## The framings of grassroots innovation and implications for models of inclusive innovation

Authors:[[1]](#footnote-1) Elisa Arond, Mariano Fressoli, Dinesh Abrol, Adrian Smith and Adrian Ely

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**ABSTRACT**

In this paper we explore the different framings underpinning grassroots innovation movement activities, and illustrate this in relation to three case study movements. The Social Technologies movement in Brazil and Argentina, and the Honey Bee Network and Peoples’ Science Movement in India, all manifest these (analytical) framings in varying combinations, which suggest much more complex and nuanced perspectives on the purpose and practice of grassroots innovation by the practitioners themselves. This plurality of framings has implications for any attempts to develop ‘models’ for inclusive innovation (amenable to policy intervention) – a point illustrated by examples of institutional encounters with our case movements. Whether models try to insert grassroots into existing innovation institutions, or offer more responsive reforms aligned with grassroots mobilisations, the representations of what grassroots innovation is, who is involved and how, are limited. Some elements get excluded at the same time that others are included. The cases outlined here illustrate that, even when trying to provide models for inclusive innovation, policy may create encounters and boundary spaces for differing framings of inclusion to be debated, experimented, and reflected upon, mirroring differing views of ‘development’.

## 1. Introduction

Historical and comparative perspectives on alternative innovation approaches at the grassroots level in South America and India are extremely relevant to contemporary debate and policy discussion about inclusive innovation regionally and internationally. Understanding particular movements’[[2]](#footnote-2) strategies for transformation, and how these grassroots innovation movements have mobilised, historically and now, may help us interrogate the notion of inclusive models of innovation for development. Inclusion is a fashionable word at the moment, but we also see it as a black box. We need to open this black box, and engage with questions about what aspects of inclusion that we, as diverse, plural societies, need or want to consider, including the nature, depth and scope of inclusive innovation (Smith and Ely 2012).

We are interested in exploring how grassroots innovator activists promote and support socially just and environmentally sustainable innovations, and to identify the challenges that these movements confront as they try strategically to build momentum behind their approaches and develop alternative pathways for innovation and development (Hess 2007; Leach et al 2010).

To what degree are these movements interested in, and able to, influence mainstream development approaches or innovation policies? The movements under study are mobilising the space available to them in their own respective national contexts of exclusion and state policies emphasising innovation for growth and development. Do they see themselves that way? A critical issue for new inclusive models of innovation is what happens when grassroots innovation and its insistence on, often marginal, activity based on largely participatory approaches encounters powerful institutional interests. What elements of inclusion are incorporated? Inclusion may not always be addressed on the same terms by which movements themselves frame grassroots innovation.

In this paper, we focus on the history and context of several grassroots innovation social movements, including Technologies for Social Inclusion in Argentina and the Social Technologies Network in Brazil (STN), the People’s Science Movements (PSM) and Honey Bee Network (HBN) in India. The approaches, experiences, contexts and encounters with institutions are different in each case. We consider some of the events, issues and arenas where encounters with mainstream innovation have been particularly pronounced. Our analysis explores how policy interest in ‘models’ relates to the ideas and approaches of grassroots movements, focused on building alternative pathways for grassroots innovation, drawing also on the notion of competing ‘frames’ or framing processes.[[3]](#footnote-3)

The cases help us explore the diverse, locally variable ways that grassroots innovation movements operate, engage with and live within the ebb and flow of mainstream currents and policies towards inclusion. Further, the cases highlight that inclusion is not an unproblematic smooth endeavour; rather, in practice it can also involve uneven, unequal, incomplete, and sometimes antagonistic processes and outcomes.

The paper is structured as follows. Section 2 briefly introduces some of the history behind grassroots and inclusive innovation, and provides a preliminary definition of the terms, and highlights both historical and recent interest among international agencies. This section also includes a brief discussion of framings that we use to begin to explore the notion of models. Section 3 introduces the three cases, and describes aspects of the three types of grassroots innovation framing visible in each movement; indicating some of the variation and thus challenges to incorporating diverse framings of grassroots innovation into formal ‘models’ for inclusive innovation. Section 4 discusses in more detail top-down ‘encounters’ between government interest and movement activities. This final section highlights some of the ways in which models for ‘insertion’ of grassroots innovation into mainstream policy are sometimes incomplete, or encounter resistance in the form of mobilisation by grassroots movements. In contrast, as shown in this section, other grassroots innovation movements collaborate with mainstream S&T institutions toward incremental change. We argue that these uneven encounters are due to differences in framings of grassroots innovation, and corresponding differential notions of inclusion.

## 2. Grassroots innovation and inclusive innovation models (1000 words)

What is ‘grassroots innovation’? The sheer diversity of grassroots innovation — in terms of technologies, people involved, organisations, purposes and contexts — makes it difficult to bound neatly and define precisely. Overlapping terms such as user-led innovation, inclusive innovation, social innovation, local or participatory innovation, base-of-the-pyramid innovation, and open-source or hacking cultures can add to confusion. The term can be used to describe anything from community food and energy initiatives, to local (re-)manufacturing and tool swapping, complementary currencies, community sanitation and water projects, housing co-operatives, and so on. Further, while ‘grassroots innovation’ might currently be viewed as a subset of a broader set of inclusive innovation approaches, it is actually a quite long-standing, yet heterogeneous ‘bundle’ or set of ways of thinking about and approaching innovation.

In Latin America, discussions around what today might be called inclusive innovation, were present in the works of authors such as Varsavsky (1976) and Herrera (1983). In India, Gandhi’s concept of ‘self-reliance’ or *swaraj,* influenced the development of a number of important movements for local technology development, multiple local networks which became the People’s Science Movement. Also inspired by Gandhi, E.F. Schumacher coined the term ‘intermediate technology’, and established the Intermediate Technology Development Group in 1966 (now called Practical Action). These and other ‘appropriate technology’ efforts drew international attention to grassroots innovation as part of an alternative to the high-technology and large-scale industrialisation blueprints dominating development theory and practice (Rist 2011).

***Towards a preliminary definition of grassroots innovation***

Today, grassroots innovation is a quite broad term that can refer to a variety of practices and definitions. Some meanings derive from practical efforts by individuals, groups, networks and social movements, while others arise from theoretical or academic origins. Diverse definitions may involve various types of actors, from social movements working with the grassroots (e.g. People’s Science Movements in India); to intermediary organizations (e.g. international NGOs like Practical Action); or self-described networks (e.g. Honey Bee Network) that support innovation to emerge from within the grassroots; to institutions that work with grassroots on adapting innovations coming from both within and from outside the grassroots (e.g. Technologies for Social Inclusion Network; for a more detailed list, see Smith et al 2012).

Grassroots innovations can also encompass wide variation in types of innovation (e.g. innovations may be technological, organizational, economic model, process, services, or product). Nonetheless, some argue that there are common characteristics to the grassroots innovation process, and which differentiate grassroots from more conventional forms or modes of innovation. For many, grassroots innovation is seen to emerge from, or be directed towards, local development (*innovation that is inclusive in its outcomes or outputs*), and must involve some level of participation, input or control, by the local community (*innovation that is inclusive in its process*). Cozzens and Sutz define inclusive development and grassroots innovation in terms of “actions that are both by and for currently marginalized groups in informal settings” where marginalized groups are “agents, not patients” (Cozzens and Sutz 2012: 2, emphasis in original). Letty et al suggest that in grassroots innovation the local individual or community has a “significant role […] in initiating and exercising control over the innovation process, and often also in executing significant parts of it themselves” (Letty et al 2012: 12), in contrast to conventional modes of innovation.[[4]](#footnote-4)

However, in our view, grassroots innovations are not necessarily constituted exclusively by bottom-up efforts alone but can also ‘hybridise’ with more top-down initiatives. Grassroots innovation groups often engage with S&T groups and development agencies seeking technical assistance, funding or other kinds of institutional support, including symbolic legitimacy, policy design, supportive regulatory structures, etc. (Ely et al 2013).

***Institutional interest in grassroots innovation***

As already alluded to above, development agencies have historically shown interest in alternative models of technological change and social development (what is now often broadly called inclusive innovation). For instance, sections of the OECD and International Labour Organisation, as well as the World Bank, UNDP, UNEP, FAO and other international institutions, conducted activities around appropriate technology in the 1970s and 1980s. Yet there were varying definitions and criteria among these agencies about what really constituted ‘appropriate technology’. Some suggest that many of these programmes were not actually concerned with appropriate technology in a sense of being harmonious with developing country contexts, policies and priorities, and even this loose definition did not focus much on the potential of knowledge held by local communities.[[5]](#footnote-5) Later on, the 1992 UN Conference on Environment and Development in Rio tried to open the way for the international community to connect more effectively and equitably with the wealth of bottom-up activities through Local Agenda 21. However, despite high-level interest, much of these efforts have yet remained marginalised, or have waxed and waned over time (Ely et al 2013).

