

Responsible Research and Innovation in the Global South: Agriculture, Renewable Energy and the Pursuit of Symmetry

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In contemporary, industrialised and industrialising cultures, science and technology have become an inseparable element of our existence and socio-cultural endeavours. The technological cultures that we live in, make us empowered and vulnerable at the same time (Bijker, 2006; Hommels et al., 2014). To accommodate the uncertainty that is inherent in innovation processes and outcomes, it is generally considered beneficial to enrol multiple perspectives and ways of seeing and understanding the world, when looking for innovative solutions to specific problems. Since some ten years, this often happens under the banner of *Responsible Research and Innovation* (RRI). This special issue originated from such an effort. Funded by the Netherlands Organisation for Scientific Research (NWO), and with the collaboration of Maastricht University and the Indian wing of the Dutch chemical company

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Science, Technology & Society 25:2 (2020): 215–222

SAGE Publications Los Angeles/London/New Delhi/Singapore/Washington DC/Melbourne

DOI: 10.1177/0971721820902961



DSM, we set forth to study the responsible innovation (RI) of biogas in a number of Indian villages in a two-year research project (2015–2017). This RespInnBio¹ project engaged with a technological innovation for the use of surplus rice straw as a feedstock for biogas production. Currently, the straw is being burnt in large amounts on the farmlands in the northern parts of India. Over the course of two years, we conducted a number of meetings. We enrolled various stakeholders, and we used various formats for the meetings—dialogue, seminar, workshop, conference and public discussion. Our final conference held in September 2017 provided a pivotal moment towards this special issue.

The involvement of stakeholders and the inclusion of multiple perspectives is not a straightforward matter. The editors of this special issue want to make a plea to pursue symmetry when including such various perspectives: to treat different perspectives and knowledges, at least a priori, symmetrically. When doing so, we do not use the word ‘symmetry’ to convey some sort of sanitised perfection or a sense of utopian equality. On the contrary, it is our intention—in line with much STS scholarship—to articulate the politics and power structures that would otherwise be hidden under seemingly neutral academic conceptions. We can shed light on the complexity, messiness and imperfections of the world we study, only if we bracket the dominance of our academic conceptions and treat them in symmetry with the knowledge systems we study.

The burning of rice straw in the north of India has become a massive problem—not only social but also political and environmental. In the months of October and November, when harvesting of rice takes place, the national as well as international media are full of critical reports about the issue. These reports often criminalise farmers and blame authorities for inaction. Along with various versions of the problems, the newspapers also report multiple innovative solutions. These include the production of straw-based bioenergy, which is thought to simply remedy the situation. Even though each year the discussion around this issue is enormous, we have also noticed over the past five years (beyond our formal project period) that after the harvesting season, when the smoke dissolves, the tension around straw burning always declines—only to return again the next year.

This leaves us with many questions. Why does issue of straw burning not get resolved, despite the recognition of the problem and availability of solutions? What are the implications of linking energy futures to agricultural futures in relation to vulnerability of technological cultures? Among the multitude of problems faced by agricultural and rural communities in India, who decides which problems should be addressed and through what mechanisms? What role do knowledge hierarchy, power and hegemony play in the decision-making processes? Are there notable alternatives to mainstream problem definitions, who creates and owns these alternatives, and how can we mobilise them?

These questions converge to the focus for this special issue: *How can Responsible Research and Innovation be understood in a distinctly Global South perspective?* While the discourse of RRI is not explicitly positioned as exclusively meant for the structures and institutions of Western countries, we do notice that many of the

ideas seem to take some of those Western foundations for granted. In this special issue, we aim to articulate the mismatches between those foundations and a case in what is very much an Indian context. We engage with these questions in relation to agriculture and renewable energy. Our engagement with the responsible interaction of the domains of agriculture and renewable energy is not only crucial for the Global South itself but also contains lessons for RRI in the Western societies where it originated. Importantly, if we care about respecting the carrying capacity of the planet, and about meeting the needs of its inhabitants in a sustainable and equitable way, it is vital that we realise that many approaches to RRI currently involve only a small subset of those inhabitants.

