values, and worldviews that often articulate different perspectives on the co-production of knowledge and social orders. A third dimension of reconsideration is the interaction between different knowledge systems that requires methodological reflection about the opportunities of inclusive knowledge production as well as a political epistemology for the negotiation of knowledge and practice in the light of power differentials and colonial legacies.

These three dimensions of epistemological reflection interact in various ways with practices of development and innovation. Different epistemic resources shape

the formulation of problems and research questions as discussed in Chapter 17 on demand articulation and Chapter 1 on transdisciplinarity. They also affect the use of concepts and framings as discussed in relation to notion of 'elite capture' in Chapter 5 and contestations of the very concept of 'development' as outlined in Chapter 6. Negotiations of knowledge shape methods of intervention and standards for evaluation as reflected in Chapter 10 on theories of change and Chapter 11 on evidence-based advocacy. Furthermore, the performative character of knowledge also creates heterogeneous spaces for intervention by pointing to different technologies (Chapters 12, 13, and 14), by creating novel spaces for dialogues (Chapters 3, 6, and 15), and by affecting styles of governing knowledge (Chapters 10, 11, 15, 16, and 17). In addition, a focus on the epistemological dimension in development and innovation requires reflexivity of involved actors as addressed by many chapters (Chapters 1, 2, 4, 5, 7, 8, and 9).

This landscape of different ecologies of knowledge demonstrates that knowledge is intricately intertwined with dynamics of inclusion and exclusion in development and innovation. Much has been written on the shortcomings of top-down and expert-driven approaches that marginalise the standpoints of local stakeholders in the negotiation of social-environment change and its global contestations (Boogaard, 2019, Leeuwis, 2004, Ludwig, 2016, Macnaghten, 2020). For example, a corpus of work has been led out of the UK STEPS (Social, Technological and Environmental Pathways to Sustainability) Centre that has argued for 'a more deliberate, equitable and accountable politics around progress towards sustainability' (Stirling, 2009: 9), that has developed a 'pathways approach' that embraces the dynamic interactions between social, technological, and ecological processes in pursuit of a more inclusive politics of sustainability (Leach, Scoones, and Stirling, 2010; Leach et al., 2012), including the role for grassroots innovation (Smith and Stirling, 2016, 2018), and that has analysed how innovation interacts with social, technological, and ecological systems to contribute to transitions at multiple levels (Ely et al., 2013).

While such critical interventions have contributed significantly to academic and policy debates on inclusive development and innovation as responses to these shortcomings (see also Gupta et al., 2015, Opola et al., 2020), this book focuses more explicitly on the applied and political epistemology that inclusivity demands and that is needed to make knowledge work *differently*. In developing such an approach towards the politics of knowledge, the chapters of this volume articulate an integrated research vision of 'doing and studying' that is equally reflexive about epistemological challenges and action-oriented in focusing on practices of making knowledge work. Parts I and II of the volume address fundamental methodological questions about epistemic diversity, the integration of different knowledge systems, and the tensions between them. Parts III to VI explore these issues through four core challenges for inclusive development and innovation in terms of transformative learning and dialogue (III), evidence in development (IV), technological change and digitalisation (V), and the governance of knowledge and innovation (VI). The six sections and 17 chapters are visualised in the

illustration at the end of this chapter. In addition, each chapter includes one illustration with the main concepts or case studies of the chapter. The illustrations aim to enhance understanding of the themes and topics throughout the book and are especially suitable for educational purposes. All illustrations are brought together in Appendix I, which provides a visual summary of the entire book.