Meanwhile, the mainstream focus fell on systems of innovation literature and science and technology-centric frameworks defined by successive editions of the Frascati Manual on R&D (from 1963 to the most recent - OECD 2002) and the Oslo Manual on innovation (most recently OECD 2005). These have struggled to engage with the less formal or structured forms of community innovation seen at the grassroots, leading to a neglect of some of the empowerment, ingenuity and transformational potential that the latter can bring to dominant innovation theory and policy. This experience is paralleled in some ways by the history of the People’s Science Movements’ engagement with traditional knowledge (described in Section 3 below).

The impact of the global economic crisis has also drawn new political attention to issues of inequality and social inclusion, alongside innovation. For example, the OECD has started to develop concepts and models of intervention around “inclusive innovation”, “inclusive growth”, and “inclusive development” (see OECD 2012a; de Mello and Dutz 2012; and OECD 2012b respectively). The latest case includes recognition of grassroots innovation, as well as ‘bottom of the pyramid’ (Prahalad 2005) and ‘frugal innovation’ (Bound and Thornton 2012) models. Individual member states have also shown renewed interest. The UK National Endowment for Science, Technology and the Arts (NESTA), has recently published on “frugal innovation” in India (Bound and Thornton 2012). Over the past decade, the World Bank has shown increasing interest in inclusive growth (Utz and Dahlman, 2007), more recently linked to the green growth agenda central to the Rio+20 conference in 2012 (World Bank 2012). Other examples of interest on the part of international development agencies include programmes by the Canadian International Development Research Centre (IDRC 2012) and the United Nations Development Programme (UNDP 2010a; UNDP 2010b; UNDP 2013), among others.

***Inclusive models and grassroots framings***

Within the context of increasing interest in inclusive models of innovation in mainstream policy, it remains to be seen how policies and programmes at national and international levels will engage with ongoing, vibrant grassroots innovation movements around the world. ‘Models’ are a tricky endeavour. Whether business models, economic models, geographic models, biological ecosystem models, policy models or conceptual models – each of these implies some level of abstraction and establishment of some discrete set of variables, defined set of rules or acknowledged logic to explain or predict functional processes within the ‘model’. When we discuss models of inclusive innovation, we imply that there exist ways to formalise, abstract, define variables or principles, and establish logical processes to develop effective and inclusive innovation (and thus policies can be designed following such models). This is necessarily attractive to policymakers, however we argue that such reductionism may not fit well with the diverse realities and plural framings of grassroots innovation. And yet, encounters with formal institutions are often important for the survival and expansion of grassroots innovation, for example by providing resources and/or scaling up experiences. But such encounters can also be controversial since they create boundary spaces (Star 2010; Lamont & Molnar 2002) where different interests, visions and definitions of innovation, social inclusion and participation are negotiated and contested (Hess et al 2007; Smith 2007).

Work in the sociology of technology and more political approaches in innovation studies emphasises the various ‘framings’ that social groups bring to innovation activities (e.g. Bijker 1995; Hess 2005; Smith 2005; Leach et al 2005; Leach and Scoones, 2007). Snow et al (1986) applied the concept of “framing” to understand the importance of interpretative orientations, interests, values and beliefs in shaping social mobilisation processes, and in the constitution of social movement actors’ self-understanding (see also Snow and Benford 1988; Benford and Snow 2000). Some authors have looked specifically at social movements around science or innovation (Beck 1992; Hess 2007; Smith 2005), the construction of knowledge in practices of activism (Eyerman and Jamison 1991) and have brought attention to the ‘politics of knowledge’ (Leach and Scoones 2007). Tarrow (1998) also points out that framing processes are enacted by both social groups and states, and in the case of social movements can serve to build boundaries of a constituency and define “others”. Research in this tradition urges analysts and practitioners to consider the existence, operation and influence of different framings of ‘inclusive innovation’, and how they manifest in negotiations over the development and implementation of different models.

An analysis of grassroots innovation framings by Smith et al (2013) identified three broad and general framings, which we summarise here in order to illustrate the point that different definitions and practices of ‘grassroots innovation’ are sought by practitioners and understood by observers (including researchers and policy-makers). In practice, and as will become evident in section 3, the actual strategies and activities that specific grassroots innovation movements have historically employed or are currently employing involve complex combinations of these framings. Participant framings (cf. analytical distinctions) prioritise different motivating factors, emphasise different parts of the innovation process and/or expected outcomes, and different (though dynamic) roles for grassroots actors – be they farmers, hackers, urban recyclers, etc.

As such, the following three framings provide a simplified, broad view of grassroots innovation that nevertheless enables an emphasis on the plurality of perspectives and commitments in play, and which any model of inclusive innovation will have to either accommodate in some form or exclude (a point we return to in the discussion in sections 4 and 5).

The **grassroots ingenuity** framing emphasises people innovating for themselves and their communities, often in response to a specific local need or desire. Innovators might include farmers who develop irrigation systems to better cultivate crops through periods of uncertain rainfall (Udagavi 1997), or drivers who develop new gear trains for their cycle rickshaws to ease the burden of their cargo (Kaley 1996). Innovators may draw upon traditional or indigenous knowledge and materials, or modify and ‘hack’ technological devices found to hand. Dissemination of such innovations may occur with the support of intermediaries; local networks or organisations, that may also occasionally help turn the innovator’s idea into a social enterprise. This grassroots ingenuity framing tends to emphasise an ‘inside-to-out’ (Bell 1979) direction of knowledge flow in processes of grassroots innovation development, as based in local knowledge systems (e.g. Gupta et al 2003).

In contrast with the grassroots ingenuity perspective, the **grassroots empowerment** perspective focuses on innovation as a tool or catalyst for local development with particular emphasis on empowerment as part of the goal of the interaction between communities and technology developers. In this perspective, local groups may not directly be the innovators, but developers make sure they are fully included in adopting and benefiting from technology, which may even be mass-produced devices such as solar photovoltaic systems. Whilst technical knowledge under this framing follows an ‘outside-to-in’ dynamic (Bell 1979), grassroots empowerment nevertheless requires considerable local knowledge to render such assistance meaningful to diverse local communities. In some cases, the technology requires deliberately re-development with community engagement in the design, manufacture, maintenance and operation.

The emphasis in this framing is on the innovation *process* as a tool or catalyst for developing capabilities, relationships and organisational partnerships useful to wider development processes — such as securing incomes, improving security and livelihoods, and building organisational capacity. Within this perspective intermediaries may take on the role of bringing innovations from elsewhere and facilitating the decisive participation of local communities in the development process (Seyfang, 2009; Dagnino, 2009; Abrol, 2005).

**Table 1. Grassroots Innovation Framings**

|  |  |
| --- | --- |
| **Framings** | **Initial Emphasis**  |
| Grassroots ingenuity | Outputs (artefact or development outcome) |
| Grassroots empowerment | Inclusive process  |
| Structural intervention | Change in power asymmetries |

A third **structural intervention** framing points to the challenge of grassroots innovation attending to relations of economic and political power, which generally underpin existing asymmetries and exclusions in institutions for knowledge production and innovation. Grassroots innovation programmes either may not seek to, or may not be able to, address the root political, economic and social causes of poverty, social exclusion and unsustainability — causes that are difficult to change by working at the local level (Dickson 1974; Edquist & Edqvist 1979). Grassroots innovation may not be able to address the distribution of power in trade and investment, or the knowledge economies that channel scientific activities towards the interests of the wealthy and those controlling capital.

But these criticisms misconstrue or overlook framings of grassroots innovation that are very aware of structural challenges, and that view material interventions into alternative innovation as a way of making structural challenges legible in specific, practicable ways (Marres 2012). This is the more proactive side to the structural intervention framing. Grassroots innovation movements include groups who do frame their activities in terms that confront structural challenges, and that deliberately develop strategies, programmes and mobilisations that seek to address economic and political impediments rendered more visible and practicable precisely by specific attempts at grassroots innovation. An example we elaborate later is how PSM’s attempts to implement a systemic approach to cleaner leather tanning including organising economic co-operation amongst the regional cluster of leather goods and raw materials, became even more effective as they learned by experience through phased implementation. Thus the PSM approach included a vision and broader strategy regarding alternative pathways for rural development, acknowledging relations of economic and political power, and based on upgrading of traditional techniques and a network system of technology implementation. This experience has developed into a deliberate strategy to think about grassroots innovation as forming a material and practical intervention into wider movements for structural change (Abrol 2005).

Each of these framings emphasises different forms of knowledge production (Smith et al 2013). Grassroots ingenuity takes a more ethnographic orientation to knowledge production, and highlights the meanings and practices of an innovation activity in terms of the local cultures involved. Grassroots empowerment is more instrumental, seeking in innovation activities tools for local capacity building and social development. A structural intervention framing is sensitive to knowledge created about the structural constraints bearing upon an innovation initiative, and which need to be addressed. In practice, however, each framing finds it requires forms of knowledge emphasised by the others, such as when the more instrumental introduction of a technology intended to catalyse local development requires good ethnographic knowledge on the ground in order to successfully align the technology with the ingenuity and situation of the communities involved. Such interplays emphasise different forms of knowledge production, relations with mainstream S&T institutions, social inclusion aims and policy requirements. These are also important factors that inclusive innovation models need to be attentive towards if such models are to ‘work’. It is useful to understand the frames that grassroots innovation movements produce or rely on to understand antagonisms, controversies and translations between social movements and policy makers. In order to understand how these encounters develop, and what kinds of boundaries and collaborations are drawn, in the next section we characterise and distinguish the STN, HBN and PSM through their different combinations of ingenuity, empowerment, and structural intervention framings.