The term responsible innovation (RI) has its origins in the early 2000s national nanotechnology programme in the USA and similar dialogues on emerging technologies in mainland Europe and the UK (Fisher, 2017; Owen & Goldberg, 2010; Rip & van Lente, 2013). The Horizon 2020 programme of the EU eventually formalised it into RRI, through which it became a central element in the European research policy agenda. Building on crucial insights from previously controversial technologies, and insights in uncertainty and lack of knowledge associated to the future, RRI stipulates that research and innovation should be attuned to societal needs through a process of anticipation, reflection, inclusive deliberation and responsiveness (Owen et al., 2013; Stilgoe, Owen, & Macnaghten, 2013). It aspires to be a process through which innovators and societal actors become mutually responsible to each other (Von Schomberg, 2013).

This special issue consists of a set of articles in which the authors explore how such processes can be shaped in distinctly Indian contexts. While the articles do not jointly offer one monolithic answer to the question what responsibility is, a range of different aspects are highlighted. One observation from Tyagi and Kumar is that an appeal to responsibility might in fact hide the shifting of the burden of risk to individuals, away from the collective. Shahare and Thayyil articulate notions of responsibility that seem to underlie existing policy frameworks and show that these are fairly narrowly defined as an economic perspective on the common good. Alternatively, they suggest that enrolling the public in the articulation of common goods would offer a better way to achieve responsibility. Pandey and Mamidipudi & Frahm, following Bijker's (2017) plea for bold modesty, emphasise the role and responsibility of social scientists and researchers in actively participating in making and becoming of things rather than being distant observers. Sharma, in the context of hybrid environmental governance, shows how responsibility articulated in a top-down manner interferes with the practice at the local level.

Learning from one's own experiences as well as mutual learning from each other are among the core themes of this issue. In the context of the Global South, the issues of huge socio-economic disparities, informality, resource constraints, knowledge hierarchies and power asymmetries are known to create hindrance to mutual learning and RRI (De Hoop, Pols, & Romijn, 2016; Macnaghten et al., 2014; Vasen, 2017). The challenge thus is to find ways of mutual learning that are symmetrical. In this special issue, various articles have engaged with this challenge

at multiple levels. In order to learn and innovate in situations of vulnerability and distress, it becomes important that different forms of knowledges are treated symmetrically and are given respect and sincere acknowledgement for their potential to contribute in a meaningful way—a phenomenon often termed ‘cognitive justice’ (Visvanathan, 2006). Prasad argues that inclusion of knowledges might mean something different in India than it does in the West. Through the case of Systems of Rice Intensification (SRI) in India, Prasad shows how RRI might offer a vehicle for farmers to escape the dominance of scientific knowledge. Valkenburg presents rules of thumb for processes of knowledge connection. These rules aim to accommodate the recognition for knowledges to depend on their own, specific conditions to appear as valuable. Pandey shows how different ontologies entail different modes of caring, which may not survive if techno-scientific rationality retains dominance. In particular, the deskilling of farmers as a consequence of mechanisation sketches a bleak future. Furthering our commitment to cognitive justice, the article by Tyagi & Kumar experiments with a dialogue between a researcher and a practicing farmer, as an alternative to standard academic papers to do exactly that: to seek symmetrical recognition of the farmer’s knowledge in its own right.

Inclusive deliberation has often been presented as a magic-wand solution to many problems of our times. RRI also commits itself to inclusive deliberation in relation to articulating and responding to uncertainties and unintended consequences in the future. By inviting everyone to the table, it is assumed, a democratic decision on a problem at stake could be achieved. Several contributions in this special issue engage with the challenges and problems of inclusive deliberation. Shahare & Thayyil and Sharma point towards the ‘deficit’ models that are still prominent in the functioning of bureaucracy and decision makers in the global south. Often, publics and communities are taken as homogeneous groups who might not be able to make proper decisions due to the lack of ‘right’ information and knowledge. As a result, decisions are made on their behalf by bureaucrats, policy makers and top-level agents. Pandey highlights that there are socio-cultural constraints such as criminalisation of a social group (e.g., farmers who burn the straw), which entails that even if they are invited to participate, they might not be willing or able to express their concerns in front of a diverse audience. Valkenburg suggests that building arrangements that organise dissensus and contestation rather than consensus might be a better alternative to overcome problems of participation that result from emergent hierarchies of knowledge.