Knowledge integration: crossing epistemic boundaries

Inclusive development and innovation require an equally inclusive epistemology that recognises the standpoint diversity of stakeholders (Chapter 1) and their various forms of situated knowledge about local environments and practices. Middelveld, Maat, and Macnaghten (Chapter 2) highlight the diversity of local knowledge systems through three case studies of resistance against Caribbean slave-based plantation economies, sheep farming in Scotland, and public responses to genetically modified foods. While the cases draw from vastly different geographic, historical, and disciplinary contexts, they share a political positioning of 'knowledge from below' that challenges the domination of institutionalised forms of scientific knowledge in practice. Middelveld, Maat, and Macnaghten conclude by highlighting the need to configure knowledge as a plural concept that incorporates heterogeneous academic and non-academic practices and in which knowledges from below can resist dominant epistemologies and governance regimes.

Recognition of 'knowledge from below' raises complex epistemological questions about the relations between academic and non-academic knowledge systems and their prospects for integration. As Ludwig and Boogaard (Chapter 1) point out, knowledge integration has become widely endorsed and articulated through integrative frameworks that appeal to 'collaboration,' 'co-creation,' 'citizen science,' 'intercultural dialogue,' 'interdisciplinarity,' 'multi-stakeholder platforms,' 'participatory design,' 'participatory action research,' 'science society dialogue,' 'transdisciplinarity,' 'public engagement,' and 'open science' (p. 20). The burgeoning literature on knowledge integration reflects intertwined epistemological and social promises for development and innovation (Byskov, 2020, Ludwig and El Hani, 2020). Epistemologically, knowledge integration contributes to a diversified knowledge base that is sensitive to local contexts and mitigates blindspots and biases of an exclusive reliance on academic—and often Global North—expertise. Furthermore, knowledge integration also contributes to more equitable knowledge production that mitigates the marginalisation of stakeholders whose knowledge often remains excluded in development and innovation processes.

Many chapters of this book demonstrate how knowledge integration can simultaneously contribute to more effective and equitable development and innovation processes. For example, Jomantas et al. (Chapter 14) draw insights from the 'Plantwise' programme that supports smallholder farmers in addressing plant health issues. By embracing online chats as knowledge sharing platforms, the programme gathered diverse expertise and experiences while also bridging

social gaps between stakeholders with otherwise isolated bodies of knowledge about plant diseases and pests. Lopez and Ludwig (Chapter 3) argue that criticism of narrow Eurocentric approaches to gender mainstreaming in development requires a transdisciplinary approach that brings together different sites of knowledge production about gender. Building on insights from feminist epistemology, Lopez and Ludwig examine three sites of knowledge production (institutional documents, gender specialists, and rural communities) about 'gender equality' in the CGIAR, an international agricultural development organisation. Their analysis suggests that engagement with different forms of situated knowledge creates opportunities for a transdisciplinary approach beyond narrow framings of gender mainstreaming that are commonly employed in the development industry.

Decolonising knowledge integration

Knowledge integration constitutes an important starting point for inclusive approaches in development and innovation that reflect on standpoint diversity in complex social-environmental contexts. However, knowledge integration does not provide a simple cure to the pathologies of expert-driven top-down approaches. As Ludwig and Boogaard (Chapter 1) point out, knowledge integration raises challenging questions: What kind of knowledge is integrated? For what purposes? Through what kind of frameworks? Without critical reflexivity about these issues, integration projects can reproduce hierarchies between stakeholders by treating local knowledge as an additional data source in frameworks that are already defined by the interests and methods of external researchers. These challenges motivate Ludwig and Boogaard's case for critical transdisciplinarity that reflects about the political structure of epistemic 'trading zones' and approaches them through intercultural and transformative dialogues.