## 3. Grassroots innovation movements

India, Brazil and Argentina are currently the sites for notable and internationally visible attempts at developing grassroots innovation. The Social Technologies movements in Brazil and Argentina involve activists and communities seeking innovation agendas and arenas that develop solutions to the problems of those on the margins of economic growth, or who suffer the negative consequences of mainstream growth patterns*.* In India, the Honey Bee Network has a twenty-plus year history, while the People’s Science Movements offer a longer historical trajectory, originating in the 1980s and with even earlier roots. In South America the historical antecedents to social technologies are not quite as clear, though appropriate technology initiatives in the 1980s, as well as the dynamic efforts of other grassroots social movements offer some background to contemporary experience (Smith et al 2013).

All three cases presented here indicate varying mixes of political radicalism and technical rationalism in their histories. Techniques for inserting appropriate criteria and information into existing innovation systems can sit uneasily alongside more radical attempts to transform innovation systems through grassroots mobilisation. Even where some of the practices appear quite similar across the cases – such as participatory design, open prototyping, and ethnographic approaches to problem framing – the plural framings and purposes at play in our cases (technical requirements, user needs, grassroots participation, political empowerment) call for careful reflection on who and what is being included in innovation models, and under what circumstances, in order that the challenges, limitations and possibilities posed for development can be debated.

***Brazil: Social Technologies Network (STN)[[6]](#footnote-6)***

Originating in Brazil in the early 2000s with the establishment of the now defunct Social Technologies Network (STN), the Social Technologies movement subsequently spread beyond Brazil, sparking the Technologies for Social Inclusion Network in Argentina (Red TISA), launched in 2011. The networks have involved a range of participants, from academics to activists, unions, NGOs and community groups, government and big donors, with the aim to foster more democratic and inclusive processes of technology and innovation development.

*a)* *Grassroots ingenuity*

The former Social Technologies Network in Brazil described *social technologies* as “comprising products, techniques and/or replicable methodologies developed in interaction with the community and that must represent effective solutions in terms of social transformation” (STN website). Thus, for the STN and Red TISA, grassroots ingenuity is used and recognized in the process of innovation but that is not necessarily a goal in itself. In other words, intermediaries may take on the role of bringing innovations from elsewhere and facilitating the participation of local communities in the development process. Thus, the STN actively seek collaborations and/or ideas and projects from R&D groups and universities (Miranda, Lopez and Soares 2011). For instance a brickman's design of a rainwater harvesting system was chosen and improved in contact with the local university in the case of the Cisterna project, detailed below. But, more importantly is the process of re-application of this technology where the design can be improved or modified by the same and other communities.

*b) Processes of empowerment*

Individuals and organizations involved with the STN and Red TISA conceive innovation as a tool or catalyst for local development with particular emphasis on empowerment as part of the goal of the interaction between communities and technology developers (Fressoli et al 2011). A key aspect for the Brazilian STN was that for a more socially just relationship to be built between technologists and local communities, the community must control both the process of innovation and the distribution of outcomes. Local groups may not directly be the innovators, but developers make sure they are fully included in adopting and benefiting from technology, which may even be mass-produced devices such as solar photovoltaic systems. In other cases, the technology is deliberately developed with community engagement in the design, manufacture, maintenance and operation.

*c)* *Structural change*

The STN and Red TISA were born in the context of political-economic and social changes in both South American countries, including economic crises in the late 1990s and early 2000s, and as part of efforts to develop alternatives to neoliberal policies that better met social and environmental requirements. Though many members are motivated by interest in enabling structural change, the efforts of both these movements are divided between competing priorities. On the one hand, they maintain a focus on resolving individual communities’ problems and developing local capacities through technological development and processes of participatory innovation. On the other hand, these movements want to shift the broader S&T regime to address social development issues more directly. However, even concrete accomplishments such as the development of a Secretary of Social Development within the Ministry of S&T (Fonseca 2011) did not translate into influencing central S&T policies. Social technologies holds a marginal position in the Ministry, arguably without enabling deeper structural change in the Brazilian state’s approach to innovation policy (Fressoli 2013).

*d) Links with other actors including governmental institutions*

In Brazil, the Social Technologies movement drew from other widespread and influential social movements in the region, including the Landless People’s Movement (MST), and especially, the Social Economy Movement. So, in order to focus on innovation and social development the social technology advocates built a network of NGOs and local organizations focused on how to use innovation to improve livelihoods (Fressoli et al 2011). Significantly, funding for the Social Technology Network was provided by the support of big state donors, including the Brazilian oil company, Petrobras, and the national bank, Banco do Brasil.

Thus, support from the state (or public companies) in terms of funding, technical assistance and public procurement was key in the STN's growth. Nonetheless, the influence of the STN on S&T policies in Brazil was quite limited. Recently, in 2012 Banco do Brasil, one of the main funders of the STN changed its policy and withdrew their support for the network, focusing instead in building centres of demonstration of Social Technologies. Thus, the future of the network remains uncertain.

### *Honey Bee Network[[7]](#footnote-7)*

The Honey Bee Network emerged in 1989 among a group of scientists, farmers, academics and others interested in documenting and disseminating traditional knowledge and local innovation in local languages, with a focus on ensuring the individual innovators would receive benefit. This was born in part as a response to the Green Revolution of the 1960s and its associated challenges, such as further marginalization of small-scale farmers.

*a) Grassroots ingenuity*

The Honey Bee Network appears to take a very precise position on the meaning of ‘grassroots innovation’: as invention and innovation coming from the grassroots, often amongst people with little formal training and reliant on local, traditional or indigenous knowledge (Honey Bee Network website). The network’s main activity is the scouting and documentation of innovations and traditional knowledge based on different actions such as visiting communities, interviews, awards and competitions. A second step is related to the exploration of the commercial potential of products and processes identified during scouting. This involves supporting local grassroots innovator in process of patenting, but also offering further assistance in terms of prototyping, incubation and seed funding in order to assure commercial viability (Sone 2012).

b) *Processes of empowerment*

As described above, the particular vision and strategy of the HBN for grassroots innovation emphasises the *grassroots ingenuity* perspective. Nonetheless, the Network also refers to inspiration in Gandhi’s concept of *swadeshi,* or “local self-reliance,” which was influential in spurring grassroots innovation, and “symbolizes a process of empowerment through self-help” (Bhaduri and Kumar 2010: 30). Honey Bee ‘signifies a philosophy of discourse, which is authentic, accountable and fair’ (Honey Bee Network website).

Honey Bee Network has also worked to mobilize many different actors and institutions at both grassroots and other levels, including the public and private sectors. In this way, though apparently focused on documenting individual artefacts or innovations, Honey Bee arguably also works to build up a broader enabling environment for grassroots innovation that empowers local communities about the value of their knowledge and its potential for innovation. Over the last twenty-plus years the Honey Bee Network has documented more than 100,000 innovative ideas, technologies and traditional knowledge practices, many of which are recorded in an online database.

*c) Structural change*

As indicated above, the HBN emphasises directly supporting local and traditional knowledge and grassroots inventiveness, as opposed to working directly to address the structural impediments to meeting the needs of India’s rural and marginalised populations. Anil Gupta is a recognized academic and a founding leader of the Honey Bee Network. Writing with other scholars, Gupta et al (2003) suggest that change takes place in the act of “solving local problems, rather than just articulating them,” and that “transformation […] takes place through subtle networking among the grassroots deviants, innovators, and other marginal but creative forces in society.” The authors call these forces “segmented, polycentric, loosely integrated and coordinated entities,” and suggest that as they “remain on the margin,” these need attention to realize their potential (Gupta et al 2003: 976). Thus, a central goal of the grassroots innovation perspective is to properly recognize and add value to the traditional knowledge and natural resources held by local communities and poor people, including through engagement with local and national institutions.

*d) Links with other actors including governmental institutions*

As just indicated, the Honey Bee Network collaborates with a number of other institutions, some of which were born from the network’s interactions with state institutions, including the Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), the National Innovation Foundation (NIF), and the Grassroots Innovation Augmentation Network (GIAN). The Honey Bee Network and its partners also publish a newsletter in various languages, and hold local innovation and media competitions. Twice each year, members of the Honey Bee Network also participate in the Shodh Yatra, in which they visit rural communities to identify and document examples of otherwise undiscovered ingenuity. This serves as a scouting, networking and dissemination programme of SRISTI, a journey for the search for knowledge, creativity and innovations at the grassroots, and of mutual exchange and sharing (Honey Bee Network website).