The collection as a whole presents a variety of ways to navigate between, on the one hand, an overly naïve celebration of formal expertise as the true model of knowledge and disregarding other knowledges, and on the other hand a hasty critique of that formal expertise as being hegemonic. By giving due attention to the knowledges held by farmers, whether these are called traditional, indigenous or community-based, the articles jointly show that the tension is much more ramified and complex. Hegemony of formal expertise usually is not only a matter of straightforward dominance and having a stronger say. It is also about rendering the subordinate knowledges invisible, underdeveloped, and in need of

further education. The articles present various forms of symmetry to counter such hegemony. Mamidipudi & Frahm show how symmetricisation renders vulnerability in different ways, which in effect amounts to empowerment of already existing paradigms. Bhaduri & Talat show how information asymmetry is strategically used for competitive advantage, and how a specific asymmetry exists in the denial to local innovations of a site for demonstration of effectiveness. Articulating both asymmetries is a first step towards their mitigation. They also show how practices of frugal innovation result in a fairer balance between user and producer of innovation. Sharma, finally, shows how top-down and bottom-up approaches to a specific innovation both engage only partially with innovation processes. In particular, both fail to recognise that there is a bi-directional construction of the value systems of social groups and the socio-technical ensembles they are part of. Symmetrising this relation opens up new handles for empowerment.

In order to counter hegemony of universalistic, Western models of innovation and development, several articles in the special issue argue for maximising alternatives rather than mainstreaming them. Valkenburg suggests that the best way of maximising alternatives is to encourage representation of diverse viewpoints in deliberations even if they pose contradiction or contestation. For Mamidipudi & Frahm, countering hegemony is in the efforts of STS researchers to encourage ownership of knowledge by local communities that could promote the maximisation of alternatives. Sharma argues that in order to avoid rejection of innovations at the ground, a deeper understanding of diversity and heterogeneity among the members of ‘public’, ‘farmers’ and ‘community’ is essential. A focus on the multiple identities that people mobilise in different circumstances is key in understanding the local dynamics that an innovation encounters.

Contributions to This Special Issue

Mamidipudi & Frahm’s article systematically walks us through the RespInnBio project and argues that there is more to RRI than just being a governance framework for techno-scientific innovations. They argue that if we mobilise the principle of symmetry and look at the knowledge-making practices of researchers as well as local actors, then RRI becomes a productive tool advocating epistemic plurality and innovation practices as well as a hybrid governance mechanism that can negotiate multiple meanings of responsibility. In such an arrangement, the role of researchers in STS and RRI also changes. From mere knowledge providers and distant observers, they evolve into actors who facilitate the ownership and circulation of local meanings and ways of knowing, as well as ways to innovate responsibly.

Pandey’s article connects the dots between the agricultural modernisation that has been going on for the past few decades, and the ‘uncared-for’ vulnerabilities generated in these agricultural systems that result in the episodes of straw burning in major parts of northern India. By an engaged to-and-fro dialogue between farmers’ responses and scholarly literature, she highlights that straw burning is not just

a problem waiting for a quick fix but a symptom of a deeper civilisational crisis in agriculture that needs careful consideration in the designing of solutions for straw burning. By re-articulating and re-emphasising farmers' vulnerabilities rather than problems caused by burning of straw as the core agenda, this article explores what it would mean for RRI to develop a 'commitment to care', and how RRI researchers could address the ethical-political obligation to bring the marginalised to the fore and help them actively participate in the making and becoming of things.