Cummings, Munthali, and Shapland (Chapter 4) complement this critical perspective by turning to epistemic decolonisation both as a challenge and as an opportunity for the negotiation of knowledge in development projects. On the one hand, epistemic decolonisation challenges established practices of knowledge production to critically reflect on the reproduction of colonial hierarchies through institutional factors such as the organisation of the academic publishing system, disconnects between the ambitions of researchers and communities, the dominance of English as the language of academic exchange, unequal attributions of testimonial credibility, and the application of categories of difference such as ethnicity, gender, and race. Shapland, van Paassen, and Almekinders (Chapter 5) focus on 'elite capture' as a more detailed case study of how colonial legacies and hierarchies are reproduced in development projects. 'Elite capture' refers to an increasingly prominent concern in decentralised development projects about the roles of local elites in usurping benefits of development interventions. Using Bourdieu's concepts of reflexivity and symbolic power, the authors address the contested development of the notion of elite capture. They argue that dominant framings identify 'elite capture' exclusively as a problem of local elites

while ignoring equally severe concerns about capture by NGOs and donors. As a result, appeals to 'elite capture' commonly legitimise top-down control of development resources and arbitrary power relations between international development institutions and rural communities in the Global South.

While epistemic decolonisation challenges simple narratives of harmonious knowledge integration, it also creates new opportunities for rethinking the relations between stakeholders and their standpoints. For example, Boogaard and van Norren (Chapter 6) focus on contested understandings of 'development' and their entanglements with underlying philosophies and practices. Focusing on *Buen Vivir* and *Ubuntu* as two prominent indigenous philosophies in the Global South, the authors show how heterogeneous epistemologies and ontologies can contribute to the articulation of alternative perspectives on inclusive development that can reimagine relations between humans and with nature beyond frameworks that are currently dominant in development projects. Rather than thinking of knowledge integration as the incorporation of easily digestible pieces of local knowledge, the cases of *Buen Vivir* and *Ubuntu* emphasise the need for deeper intercultural dialogues about different ways of relating knowledge and practice in the negotiation of development and innovation.

Learning for transformative change: creating space for diversity and dialogues

Inclusive knowledge production has the potential to transform development and innovation processes through the concerns and perspectives of stakeholders who commonly remain marginalised in narrow appeals to technological and scientific expertise. At the same time, knowledge integration is not a smooth process but creates tension between different standpoints in different positions of power. Successfully crossing epistemic boundaries therefore requires learning for transformative change which creates space for diversity and dialogue. This challenge is addressed by several chapters of this book (van Mierlo et al.; Lie, Boogaard, and Witteveen; van der Burg).

While these three chapters are rather different in their approach—from a systems approach in Chapter 7, to an educational approach in Chapter 8, and a historical approach in Chapter 9—the authors all argue for transformative change through learning processes. Lie, Boogaard, and Witteveen's chapter identifies design principles for diversity sensitive learning based on a study of three university courses: Intercultural Communication, African Philosophy, and Visual Research Methods. The authors argue that diversity sensitive learning can be fostered by designing courses through three principles of (1) situating knowledges, (2) enabling dialogical encounters, and (3) integrating experience and reflection. Van Mierlo et al. discuss how action-oriented research stimulates learning for transformative change through a discussion of three methodologies of Companion Modelling, Visual Problem Appraisal, and Reflexive Monitoring in Action. Van der Burg's chapter adopts a historical approach in discussing

social segregation of agricultural education along gender and race in Ghana, the Netherlands, and the United States. Her discussion shows how 'adapted' agricultural education for marginalised groups often functioned to reinforce this marginalisation and argues for a transformative approach beyond segregated agricultural education.

Rather than being a smooth and straightforward process, all three chapters demonstrate that learning for transformative change is full of challenges. Many of these challenges emerge because the political dimension of knowledge in such learning processes is essential: knowledge and learning are not neutral or objective, but—as Paulo Freire already wrote many years ago—knowledge is political (1970). Learning for transformative change occurs when people learn about and from different or new perspectives and knowledge than their own. As such, learning processes recognises diversity in terms of people, content, and process (Chapter 8). This means that existing biases and 'blind spots' in learning processes—such as those that reinforce 'othering' (Chapter 8) or maintain structurally built-in gender and racial inequalities (Chapter 9)—should be made explicit and overcome. As such, reflection and learning are deeply interwoven, and learning processes for transformative change require critical reflection at an institutional as well as a personal level.