Yet Honey Bee, through the National Innovation Foundation, is also involved in processes of commercialization and engagement with formal economic sectors and knowledge/science institutions. The Honey Bee perspective is arguably distinct to the approach of the Technologies for Social Inclusion Network of Argentina, which supports bringing innovations initially created in formal institutions to the grassroots for subsequent development.

### People’s Science Movement (PSM)[[8]](#footnote-8)

The People’s Science Movement began in India in the early 1980s, encompassing a range of grassroots networks, organizations and associations, varying in size, history, focus and strategy, some of which trace roots back decades earlier, all sharing concern for leveraging the relationship between science and social needs (Jaffy et al 1983; Varma 2001). Some of these groups focused on promoting and popularizing science, including through local language education initiatives, to “reduce disparities in scientific knowledge,” while others were more concerned with “promoting an alternative development model, based on local Indian science and technology” (Varma 2001: 4796).

Various factors influenced the emergence of PSM groups, including political-economic changes and mainstream developments, and shaped the motivations, framings, enrolment processes and strategies of PSM mobilization (Abrol 2012). PSM groups arose at least partly in response to diverse post-colonial nation-building arguments (both Gandhian and Nehruvian), as well as taking inspiration from Mao Tse Tung’s concept of “walking on two legs”, to draw on both small-scale labour-intensive industry as well as larger scale industry for Chinese rural development (Abrol 2013a). This framing, toward self-reliance and national development, with attention to the rural context, shaped the ‘model’ of PSM grassroots innovation.

a) *Grassroots ingenuity*

The PSM grassroots innovation ‘model’ came out of discussions in the late 1970s between individuals in national S&T institutions[[9]](#footnote-9) and PSM organizations. These discussions centred on the potential for upgrading traditional techniques through the application of ‘modern’ science, with particular attention to the achievements and limitations of existing “appropriate technology” programmes. This approach (Frame III) differed from prior approaches applied at CSIR and ASTRA which focused on downsizing modern techniques to make them appropriate for tiny / micro / small and medium enterprises (Frame II), and also from the *grassroots ingenuity* approach used at the Khadi and Village Industries Commission (KVIC), which focused on the upsizing of traditional techniques to modernize the individual producer for competition in the market sectors of leather tanning and product making (Frame I) (Abrol 2013a).[[10]](#footnote-10)

While being focused on the upgrading of traditional knowledge and techniques, the PSM grassroots innovation model has sought to involve the institutions of formal S&T in the improvement and commercialization of traditional techniques, and the harnessing of technical improvements in the systems of local production by building on grassroots ingenuity. This aimed to make artisans, workers and peasants competitive against non-local businesses that threatened their livelihoods. Interventions made by PSM members in the case of upgrading of leather tanning, carcass recovery for value-added products and making of leather products, processing of fruits and vegetables, extraction of value-added oils from edible and non-edible seeds and rural pottery have resulted in the establishment of niches; efforts to mainstream these niches are have resulted in the acceptance of these innovations at the national and state levels in India (Abrol 2013a).

For example, the Ministry of Rural Development, Government of India, recognized efforts by the Madhya Pradesh Vigyan Sabha (a local PSM organization) through the award of Best Technology Resource Centre, including for its work to support development of traditional household products in the tribal areas of Madhya Pradesh.[[11]](#footnote-11)

b) *Processes of empowerment*

The PSM model of grassroots innovation was developed to change the practice of the application of scientific knowledge for industrial upgrading of the rural farm and non-farm sector occupations, the basis for subsistence employment for millions even today in India. The PSM model of grassroots innovation was focused on the incorporation or *empowerment of* *rural poor as the* *social carriers* *of traditional techniques*, which, in combination with modern science, could result in industrial upgrading. This industrial upgrading frame focused on the challenges of a) how to organize the rural poor for cooperation in production and b) how to achieve economies of scale and scope by technological upgrading of the local peasant-artisan economies as “systems in themselves” for multi-sectoral network development (2013a).

In other words, the PSM grassroots innovation model enabled artisans, workers and peasants to function as inter-linked social carriers, organise themselves cooperatively and acquire capabilities for industrial and technological upgrading of local production as “systems in themselves”. In this model, they also collaborated with laboratory scientists in the creation of new techniques with the help of PSM organisations playing the role and function of intermediaries. An important feature of the model has beenthe *open participation of the potential social carriers* in the assessment of technology implementation needs. The PSM grassroots innovation model has thus included aspects of participatory development of technologies, enhancement of “user capability”, and application of heuristics of “pro-poor” business models (Abrol 2013a).

Further, the PSM model is embedded in a systemic understanding of the local rural and peri-urban economies, recognising that a) all these occupations are inter-linked and should be suitably upgraded as a system in order to enhance market competition and b) when upgraded they should be able to serve the local rural markets and also meet needs of the urban poor not yet addressed by the modern industrial sector (Abrol 2013a).

*c) Structural change*

Realization of the enormous diversity of perspective, approaches, capabilities, areas of strength, technologies developed for rural areas, and even methods of utilizing DST’s support grants have been a strength as well as limitation. Uneven outcomes in respect of structural change achieved through the methodologies under development for replication in the regions by the respective PSM organizations is a major area of debate. New strategies are being experimented to deal with this challenge; for example, the need to link the work on rural non-farm sectors with the implementation of agro-ecological approaches to deal with the challenge of sustainable diffusion of the upgraded systems of local economy in competition with the start of Chinese imports. This also highlights the challenge of innovating in collaboration with marginalised sectors, and the need to take a broader systemic perspective. Like the STN, the PSMs indicate a dual focus; both on enabling concrete outcomes for marginalised people in India, but also consciousness about the structural barriers to deeper change. The PSMs are also part of a wider democratic movement motivated by a larger purpose of “structural transformation”. The PSMs apparently also judge progress toward building capabilities for technology development and implementation as well as toward this larger purpose of structural change (Abrol 2013a).

*d) Links with other actors including governmental institutions*

The PSMs began their work by developing the organizations and heuristics of a “Network System of Technology Implementation”. The PSM grassroots innovation model required the participating PSM organisations and other S&T voluntary organizations to develop collaborative arrangements with laboratories and in the field with communities (potential social carriers) to participate in the design and development of feasibility studies for the introduction of techniques under consideration for local development. [[12]](#footnote-12)

Today the PSM model of grassroots innovation is emulated by the S&T based voluntary organizations under the Department of Science and Technology’s (DST) schemes for the application of S&T in rural areas. The national leather mission also adopted new PSM technology models to upgrade the leather tanning and leather products sector. Similarly the Small Scale Industrial Development Bank of India (SIDBI) and other financial institutions supported PSM models of fruits and vegetable processing. The Centre for Technology and Development of the Delhi Science Forum (a PSM) has also been recognized for the development of expertise in a wide range of products.

Were we to examine these cases in search of models for inclusive innovation amenable to policy intervention or incorporation, then at face value, it might be possible to identify in each of the grassroots innovation movements a core ‘model’ for inclusive innovation. The STN *appears* to hinge on a model based upon development activists co-producing specific innovation objects with local communities participating fully in process and outcomes. The HBN, on the other hand, *appears* to have arrived at a model for identifying and helping (individual) innovators to pilot and commercialise their innovation. The PSM *appears* to have arrived at a more systemic model in which innovations form part of activities for more inclusive economic organisation and co-operation in regional clusters. However, such a general analysis would be controversial.

Table 2 summarises key features of each movement and indicates how each could reasonably claim to attend to various framings – though with different emphases. Our analysis of the different grassroots innovation framings in play within each movement demonstrates how such abstraction overlooks (sometimes uneasy) co-existence of different understandings, purposes, strategies, activities and criteria for grassroots innovation within any single movement.

**Table 2. Comparing the three cases[[13]](#footnote-13)**



## 4. Top-down interest in grassroots innovation

In this section we develop our points further by considering instances when policy and knowledge institutions have taken an interest in the three movements. Again, encounters with these institutions are interpreted and responded to through the various frames at play in grassroots innovation. The examples of encounters described below suggest that policy tends to try and develop models for abstracting knowledge, capabilities, and artefacts from grassroots activities and processes. Such models lose sight of the different framings of grassroots innovation that encompass different understandings of inclusion, and the power struggles that accompany attempts to develop alternative pathways.

Grassroots innovation movements interact with mainstream S&T agendas, negotiating with conventional innovation institutions to enact change (either through engagement or opposition). One challenge for social movements is whether their goals are captured and integrated and/or whether they resist mainstream systems of innovation and technological change. There may be significant diversity within a social movement comprising a coalition of groups that ally toward a common goal or target. Some more radical elements may oppose the prospect of incremental change incorporated into the state, challenging this as co-option, while others welcome the possibilities for support and resources that such attention brings to the grassroots, even while recognising its limits.