Tyagi & Kumar, in an unconventional dialogue between a researcher and a practicing farmer, explore the meanings of responsibility associated to the future of farming, its purposes and ends. The core question of their discussion is whether agriculture is something more than a source of livelihood. This question opens up multiple avenues to critically engage with the role of science and technology, the responsibility of a farmer, nature, culture and tradition and multiple relational aspects that make agriculture a civilisational force. Far beyond the dichotomy of glorification of nature, culture and traditional methods *versus* a celebration of modern science and technology, the authors argue in favour of due consideration of the relationalities between different systems. To think about the future of farming and its purposes, we should use identification of complementarities, differences, symmetries, and harmonies to finetune agricultural practices and farmers' engagement with natural systems.

Bhaduri & Talat's article engages with the responsibility embedded in the innovative practices of vulnerable people at the grassroots. The social commitment of grassroots innovators to solve local problems around them with limited resources makes them responsible in relation to sustainable and communitarian practices. The authors argue that RRI can learn inclusion, transparency and frugality from the innovations developed by grassroots actors.

Prasad in his article begins with the question whether RRI has the potential to construct alternative socio-technical worlds or whether RRI too will end up reproducing the status quo. Prasad discusses the case of SRI in India, which is an alternative method of doing agriculture in regions where Green Revolution (GR) farming could not work because of insufficient resources. Many vulnerable farmers have adopted this method and support its claims in practice. However, the scientific establishment seems still committed to the GR paradigm, and refuses to be convinced. They, thus, remain non-supportive of this method. In view of the emergent knowledge hierarchy, Prasad argues, conflicts and controversies become battlegrounds to present and defend alternative world views. In such situations, RRI can prove to be a useful tool only if it is sensitive and reflexive towards the global politics of knowledge making and circulation.

Sharma's article takes the case of social shaping of a solar microgrid in rural India in order to show the tensions between the top-down and bottom-up understandings of energy access, justice and RIs. The top-down narrative considers decentralised solar (renewable) energy as a responsible solution to the energy needs of the people in the rural villages of Bihar in the absence of connection to the central electricity grid. They believed that in the absence of any other options, people might be willing to pay a minimum user fee. However, in the heterogeneous community

of the local village, the most marginalised and poor people asserted their rights as citizens being eligible for free electricity from the state on the basis of their socio-economic status. For these villagers, solar energy is neither responsible nor a solution but rather a ‘fake’ promise.

Shahare and Thayyil’s article presents a critique of the current developments around biofuel innovations in India. They argue that these developments make the goal of RRI for inclusive deliberation extremely difficult to achieve. By critically engaging with the trajectory of biofuel support and development in the policy and scientific circles over the past few decades, the authors conclude that the biofuel development in India is entirely motivated by techno-bureaucratic agenda setting. It is aimed at realisation of techno-economic goals rather than societal needs.

Valkenburg’s article engages with the challenges posed by RRI’s mandate of inclusive deliberation in settings that have high epistemic and epistemological diversity. He draws on Chantal Mouffe’s articulation of contestation rather than consensus as the central tenet of democracy. Applying this to the governance of bio-gasification of rice straw in India, he concludes that inclusive deliberation in RRI in the global south could aim for promoting contestation and presentation of diverse viewpoints rather than consensus building. The latter might unwittingly exclude many marginal viewpoints and knowledges.

Altogether, the collection presents an articulation of the many ways of knowing that seem to matter to socially relevant innovations, and which may not self-evidently find their way into processes of innovation nor into the governance of those processes. The paradox is that RRI often breathes a certain universality in its concerns and approaches, whereas the present collection shows that, rather, particularity is the way to go. Only if particularity is given due attention, will it become clear that also the opposition between ‘science’ and ‘tradition’ is a false one. The solution is thus not in simply silencing expertise and giving voice to traditional knowledges, but rather in articulating the various logics with which the various knowledges come, and how each in their own right can be enabled to contribute to our common future.

DECLARATION OF CONFLICTING INTERESTS

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

FUNDING

This work was funded by Netherlands Organization for Scientific Research [Nederlandse Organisatie voor Wetenschappelijk Onderzoek], grant number 31399300, and DSM India.

NOTE

1. RespInnBio is the acronym for the project Responsible Innovation of Biogas.

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