In this regard, Chapter 8 identifies critical reflection as one of the three design principles in diversity sensitive learning at Higher Education, while Chapter 7 emphasises the importance of reflexivity in action-oriented research, in other words, the ability to interact with and affect the institutional setting in which actors operate (Van Mierlo et al.). Dialogues are particularly suitable to reflect on one's thinking and acting, to learn from each other, and to open up for different perspectives and knowledges (Bohm, 2004, Kimmerle, 2012). As such, dialogues are essential to create space for diversity where transformative change can occur. Chapter 7 therefore endorses dialogues as requirement for good facilitation in action-oriented research, and Chapter 8 identifies dialogues as one of the three design principles for diversity sensitive learning.

Rethinking evidence in development

The notion of evidence is at the centre of many debates in the development sector that are driven by donor demands to use resources more effectively (McMichael et al., 2005, Storeng and Béhague, 2014). The imperative to provide evidence for effectiveness creates an important site for the negotiation of knowledge by raising questions about the nature of evidence and about development goals for which this evidence is produced. The chapters by Cieslik and Leeuwis (Chapter 10) and by Van Wessel (Chapter 11) discuss such questions in connection with the ex-ante and/or ex-post assessment of development interventions, with emphasis on relevant sources and methods for constructing evidence. Cieslik and Leeuwis discuss the widespread use of 'Theories of Change' (ToC), a development tool that many projects and programmes (have to) use in order to

make plausible that and how proposed interventions will yield desired effects in a given context. While such ToC are typically formulated at the outset of a project, Cieslik and Leeuwis signal that, in the era of 'evidence-based policy,' there is an increasing trend, and even pressure, to demonstrate the validity of ToCs through Randomised Controlled Trials (RCT), and to use ex-post 'validated' ToCs as an underpinning for interventions in other time and space settings. Cieslik and Leeuwis discuss why the use of RCT is methodologically unsound for such purposes. They make a plea for including other sources of knowledge in the design of ToCs, notably locally contextual stakeholder knowledge and forms of historical and/or social science evidence that has been created through other methods and forms of analysis.

Van Wessel (Chapter 11) seamlessly connects to this discussion. On the one hand she broadens the debate by pointing to the relational, dynamic, and political dimensions of evidence in the everyday reality of Civil Society Organisations (CSO), and at the same time she zooms in on a particular type of intervention (evidence-based advocacy) and points to specific qualitative strategies and sources for gathering local stakeholder evidence, including testimonies, visuals, case studies, and storytelling. Van Wessel demonstrates how CSOs are tapping into the language of 'evidence-based' intervention and using multiple communicative strategies and roles to influence various stages of policy-making, whereby scientific evidence is only one of the sources used to build credibility. In doing so, she argues that the role of evidence is only relative in efforts to build legitimacy, exert influence, and attract resources. Importantly, Van Wessel makes clear there are large differences between Northern CSOs and Southern CSOs in their capacity to engage with evidence, voice concerns, and make these count in policy and/or resource mobilisation. Thus, evidence-based advocacy does not take place in a level playing field of CSOs, so that the creation, interpretation, and use of evidence is intricately intertwined with political processes, the exertion of power, and the privileging of certain types of evidence over others, which may lead to the exclusion of less powerful groups and marginalised interests. In order to make evidence-based advocacy more inclusive, Van Wessel argues, we need to consider altering the structural conditions under which CSOs operate, including reform in the way development funds are controlled.

In all, the two chapters highlight several forms and mechanisms of exclusion in relation to both the production of evidence and its use in the arena of development intervention, and emphasise complementary strategies for 'making evidence differently' (through different methods), 'making different evidence count' (from different sources), and 'making evidence count differently' (through different strategies).