Movements are also under pressure to demonstrate the potential of grassroots innovation on more conventional terms, sometimes resulting in tensions within a movement. Evidence of difficulties in becoming commercialized (conventionally) or scaling-up and diffusing widely are interpreted negatively to mean a lack of innovative success (see Utz and Dahlman 2007). However, this framing of the activity coming from conventional innovation institutions overlooks the alternative frames that have originally motivated grassroots activity, and where exist different criteria, priorities and notions of what works and does not work for grassroots. Alongside entrepreneurial frames might be more radical, transformational frames wary of commercialization or co-option, but that may yet be constructive, as illustrated by the CISTERNA case detailed below.

For the purposes of teasing out the complex political realities of these encounters, we suggest that top-down engagement tends to seek models of grassroots innovation based on the *insertion* of elements of grassroots innovation into existing innovation systems. In contrast, grassroots innovation movements, especially drawing on empowerment and structural transformation framings, sometimes look to what we call grassroots *mobilisation* to help develop pathways toward alternative innovation systems. This latterperspective questions whether ‘models’ and policies can really accommodate different forms of and reasons for mobilisation. Though mobilisation is not a model of grassroots innovation, this perspective seeks to include grassroots innovation as part of reformed innovation systems, and sometimes arises in response to attempts at *insertion*. As we see below, both the *insertion* and *mobilisation* perspectives satisfy and provoke grassroots innovation framings differently, and both will be frustrated in ways that are illustrated below. This has implications for ideas about models for inclusive innovation that we discuss in the subsequent and final section.

Thus, the *insertion* mode of institutional engagement proposes to read grassroots creative capacities in ways that make it legible and useful for insertion in marginally adapted innovation systems and product markets. This form is perhaps most prominent amidst HBN (but also is arguably present in all the cases) and derives from its emphasis on grassroots ingenuity. Laudable as this is, there is the risk that policy makers, development agencies, investors, university teams, and other relatively powerful actors operating within innovation systems are those who ultimately do the reading and selecting: identifying prototypes to develop, and goods and services to commercialise.

Such top-down selection can exclude at the same time as it seeks to include. Even if not on a case-by-case basis, the criteria and conditions of investment, the design and orientation of policy programmes, work to select indirectly. Grassroots innovation initiatives are of interest to policy-makers as a means to reach below the radar and bring communities into view, but without really altering broader innovation agendas, institutions and practices. This focus may put the onus on grassroots innovators to learn how to become more efficient and successful – how to read the programmes of support and adapt to them in order to gain recognition and resources. Such selective insertion and imposition effectively excludes and disempowers the agendas and capabilities of dissenting groups or those lacking the capabilities to conform.

However, these risks can be countered, and experiences can also be read in different ways, not just as resulting from exclusion by institutions, but as also sometimes involving the active participation and negotiation by social movements in shaping these spaces of insertion or incremental change. For example, the HBN’s involvement in establishing the National Innovation Foundation, which helps support commercialisation of Honeybee inventions, might be read in this way (Abrol 2013b). Though HBN maintains core attention to a grassroots ingenuity framing, the network has been carefully and strategically established, with critical attention to building political support and establishing links with relevant S&T institutions and actors (see Box 1). In reality the dimensions of grassroots ingenuity, local empowerment and structural intervention are invoked in all three cases. However, the ways these dimensions are institutionalized in each case shapes innovation outcomes, their pattern of adoption/diffusion and the impact on pathway creation.

*Box 1: Policy Encounters – Honeybee Network*\*

In the case of the HBN, encounters with formal/ mainstream policy increased as the Honeybee Network and associated institutions gained in reputation over the years and decades, and as HBN and its associated institutions have accrued both financial and political capital. Over the periods of establishment of the Honeybee Network (1986-87), SRISTI (1993) and GIAN (1997), funding sources included individual innovators who had benefitted from the networks’ activities, but to a large extent a “no funding” model was adopted. Turning down some offers of financial support, the networks at the same time built a strong, values-led group of members that ensured their sustainability through the 1990s (when they ran with a skeleton staff of 8).

Initial support from mainstream policy came in the form of the Indian Ministry of Finance, when the National Innovation Foundation was initiated with Dr R A Mashelkar, former Director General, CSIR as its chair. At that point and from 2000-2010, the annual budget was approximately less than US$300,000, however in 2010, the Ministry of Finance provided the networks with roughly US$3.7 million that enabled the formation of the National Innovation Foundation. They have since worked with an annual budget of around $1.1 million from the Ministry of Science and Technology (Gupta).

This approach has been successful in facilitating further expansion of the HBN networks – already very broad prior to the initiation of the National Innovation Foundation. They have since spread yet wider to include state-level and national-level government, banks, firms, research laboratories and civil society organisations. These and the huge networks of volunteers across the country perform the bulk of the work, supported by the staff of around 40.

According to Anil Gupta, a deliberate effort has been made to retain control of the ethics and philosophy of the Honeybee Network by insisting on independence from government, a policy only possible due to the political capital generated over decades of the movement’s development. The Foundation is now an autonomous organization within the Indian government’s Department of Science and Technology, and works to scout, document, validate and add value to, develop and help to commercialise innovations developed in rural areas of India in order to benefit the masses in India and elsewhere (with a proposal for a global network drawing on the Honeybee philosophy)(Gupta 2012).

\* Based on interview by Adrian Ely with Anil Gupta (13/6/2011) and on draft paper by Abrol (2013b).

The second mode of engagement coming from our cases, and again relevant to inclusive innovation, seeks to go further than insertions, and follow a more radical framing of grassroots innovation, its purpose and goals. Rather than seeking to imprint prevailing innovation rationalities upon grassroots initiatives, movements seek to *mobilise* and inform changes towards new alternative, innovation institutions better attuned to grassroots innovation. This mode of engagement emphasises local empowerment and structural intervention framings described above. We saw this perspective amongst some activists within the STN, who framed grassroots innovation in terms of its processes, for the purposes of transforming innovation systems (often as part of a wider goal of alternative development pathways). Inclusion, were the term to be used, would be about opening up and reconfiguring systems of innovation to radical *alternatives,* and with particular attention to participation by marginalized communities in the *processes* of innovation, not only in the outcomes.

This mode is visible in the experience of the STN, particularly around the case of CISTERNA, described in Box 2, below, where mobilisation literally meant protests and clash around a change in policy that excluded the capabilities-building, empowerment aspect of a massive regional self-build water cistern project. Nonetheless, the more ‘radical’ framings do not necessarily have to involve protest or direct confrontation between social movements and the state. In the case of the PSM, the more empowerment-oriented PSM grassroots innovation ‘model’ (‘Frame III’) developed at least partly on the basis of realising limitations of earlier approaches (Frames I and II), became incorporated into some policies for rural development, possible under support programmes that recognised the advantages of the approach (Box 3).

*Box 2: Policy Encounters – Social Technologies Network\**

An example of encounter between the social technologies movement and the state is the One Million Cisterns Program (P1MC) funded by the National Ministry of Social Development (MSD) of Brazil and a network of organizations linked to the now-defunct Social Technology Network in Brazil. P1MC is a program for the construction of water cisterns in a large semi-arid region in Northeast Brazil with a population of around 25 million. The region is characterized by low rainfall and scarce groundwater sources.

Since its start in 2003, over 549,000 water cisterns were built and put in place by local inhabitants with the support of the MSD and the STN (MSD website). The cisterns are simple cement-layered containers that collect rainwater from the roof, with a capacity of around 16,000 litres, enough to sustain a family’s needs through the region’s drought season. The cistern system was originally designed by a bricklayer from the region and later modified in collaboration with public R&D labs. However, according to social technology advocates, the main feature of the technology is its self-build aspect, which fosters relationship-building in the community, through the process of learning to build, use and modify the technology, indicating a grassroots empowerment framing. The water system empowers local people in the building process while also providing autonomy from local governments and water suppliers (which previously distributed water in water tanks).

Urged by a desire to demonstrate faster results, the Brazilian government announced a plan to speed up the implementation of the program through the purchase of 300,000 plastic water cisterns at almost twice the price of the original cement scheme. Focused on outcomes, this change disregarded the process of participation and empowerment that was central to the design of the program. Also, some private companies saw a business opportunity in the proposal (see Dias 2012).

Furthermore, early attempts to introduce the plastic cisterns showed design problems, as the plastic cisterns bent and folded due to the intense heat of the region. These failures led to a public rally of 10,000 people from the region, marching against the plastic Cisterna initiative. Protestors claimed that changes in management disempowered people from participation in the construction. Another element of the controversy included concern that introduction of the plastic cisterns would enable the local political elites to regain power over controlling water, by controlling the market in water cisterns.

It appears that the pressure from these mobilisations by the movement pushed the government to reinstate the self-build cistern programme, though they also continue to install some plastic cisterns (Semi-Arid Association website).

\* Based on Fressoli (2013b) and Dias (2012).