Negotiating technological change and digitisation

Several chapters in the book engage with the widespread expectation and optimism that new digital technologies will transform and improve interaction in

innovation systems (Klerkx et al., 2019) and yield considerable benefits for users. In relation to this, the chapter by Jomantas et al. (Chapter 14) discusses the role of social media in enhancing knowledge exchange in and around agricultural advisory organisations, while Nyamekye et al. (Chapter 13) examine efforts of a social enterprise to deliver information on market conditions, weather, and best agricultural practices to farmers through a digital platform. Preceding these chapters is a critical problematisation by McCampbell et al. on forms of inclusion and exclusion that may occur in relation to the digitisation of African agriculture (Chapter 12).

McCampbell et al. draw lessons from experiences in the Global North and South, and argue that we need to move beyond simplistic frameworks of thinking about inclusion and exclusion in digital settings. They argue that we must abandon the binary distinction of inclusion and exclusion; being excluded from something can at the same time imply inclusion in something else. Similarly, they point out that, over time, inclusion may not always yield favourable consequences, while forms of exclusion can eventually become advantageous. They apply this refined understanding to several levels and spheres in which inclusion and exclusion in relation to digitisation may happen, ranging from differential access conditions to specific technologies (such as with digital divides), to design choices made in the development trajectories of digital platforms (such as with privileging certain logics or actors in intended or unintended ways), to system level complexities (such as with unequal control over data or vulnerability to cybercrime and digital traps). McCampbell et al. assess that the latter levels receive relatively little attention in debates on digitisation, even though they can become powerful determinants of who is included or excluded and whether inclusion and exclusion is beneficial or harmful. Thus, they make a plea for more careful consideration of trade-offs and unintended consequences in digitisation processes.

This challenge is taken up by Nyamekye al. (Chapter 13) who look at the development of digital information services in Ghana through the lens of the Responsible Research and Innovation (RRI) framework (see also Chapter 15 Macnaghten, Shah, and Ludwig). This approach is directed at making innovation trajectories more inclusive and responsive to societal demands and values, and also invites greater reflexivity and anticipation of possible negative consequences and trade-offs. However, Nyamekye et al. suggest that applying RRI principles to the development of digital information services in Ghana is hampered by strategic, institutional, and substantive uncertainties. As a response, they suggest several mechanisms to address such challenges, including greater integration of scientific and indigenous knowledge (see also Chapter 1 Ludwig and Boogaard) and the development of a tailored and culturally sensitive RRI rubric for digital agriculture.

While Nyamekye et al. examine a route to making digital technologies that are deliberately designed by relative outsiders more inclusive and responsible, Jomantas et al. (Chapter 14) report on a trajectory where users themselves

initiated the use of digital platforms in their professional work. The chapter discusses and compares two experiences where agricultural advisers started to informally use social media chat groups. The authors make a plausible case that these chat groups have complemented face-to-face communication in useful ways, and have played a significant role in knowledge sharing and problem solving when a crisis (the rapid spread of a new pest, the fall armyworm) emerged. At the same, they point to interesting differences between the platforms in terms of their composition (homogeneous versus heterogeneous), size (small versus large number of participants), scope (local versus national), and the patterns of interaction that evolve (more and less egalitarian). The chapter shows how these differences are interrelated, and also signals that they are affected by a process whereby one of the initially self-organised platforms became more formalised, regulated, and integrated into organisational policy. While the chapter demonstrates the strength of self-organised digital initiatives, it also signals that interaction on social media platforms is shaped by social, institutional, and political processes, and it raises pertinent issues on whether and how bottom-up initiatives may be 'professionalised.'

In all, the chapters in this cluster help us to rethink inclusion and exclusion in digital agriculture, and examine the complexities involved in 'making knowledge work' through digital platforms. Moreover, they all offer food for thought on pathways and processes through which the design and 'making' of digital technologies may become more responsible and effective. In doing so they call into question the naive and sometimes strategic technological optimism that surrounds investment in digital agriculture.