*Box 3: Policy Encounters – People’s Science Movements*\*

The PSMs in India have engaged with policymakers at national and state level since the last twenty-five years, with the aim of generating sustainable livelihoods and improving productivity of traditional occupations and quality of life, especially in rural areas. The PSMs’ early collaboration with the Department of Science and Technology (DST) expanded to include schemes across India such as the S&T Application for Weaker Sections, S&T Application for Rural Development, Tribal Sub-Plan, Special Component Plan for Scheduled Castes, and S&T for Women and Young Scientists Programme. All these schemes draw on the various characteristics of the PSM approach: a multi-sectoral approach focused on local markets, capabilities and resources, linkages with S&T institutions and participation of beneficiary groups in all stages of the innovation process. These have developed through significant involvement by regional PSMs, which positioned themselves as bridging organisations, and voluntary organisations, as well as through continuous engagement with national and state S&T institutions.

An emblematic success of the PSMs was around the development of successful group enterprises and broader sectors around cleaner vegetable-based techniques for leather processes, involving people involved in tanning, carcass processing and flaying, and more. The technology itself was originally developed in the 1950s by the Central Leather Research Institute, but remained filed on a shelf, unimplemented in practice. The PSMs drew on their knowledge of local economies as area-based production networks, and instead of focusing on a technology artefact, focused instead on developing a systemic approach, developing cooperative enterprises and improving local supplier relationships (Abrol 2013a).

However, one of the challenges of ‘success’ of government attention is recognised by the PSMs. This challenge is how to replicate a PSM ‘model’ of grassroots innovation, given the diversity of perspectives, approaches, capabilities, technologies and even methodologies for using DST support grants. While the DST suggests the PSM approach to grassroots innovation should be treated as a model for funding rural innovation by government agencies in India (DST 2008), there is debate within the PSMs about how to achieve the original PSM aims toward structural transformation, and how to absorb and nourish the noted diversity in models of funding and implementation of rural innovation (Abrol 2013a).

\* Based on Abrol (2013a) and Abrol (*forthcoming*).

Interestingly, in both the HBN and STN cases, ‘models’ for grassroots innovation are sought (and debated) by proponents of grassroots innovation and the state on the basis of these contrasting framings of inclusion in terms of insertion or mobilisation. In the STN CISTERNA case, the state selected an aspect of inclusion (a focus on inclusive outcomes) as priority over another (a focus on inclusive process), which clashed with the STN grassroots empowerment perspectives and led to mobilisation. In contrast, HBN may not be described as utilising mobilisation to resist insertion in the same way as STN, but it *is* taking action to prevent the appropriation of grassroots ingenuity through protection of intellectual property, among other strategies.

One could argue that government attempts at 'insertion' (e.g. taking NIF as an example of trying to insert the HBN model into the existing innovation system) have to some extent been able to accommodate 'grassroots ingenuity' and at other times  (e.g. after public backlash as in the CISTERNA case) 'grassroots empowerment' framings, however have not enabled/allowed structural change.  PSM's approach to grassroots innovation - created through partnerships between the movement and the formal NSI institutions (so not necessarily 'insertion') - was able to experiment directly with structural interventions and point to alternative innovation system configurations; particularly interested in the creation of counter-hegemonic pathways.  In the HBN case it seems that mobilisation continues outside the 'inserted' component of the grassroots innovation movement.  HBN's deeper philosophy aspires to a more structural (even cultural) shift.

In sum, the experiences of our case movements indicate complex negotiations and clashes in framings of inclusion and the ultimate purpose of engagements, and that problematize the notion of simple models. On the one hand, the state seeks ‘models’ for grassroots innovation, while grassroots innovation movements seek alternative pathways based on various framings of inclusion. Not all grassroots innovation movements are attempting to construct the same pathway, but all are trying to create spaces for grassroots innovation in mainstream systems. From the lens of social movement theory, and given the political-economic context of Brazil, the STN CISTERNA example could be interpreted as a Polanyian counter-movement to an expansion of neoliberal market principles (Polanyi 1944). Or it could also be interpreted under the rubric of a moral economy (Thompson 1971; Scott 1976; Wolford 2005), where the public rally against the plastic cisterns was about maintaining control of the regulation of the water economy, and also about maintaining the moral economy of autonomy, community and mutuality in self-building the cisterns, in ways that were overlooked by the Ministry’s interest in accelerating the diffusion (cf. development) of rainwater harvesting. These framings are overlooked by the state’s focus on inclusive outcomes, an ‘insertion’ model of grassroots innovation.

Attempts to insert grassroots into innovation systems seek models and techniques for representing grassroots solutions, needs, and capacities that harmonise with mainstream systems. These also seek to gauge receptiveness to the ‘inclusive innovations’ that are fed back through the products and services developed. In contrast, alternative pathways for mobilising grassroots innovation for empowerment or transformation seek processes whereby involvement in an innovation project leads to awareness, capacities, and mobilisation of participants in processes of transforming innovation systems.

And yet the ‘successful’ operation of both models of *insertion* and alternative pathways of *mobilisation* for grassroots innovation proves elusive in our cases. All suffer implementation ‘deficits’ on their own terms. In the case of grassroots *insertion*, this is because representations of grassroots initiative will always be imperfect. Whereas grassroots initiatives seek context-sensitive solutions, policy pressures to scale-up lead to decontextualized models whose abstractions lose sight of the generative context and alienate those who were involved ([Smith, Fressoli et al. 2013](#_ENREF_2)). There can be no definitive reduction of grassroots initiative into objective knowledge for inclusion in innovation processes. Indeed, decisions about how to represent, and which representations to include, and taken by those with more powerful influence over innovation processes, can effectively disempower and exclude some grassroots perspectives. Inevitably, not everything can be included in participatory design, prototyping and innovation development; something will be overlooked or communicated poorly in the process, to return disruptively in, say, processes of implementation and commercialisation ([Asaro 2000](#_ENREF_1)). Nonetheless, social movements are also actants with certain types of power and capacity for reflexive learning, as evident in PSMs’ development of a new approach to grassroots innovation (Frame III), building on lessons gained from prior approaches.

In the case of grassroots *mobilisation* to develop alternative pathways, movements have to struggle with the fact that they are seeking social change on the basis of innovation projects, programmes and objects, when the root causes of the situations they seek to transform are fundamentally structural ([Smith, Fressoli et al. 2013](#_ENREF_2)). Alternative innovation processes can only push so far and change certain relations of economic and political power in society. Not all the processes of social transformation can be included in the innovation process, and some efforts may result in co-option. For example, the People’s Science Movements’ successes in grassroots innovation for cleaner leather tanning, using vegetable tannins, also involved awareness of a need to consider the broader social-economic system in which the leather tanning process, the people who worked in leather tanning, the technologies, inputs and processes were embedded. This led PSMs to attempt to organise economic cooperation at the local multi-sectoral scale. As noted above, features of this process have attracted policy attention, though the impact has yet been limited to programme and network development, not yet achieving deeper reforms.

## 5. Conclusions

As grassroots innovation movements develop over time, they face challenges in terms of funding, technical capabilities and scale of experiences. So, in most cases, encounters with institutions focused on S&T, development, or other related areas, can become key for the further development of these movements. At the same time, such national institutions and international agencies periodically express their interest in supporting these kinds of initiative, either by helping existing movements and networks or by developing their own models of intervention. Such encounters can be fruitful.

Nonetheless, in this paper, we have questioned the facility with which ‘models’ for inclusive innovation can be developed. Through an exploration of the plural framings evident in three grassroots innovation movements, we have illustrated their varied ‘inclusive’ innovation activities and approaches, not easily subsumed into a ‘model’. Indeed, all these activities exclude, or at least underplay, some forms of inclusion, while including and emphasising others. A model likely picks and chooses from these framings.

Neither can grassroots innovation be reduced to innovation agents, artefacts or a precise formula, as we tried to show in section 3. On the contrary, grassroots innovation movements should be acknowledged as networks of actors with their own framings of knowledge for problem-solving, mobilisation and social inclusion. In this sense, the models that get shaped under encounters may be a translation of these frames, but probably do not account for the whole range and depth of their richness.

Turning to institutional encounters in section 4, we noted tensions between insertion and mobilisation that seem to be coherent with other cases of grassroots innovation. Hess et al (2007) highlight cases from renewable energy, green business and sustainable agriculture where alternative technical changes occurred, but related political and social justice goals were watered down or eliminated. In an effort to seek credibility and have their goals heard, social movements may ‘pitch critical alternatives in a language that reflects the dominant “governing mentalities”’ (Hess et al 2007: 487).

But, incorporation is not always possible or desired, and sometimes grassroots innovation movements seek to mobilise to resist such selective insertion, aiming instead toward the creation of alternative development pathways that address multiple framings of grassroots innovation. As well as trying to preserve movement integrity, this mobilisation can sometimes meet with policy success and lead to support for more rounded approaches to grassroots innovation.

All these observations are reasons to rethink attempts to develop inclusive innovation models. As highlighted here, thinking in terms of models implies the existence of discrete variables that can be inserted, adjusted or selected. For grassroots innovation movements, this way of thinking about grassroots innovation may be too narrow. Approaches (in the plural) to support and develop inclusive innovation need to be viewed as creating spaces for interaction, negotiation and contestation between grassroots initiatives and innovation systems in technology development. It is through those interactions that the ‘plasticity’ and appropriateness of technologies can be researched under the values and norms being debated in those spaces.

A social enterprise, for instance, might use inclusive models to test options for commercialising a mobile-phoned agronomic information service for farmers. The enterprise will choose which grassroots-user representations to insert into their innovation choices, and farmers will ultimately respond through their consumption choices (including choosing to exclude the technology from their farming practices). Social activists, on the other hand, might use GPS features to help map claims for land reform, and grassroots mobilisers will judge how helpful or welcome is such an innovation. Other spaces for inclusion could open scientific agendas and other knowledge institutions to grassroots involvement, and explore what new requirements in research practice emerge, as well as what is best left the same.

Encounters between grassroots innovations and developmental institutions can be understood as boundary spaces where different actors negotiate knowledge production, use of ingenuity, and different strategies of empowerment, participation and potential forms of inclusion. The inevitable compromises, partial successes, limited failures, and changes engendered by these spaces need to be considered dynamically over time. The insertion/mobilisation modes are not necessarily a dichotomy, but rather may represent different moments in the development of a continuous pathway towards alternative forms of innovation, where inclusions and exclusions are debated and experimented openly and democratically. Instead of ‘models’, ‘spaces’ and ‘pathways’ suggest more flexibility and may better accommodate diverse ways of thinking about and practicing grassroots innovation.

The issues at stake here are all reasons for policy to be pragmatic towards grassroots innovation. They counsel policy-makers to develop a plurality of ‘inclusive’ approaches, to be clear and open about their purposes, and to build processes for continuing participation, reflection and learning into their operation. It also calls for policies to be put into context, and to be honest about the wider power relations shaping their operation. Policy needs to accept that models exclude: some participants may choose not to participate; some may be unable to participate, whereas the participation of others may need to be regulated. In these ways the inevitable limitations of representation and control over social change become clearer.

In sum, talk of models needs to avoid discussing them as arrangements for best practice or devices for scaling-up. Experience with PSM, HBN, and STN suggest it is better to talk about plural spaces for grassroots encounters and engagements in innovation that are decentred, and provide context-rich experiments in practising technological democracy, as much as they are testing grounds for novel goods and services. So, seeking alternative models is perhaps misguided. Cultivating spaces for engagement and empowerment is perhaps a better policy goal, where the constantly contested and emergent forms of inclusion/exclusion can be explored and new forms of innovation practice developed in parallel across different sites and at different scales.

## References

Abrol, D. (2013a) ‘Policy Makers and PSMs in the Making of Grassroots Innovation Movements: Indian Experience.’ Unpublished draft paper.

Abrol, D. (2013b) ‘“Grassroots Innovation” Model, Honey Bee Network and Policy Making.’ Unpublished draft paper.

Abrol, D. (*forthcoming*) ‘Pro-poor Innovation-making, Knowledge Production and Technology Implementation for Rural Areas: Lessons from the Indian Experience,’ chapter in book Ramani, S. (Ed) *India’s National System of Innovation,* Routledge.

Abrol, D. (2012) ‘Innovations at Grassroots in India: A historical and comparative perspective’ Presentation (May 24), STEPS Centre, University of Sussex, Brighton, UK.

Abrol, D. (2005) ‘Embedding technology in community-based production systems through People’s Technology Initiatives: Lessons from the Indian experience,’ *International Journal of Technology Management and Sustainable Development*, 4.1: 3-20.

Altenberg, T. (2009) “Building Inclusive Innovation Systems in Developing Countries: challenges for IS research” Lundvall, Joseph, Chaminade, V. and Vang, J. (eds) Handbook of Innovation Systems and Developing Countries, Cheltenham: Edward Elgar, pp. 33 – 56

Bell, M. (1979) ‘The Exploitation of Indigenous Knowledge or the Indigenous Exploitation of Knowledge: Whose Use of What for What?’ *IDS Bulletin,* 10.2: 44-50.

Benford, R.D. and Snow, D.A. (2000) ‘Framing Processes and Social Movements: An Overview and Assessment,’ *Annual Review of Sociology*, Vol. 26: 611 -639.

Bhaduri, S. and H. Kumar (2010) ‘Extrinsic and intrinsic motivations to innovate: tracing the motivation of ‘grassroot’ innovators in India’ *Mind Soc,* 10:27–55.

Bijker, W.E., 1995. *Of bicycles, bakelites and bulbs*, Cambridge, Mass.: MIT Press.

Bound, K. and I. Thornton (2012). Our frugal future: lessons from India's innovation system. London, National Endowment for Science, Technology and the Arts.

Chesbrough, H., Vanhaverbeke, W. & West, J., 2006. Open innovation: researching a new paradigm.

Cozzens, S. and Sutz, J. (2012) *Innovation in Informal Settings: A Research Agenda.* Ottawa: IDRC.

Dagnino, R. (Ed.) (2009) *Tecnologia Social: ferramenta para construir outra sociedade*. Instituto de Geociencias de UNICAMP, Campinas.

de Mello, L. and M. A. Dutz (eds.) (2012), Promoting Inclusive Growth: Challenges and Policies, OECD Publishing. http://dx.doi.org/10.1787/9789264168305-en

Dias, Rafael. B. (2012) ‘Uma análise sociotécnica do Programa Um Milhão de Cisternas (P1MC),’ Paper presented at the *IX ESOCITE - Latin American Congress of Social Studies of Science and Technology*, Mexico City, June 8.

Dickson, D., 1974. *Alternative technology and the politics of technical change*, London: Fontana/Collins.

DST (2008) *Science, Technology and Innovation Policy 2013*. Department of Science and Technology, Government of India. Available online: <http://www.dst.gov.in/sti-policy-eng.pdf> (accessed 15/5/2013).

Edquist, C. & Edqvist, O., 1979. Social Carriers of Techniques for Development. *Journal of Peace Research*, 16(4), pp.313–331.

Ely, A., Smith, A., Leach, M., Scoones, I. and A. Stirling (2013) ‘Innovation politics post Rio+20: hybrid pathways to sustainability?’ *Environment and Planning C: Government and Policy*, in press.

Eyerman, R. and Jamison, A. (1991) *Social Movements: A Cognitive Approach,* Penn State University Press.

Fressoli, M. (2013) ‘The Social Technologies Network in Brazil and Technologies for Social Inclusion Network in Argentina: Draft GIM Case Study Report.’ Unpublished draft paper.

Fressoli, M., Smith, A., and Thomas, H. (2011) ‘From Appropriate to Social Technologies: Some Enduring Dilemmas in Grassroots Innovation Movements for Socially Just Futures’ *Globelics Paper.*

Gupta, A. (*personal interview*) Interview by Adrian Ely (13/6/2011).

Gupta, A. et al. (2003) ‘Mobilizing grassroots’ technological innovations and traditional knowledge, values and institutions: articulating social and ethical capital’, *Futures* 35: 975–987

Gupta, A. K. (2012) Innovation, Investment, Enterprise: Generating Sustainable Livelihood at Grassroots through Honey Bee Philosophy, IIMA Working Paper No. 2012-06-04,June 2012

Hess, D. J. (2005) Technology- and Product-Oriented Movements: Approximating Social Movement Studies and Science and Technology Studies  *Science Technology Human Values* 2005 30: 515

Hess, D., Campbell, N., Breyman, S., and B. Martin (2007) ‘Science, Technology, and Social Movements,’ *New Handbook of Science and Technology Studies*, eds. Edward Hackett, Olga Amsterdamska, Michael Lynch, Judy Wajcman (Cambridge, MA: The MIT Press, 2007, pp. 473-498).

Kaley, V. (1996) ‘Pedalling Uphill: An Innovation on the Roadside.’ Honey Bee 7, 5-6. Available at: <http://www.sristi.org/hbnew/honeybee_detailed.php?ID=5575&page=1&search_case=bicycle> (accessed 15/03/2012).

Lamont, M. & Molnar, V., 2002. The study of boundaries in the social sciences. *Annual Review of Sociology*, 28, p.167.

Leach, M., and Scoones, I. (2007) *Mobilising Citizens: Social Movements and the Politics of Knowledge*, IDS Working Paper 276, Brighton: Institute of Development Studies.

Leach, M., Scoones, I. and B. Wynne (2005) ‘Introduction: science, citizenship and globalization,’ in *Science and Citizens: Globalization and the Challenge of Engagement.* London: Zed Books.

Letty, B. Shezi, Z. and Mudhara, M. (2012) ‘An exploration of agricultural grassroots innovation in South Africa and implications for innovation indicator development’ UNU-MERIT Working Paper 23.

Kaplinsky, R. (2011). “[Schumacher meets Schumpeter: Appropriate technology below the radar”](http://oro.open.ac.uk/27046/) Research Policy, 40(2), pp. 193–203

Marres, N., 2012. *Material participation: technology, the environment and everyday publics*, London: Palgrave Macmillan.