Governing knowledge and innovation

The goal of inclusive innovation is not simply the procedural challenge of including a broad range of societal stakeholders in innovation processes, including in sites and processes of knowledge production and application, but also in ensuring that innovation works for and with society and local communities. Since we know that science and innovation wield unfathomable power in the shaping of social life and the environment it becomes necessary to shape such processes to help ensure they contribute to the common good. This is what we mean by governance. Such a goal fits loosely under the concept of responsible innovation and in its constitutive frameworks that have been developed to align innovation with societal and democratic values. One such model is the AIRR framework (Stilgoe, Owen, and Macnaghten, 2013) that has been configured to help innovators to anticipate (A) future impacts on the basis of inclusive (I) deliberation that fosters reflexivity (R) about background assumptions and that responds (R) to concerns, interests, and values of diverse stakeholders. Yet, as we show in Part VI, the appeal to democratise and align knowledge with and for society is far from straightforward.

In Chapter 15, Macnaghten, Shah, and Ludwig analyse the complexities associated with making societal dialogues work in practice. While it has become

commonplace that there should be inclusive and early dialogue in the development of emerging science and technology, not least to improve science and society relations and ensure socially robust innovations, it is not at all clear that inclusive dialogues in themselves will lead to effective democratisation of knowledge. Using the case of gene editing, the chapter analyses the dialogue that took place at the 2019 Wageningen CRISPRcon forum, highlighting how the forms of dialogue acted primarily to legitimate existing relations of professional power, reinforcing a quintessentially positive view of the technology and its promises of societal benefit. Subsequently, the chapter set out design principles that mitigate against the use of dialogue to legitimate dominant perspectives, and how these were put to use in a particular public engagement research aimed at identifying public concerns to the application of gene editing in livestock.

This line of argument is extended by Leeuwis (Chapter 17) in a wide-ranging and critical engagement with attempts to better align knowledge with the needs, values, and demands of societal user groups. Again, this process of alignment is seen as far from straightforward. Engaging with five case studies that have taken place over a period of more than two decades, each set up to include citizens in agenda setting for research, Leeuwis shows the multiple reasons why such initiatives so commonly disappoint. Largely, these failures are due to questionable and even naive assumptions about the nature and structure of societal demands and in the incapacity of (participatory) methods to accommodate these. Leeuwis concludes the chapter through an imaginative attempt to integrate a more dynamic, iterative, interactional, and cross-disciplinary account of change into demand articulation processes.

This need for what we might term a 'second order' critique is developed once more by Vellema, Adomaa, and Schoonhoven-Speijer (Chapter 16), in their engagement with the domain of practice. Just as Leeuwis seeks to problematise a naive account of demand articulation, Vellema et al. focus on the highly contextual and situated domain of everyday practice in their investigation of how users make knowledge work in daily life. Taking two diverse case studies—pruning in the global commodity chain of cocoa in Ghana and the practice of aggregating volumes in local food markets for oilseed and edible oil in Uganda—the aim of the chapter is to open up innovations in methodology at the interface of situated practices, coordination practices, and knowledge-based interventions. Drawing on literatures from organisation studies, technology studies, and learning studies, the chapter demonstrates the value of a practice-based account on localised attempts to repair errors, improvise workable action, and navigate unanticipated problems.

Conclusion

Debates about development and innovation are situated at the intersection of research and intervention that is addressed by traditions such as 'action research,' 'participatory research,' and 'research for development.' This book reflects these

action-oriented traditions that aim to 'make knowledge work' at the intersection of research and intervention. At the same time, it aims for critical reflexivity by asking how to make knowledge work *differently*. Inclusive development and innovation require an applied and political epistemology that addresses the complex challenges of integrating different forms of knowledge, negotiating different standpoints, relating knowledge to contested social and technological change, and governing practices of knowledge production.