Miranda, Isabelle., Michelle Lopez, and María Clara Couto Soares. 2011. “Social technology network: paths for sustainability.” *Innovation and Development* 1: 151-152.

MSD website (Ministry of Social Development) <http://www.mds.gov.br/segurancaalimentar/acessoaagua/cisternas> (accessed 16 April 2013).

OECD (2002), Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development, The Measurement of Scientific and Technological Activities, OECD Paris

OECD (2005) Oslo Manual: Guidelines for collecting and interpreting innovation data, OECD: Paris.

OECD (2012). Innovation for Development: A Discussion of the Issues and an Overview of the Work of the OECD Directorate for Science, Technology and Industry. Paris, Organisation for Economic Cooperation and Development.

OECD (2012b) Innovation and Inclusive Development: Conference Discussion Report, Cape Town, South Africa, 21 November 2012. Paris: Organisation for Economic Cooperation and Development

Polanyi, K. (1944; 1957; 2001) *The Great Transformation,* Boston, MA: Beacon Press.

Prahalad, C.K. (2005) The Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits. Upper Saddle River, NJ: Wharton School Publishing.

Rist, G. (2011) The History of Development: From Western Origins to Global Faith, Zed Books, London, third edition.

Seyfang, G., (2009) *The New Economics of Sustainable Consumption: Seeds of Change*. Palgrave Macmillan, Basingstoke.

Scott, J. (1976) *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia,* New Haven, CT: Yale University Press.

Semi-Arid Association website <http://www.asabrasil.org.br/> (accessed 6/6/2013)

Smith, A. (2007) Translating Sustainabilities between Green Niches and Socio-Technical Regimes. *Technology Analysis & Strategic Management*, 19(4), pp.427–450.

Smith, A. (2005) The alternative technology movement: an analysis of its framing and negotiation of technology development. *Human Ecology Review*, 12, 106-119.

Smith, A. and Ely, A. (2012) ‘Rio+20 must make inclusive innovation stepping stone to a sustainable future,’ *The Guardian* (18 June).

Smith, A., Fressoli, M. and Thomas, H. (2013) ‘Grassroots innovation movements: challenges and contributions’ *Journal of Cleaner Production,* in press.

Snow, D.A., Burke Rochford, Jr., E., Worden, S.K. and R. Benford (1986) ‘Frame Alignment Processes, Micromobilization, and Movement Participation,’ *American Sociological Review*, 51.4: 464-481.

Sone, L. (2012) “Innovative initiatives supporting inclusive innovation in India: Social business incubation and micro venture capital.” *Technological Forecasting & Social Change* 79: 638–647.

Star, S.L. (2010) This is Not a Boundary Object: Reflections on the Origin of a Concept. *Science, Technology & Human Values*, 35(5), pp.601–617.

Tarrow, S. (1998) *Power in Movement: Social Movements and Contentious Politics,* Cambridge: Cambridge University Press.

Thompson, E. P (1971) ‘The Moral Economy of the English Crowd in the 18th Century’. *Past & Present*, 50, 76-136

Udagavi, A. (1997) Washing Away Whiteflies with a Rain Gun: Saga of a Sprinkler Designer. Honey Bee 8, 5-6. Available at: <http://www.sristi.org/hbnew/honeybee_detailed.php?ID=6205&page=7&search_case=transport> (accessed 15/03/2012).

UNDP (2010a) Brokering Inclusive Business Models, New York United Nations Development Programme Private Sector Division

UNDP (2010b) Inclusive Growth: what is it and what does it take? Concept note for International Workshop, 8-10 December 2010, Foz do Iguaçu, PR, Brazil, <http://www.ipc-undp.org/conference/workshop_ig/concept_note.pdf> accessed 12/4/2013

UNDP (2013) Growing Inclusive Markets database, <http://cases.growinginclusivemarkets.org/>, accessed 12/4/2013

Utz, A. and C. Dahlman (2007) “Promoting inclusive innovation in India” in M.A. Dutz (ed.) (2008) *Unleashing India’s Innovation: Towards sustainable and inclusive growth*, Washington, DC: World Bank, pp. 105 - 128

Wolford, W. (2005) ‘Agrarian Moral Economies and Neoliberalism in Brazil: Competing Worldviews and the State in the Struggle for Land’ *Environmnt and Planning A,* 37: 241-261.

World Bank (2012) “Inclusive Green Growth: the pathway to sustainable development”, Washington, DC.

1. Please note that all authors have contributed to all sections of the paper. Nonetheless, we want to acknowledge that the text draws significantly from three draft papers on the case study movements: two written by Dinesh Abrol (on Honey Bee and People’s Science) and one written by Mariano Fressoli (on Social Technologies). Also, we acknowledge specific authors for their significant contributions to specific sections; these are footnoted accordingly throughout the text. [↑](#footnote-ref-1)
2. We argue that the case studies proposed – Honey Bee, People’s Science, and Social Technologies, can appropriately be called ‘social movements’ because they are not simply about innovation; there are wider goals involved. Also, leaders attract various groups and types of people to the broader effort, including voluntary elements. Finally, these are not merely networks; these are arguably looser affinities engaging with other types of social activism too. [↑](#footnote-ref-2)
3. In our broader work, we are interested in the frames and framing processes within which social movements and their constituents develop motivation, direction (agendas) and strategies, and build grassroots networks. We also explore to what extent these framings arise from (or could be described as leading to) the establishment of alternative “pathways” (Leach et al 2010) that challenge mainstream or dominant innovation paradigms. An exploration of the constitution and encounter of different framings by grassroots innovation movements and other (e.g. state) actors can also help elucidate tensions and movement conflict. Integrating attention to framings and representation may help us to unravel the dynamics of the politics of knowledge and to understand occurrences of network fragmentation, consolidation, co-option or incorporation. [↑](#footnote-ref-3)
4. However, these ‘modes’ may also turn out to be hybrids sometimes. Conventional innovation is often associated with highly centralized, formally organized research institutions, while grassroots innovations are usually thought of as decentralized and locally sensitive. Yet conventional innovation has arguably shifted to include more decentralized modes as well (Chesbrough et al. 2006). [↑](#footnote-ref-4)
5. Depending on the agency and project, appropriate technology meant everything from a reliance on local natural resources for industrial processes, to North-South technology transfer, harmonisation with national development policies, or a focus on efficiency, affordability, usability, and socio-cultural appropriateness. For example, the UNDP called for attention to appropriate technology from at least 1975, and UNIDO established a ‘Cooperative Programme of Action on Appropriate Industrial Technology’ in 1977. Floor points out that UNCTAD’s work at the time, which was largely focused on technology transfer from ‘developed’ countries to ‘developing countries’, ‘[…] cannot be classified […] as primarily aimed at alleviating poverty and satisfying basic needs’ and he suggests it was ‘more often than not, inappropriate to the [developing countries’] needs’ (1983: 147). In contrast, Floor suggests World Bank activities since 1971 *did* constitute ‘appropriate technology’ as they used the following criteria for a technology: ‘It is in accordance with the national development policy, the final product or service is useful and affordable by the consumers, the production process fits the socio-cultural setting and makes economic use of resources’ (1983: 148). Note this definition does not mention local knowledge as a source of innovation. [↑](#footnote-ref-5)
6. This section draws on a draft paper by Mariano Fressoli (2013). [↑](#footnote-ref-6)
7. This section draws on a draft paper by Dinesh Abrol (Abrol 2013b). [↑](#footnote-ref-7)
8. This case study draws heavily from an unpublished draft paper by Dinesh Abrol (Abrol 2013a) and a forthcoming book chapter (Abrol *forthcoming*). [↑](#footnote-ref-8)
9. These discussions involved Dr. Upendra Trivedi of India’s Department of Science and Technology (DST) and Prof. P. N. Chowdury, head of the Centre for Management and Development (CMD) in the Council of Scientific and Industrial Research (CSIR). Dr. Trivedi was also involved with the National Committee on Science and Technology (NCST) for the formulation of India’s first S&T plan. [↑](#footnote-ref-9)
10. The leather industry employed the poorest of the poor, considered to be “untouchable” within the rural economies of India in the mid 1980s. [↑](#footnote-ref-10)
11. The MPVS works to support many types of technologies, from fisheries, ceramics, and vermi-compost, to seed production, value-added non-timber forest products, and processing of medicinal, aromatic plants and non-edible oil extraction, among many others. [↑](#footnote-ref-11)
12. As indicated in Table 2, the PSM approach uses grassroots innovators and his/her current level of access to local knowledge, capabilities, resources and markets as the starting point. PSMs aim at the development of peasants, artisans and workers as social carriers of innovation, which implies various aspects of local empowerment to prepare them for competition against entrenched market forces. A PSM focus on intervention for structural change means the upgrading of local economies as a system in itself in the multilevel economy to seek and manage transition towards the adoption of ecologically and socially just socio-technical systems and trajectories (Abrol 2013). [↑](#footnote-ref-12)
13. Table contents based on research in progress, especially Abrol (2013a; 2013b) and Fressoli (2013). [↑](#footnote-ref-13)