The goal of 'making knowledge work differently' should not be misunderstood as providing one unified framework for inclusive knowledge production. Plurality is a core message of this book and undermines the prospects of one universally applicable framework for integrating heterogeneous knowledge systems for development and innovation. Instead, the chapters of this book relate through a shared commitment to both critical reflexivity and practical intervention. On the one hand, the book discusses knowledge production as a site of exclusion that reproduces deeply entrenched and often colonial hierarchies through narrow notions of expertise and reliance on epistemological framings of dominant stakeholders. Furthermore, generic appeals to inclusivity are not sufficient but can reproduce these hierarchies in how local knowledge is integrated and assimilated into dominant frameworks. On the other hand, this book is not merely an exercise in critique but explores avenues for inclusive knowledge production and epistemological negotiation. Again, these avenues are heterogeneous and require engagement with a wide range of domains from intercultural education and dialogue to inclusive uses of digital technologies, to responsible governance of research and innovation.

The politics of knowledge in inclusive development and innovation

© Birgit Boogaard
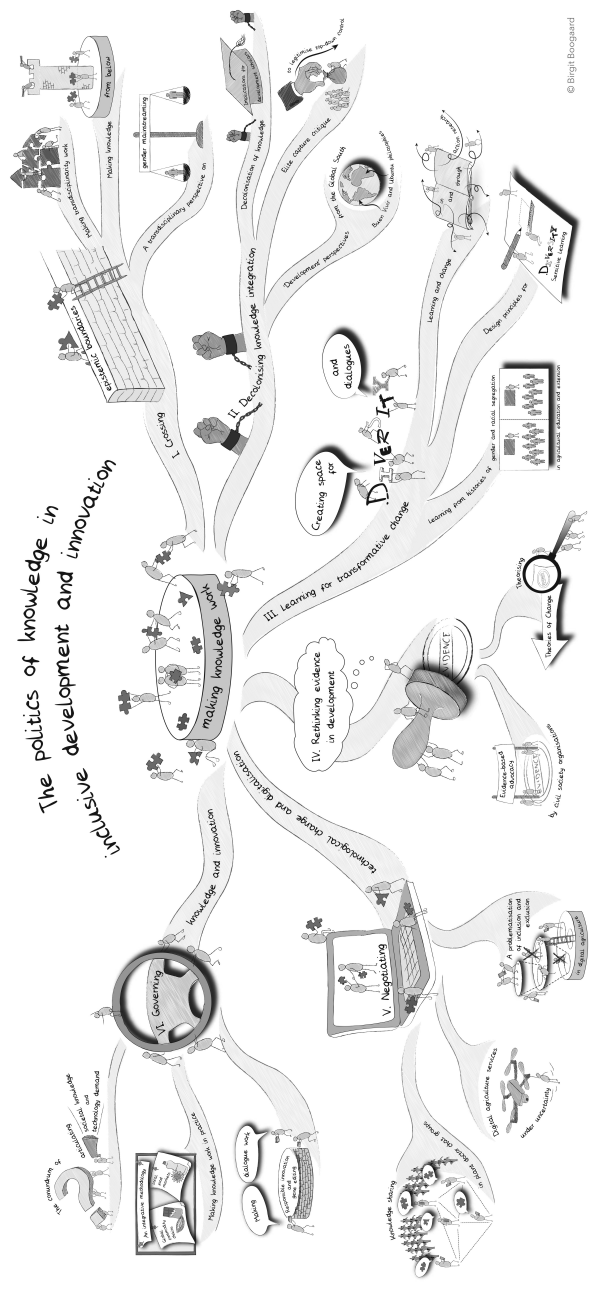
References

Bohm, D. (2004). *On dialogue.* London: Routledge.

Boogaard, B. K. (2019). The relevance of connecting sustainable agricultural development with African philosophy. *South African Journal of Philosophy*, 38(3), 273–286.

Briggs, J. (2005). The use of indigenous knowledge in development: Problems and challenges. *Progress in Development Studies*, 5(2), 99–114.

Byskov, M. F. (2020). Four challenges to knowledge integration for development and the role of philosophy in addressing them. *Journal of Global Ethics*, 16(3), 262–282.

Ely, A., Smith, A., Stirling, A., Leach, M., & Scoones, I. (2013). Innovation politics post-Rio+20: Hybrid pathways to sustainability? *Environment and Planning C: Government and Policy* 31(6), 1063–1081.

Freire, P. (1970). *Pedagogy of the Oppressed. 30th Anniversary Edition (2005).* London: Continuum International Publishing Group.

Gupta, J., Pouw, N. R., & Ros-Tonen, M. A. (2015). Towards an elaborated theory of inclusive development. *The European Journal of Development Research*, 27(4), 541–559.

Kimmerle, H. (2012). Dialogues as form of intercultural philosophy. Irian Society of Intercultural Philosophy. http://isiph.ir/en/?p=27

Klerkx, L., Jakku, E., & Labarthe, P. (2019). A review of social science on digital agriculture, smart farming and agriculture 4.0: New contributions and a future research agenda. *NJAS - Wageningen Journal of Life Sciences*, 90-91, 100315.

Leach, M., Scoones, I., & Stirling, A. (2010). *Dynamic sustainabilities: Technology, environment, social justice.* London: Earthscan.

Leach, M., Rockström, J., Raskin, P., Stirling, A., Smith, A. et al. (2012). Transforming innovation for sustainability. *Ecology and Society*, 17(2), 11.

Leeuwis, C. (2004). *Communication for rural innovation: Rethinking agricultural extension.* Oxford: Blackwell Science.

Leeuwis, C. (2013). *Coupled performance and change in the making*, Inaugural lecture. Wageningen: Wageningen University.

Ludwig, D. (2016). Overlapping ontologies and Indigenous knowledge. From integration to ontological self-determination. *Studies in History and Philosophy of Science*, 59, 36–45.

Ludwig, D., & El-Hani, C. N. (2020). Philosophy of ethnobiology: Understanding knowledge integration and its limitations. *Journal of Ethnobiology*, 40(1), 3–20.

McMichael, C., Waters, E., & Volmink, J. (2005). Evidence-based public health: What does it offer developing countries? *Journal of Public Health*, 27(2), 215–221.

Macnaghten, P. (2020). *The making of responsible innovation*. Cambridge: Cambridge University Press.

Mawdsley, E., Townsend, J. G., Porter, G., & Oakley, P. (2002). *Knowledge, power and development agendas: NGOs North and South*. INTRAC NGO Management and Policy Series.

Opola, F. O., Klerkx, L., Leeuwis, C., & Kilelu, C. W. (2020). The hybridity of inclusive innovation narratives between theory and practice: A framing analysis. *The European Journal of Development Research*, 33, 626–648.

Richards, P. (1989). Agriculture as a performance. In R. Chambers, A. Pacey, & L. A. Thrupp (eds.), *Farmer first: Farmer innovation and agricultural research* (pp. 39–43). London: Intermediate Technology Publications.

Sillitoe, P. (ed.) (2007). Local science vs. global science: Approaches to indigenous knowledge in international development. New York: Berghahn Books.

Smith, A., & Stirling, A. (2016). *Grassroots innovation and innovation democracy*. STEPS Working Paper 89, Brighton: STEPS Centre.

Smith, A., & Stirling, A. (2018). Innovation, sustainability and democracy: An analysis of grassroots contributions. *Journal of Self-Governance and Management Economics*, 6(1), 64–97.

Stilgoe, J., Owen, R., & Macnaghten, P. (2013). Developing a framework for responsible innovation. *Research Policy*, 42(9), 1568–1580.

Stirling, A. (2009). *Direction, distribution and diversity! Pluralising progress in innovation, sustainability and development*, STEPS Working Paper 32. Brighton: STEPS Centre.

Storeng, K. T., & Béhague, D. P. (2014). "Playing the numbers game": Evidence-based advocacy and the technocratic narrowing of the safe motherhood initiative. *Medical Anthropology Quarterly*, 28(2), 260–279.