

Which Inclusive Innovation? Competing Normative Assumptions around Social Justice

Les Levidow, L.Levidow@open.ac.uk
Theo Papaioannou, theo.papaioannou@open.ac.uk
Development, Policy and Practice (DPP), Open University
Milton Keynes MK7 6AA, UK, tel. +44 -1908 655708/653496

Abstract

The concept ‘inclusive innovation’ has responded to an increasing realisation that capital-intensive innovations have generally resulted in social exclusion, especially for lower-income people. Towards alternatives, the literature has competing models of social inclusion – its forms, causes and remedies. These models depend on different normative assumptions about socio-economic in/equity, corresponding to divergent theoretical camps of social justice: A liberal-individualist camp emphasises a fairer distribution of societal benefits to individuals; more high-tech investment, skills training, cheaper products and/or more favourable external conditions will help low-income people to gain greater access. By contrast, a social-collectivist camp seeks different conditions for reconstituting societal benefits through commons and public goods. Any initiative or policy framework entails such assumptions or tensions among them. Given these competing assumptions, their models can be made explicit for strategic debate, towards opening up inclusive innovation to more conscious political choices.

Key words: inclusive innovation, normative assumptions, social justice, public goods, models

Acknowledgements: For helpful editorial comments we thank David Hess, Giles Mohan and Eve Seguin.

Contents

1	Introduction	2
2	Socio-economic in/equity: theorising its forms, causes and responsibility	3
	2.1 Divergent theories of social justice.....	3
	2.2 Innovation’s relationships with its context	4
3	Inclusive innovation: divergent normative assumptions and models	6
	3.1 Inclusion: fairly distributing goods or redefining them?	6
	3.2 Favourable conditions: contingent or constitutive?	9
	3.3 Inclusion as empowerment: extra or conflictual?	11
4	Conclusion	12
	4.1 Competing normative assumptions and models	13
	4.2 Explanatory models as a reflexive resource	13
	Figure 1: Levels of Inclusive Innovation (Heeks et al., 2013)	15
	References	16

1 Introduction

After more than a decade of research on inclusive innovation, this has become a broad generic term linking public-action initiatives, policy agendas and specific innovations. As a central problem-diagnosis, social exclusion and inequality have often resulted from mainstream technological innovations, products and processes. The latter are generally top-down, expensive capital-intensive innovations which exclude the interests and aspirations of lower-income people. .

In order to provide more equitable alternatives, ‘inclusive innovation’ initially emphasised innovations accommodating needs of lower-income people, enhancing their capabilities, improving their welfare and potentially empowering them (e.g. Arocena and Sutz, 2003; Prahalad, 2005; Cozzens et al, 2007; Srinivas and Sutz, 2008; Kaplinsky et al., 2009; Chataway et al, 2014; Papaioannou, 2014a, 2014b). As one general definition, inclusive innovation ‘harnesses science, technology and innovation “know-how” to address the needs of lower-income groups’, who may themselves become innovators (OECD, 2013: 9). Later the term was given broader meanings, beyond low-income people.

While all innovations have socio-economic aspects, their precise forms undergo scrutiny within an ‘inclusive innovation’ agenda seeking more equitable alternatives. This agenda encompasses diverse sub-categories, in particular: Bottom-of-the-pyramid products are cheaper functional substitutes aimed at low-income populations (Prahalad, 2005; UNCTAD, 2014), e.g. India’s low-cost motorcar; low-cost nets protecting people from mosquitos and thus malaria; cheap analogues of patented drugs or treatments; Grassroots innovation networks design processes to serve different needs and aspirations (e.g. Smith et al, 2013, 2014, Fressoli et al., 2014) e.g. India’s Honey Bee Network promoting local knowledge, innovations, biodiversity conservation, etc.; Fab Labs and Hackerspaces.

Inclusive innovation can contribute not only to economic development or sustainable development but also to inclusive development (Cozzens and Sutz, 2014). For example, ‘inclusive innovation policies can help achieve more equitable, sustainable and inclusive development’. As well as benefiting individuals, such innovation offers ‘significant opportunities for economic growth that low-income markets represent’, especially for firms in developing countries (UNCTAD, 2014: 1, 6). The dominant innovation system has been oblivious to those new market opportunities (Kaplinsky et al., 2009), at least until recently.

As a common rationale for such agendas of innovation and development, they favour social inclusion and socio-economic equity. These aims involve implicit or explicit models, e.g. taxonomic distinctions amongst various forms of inclusion and empowerment (Heeks et al., 2013, 2014; see Figure 1). Why do these matter? As Fressoli et al. (2014: 13) emphasise, ‘Models are a necessary step in building pathways to alternative knowledge production and sustainable development. But they are also subject to tensions between different framings of inclusion...’.

This paper extends those insights to implicit and explicit models by linking the following issues: the sources of social exclusion and socio-economic inequity through prevalent innovation; the responsibility for either undermining or facilitating social inclusion; alternatives which can provide a remedy; the relationship between social inclusion and socio-economic equity; diverse forms of social inclusion and their relation to fairness. The latter issue in particular involves normative assumptions about societal arrangements.

Thus the paper raises several questions: What different assumptions arise? How are they complementary or competing? How do they inform explanatory models and practices of inclusive innovation? What roles do or can such models play in opening up the issues?

In order to address these questions, we survey the literature on inclusive innovation. This has various ways to distinguish between social inclusion/exclusion and socio-economic in/equity, and to advocate specific means towards improvement, in turn based on various normative assumptions and explanatory models assigning responsibility. To identify those diverse models, our survey relies on a search of numerous documents for key words (e.g. inclusive, fair, equitable, inequality/equity, etc.); also ‘needs’ of excluded or low-income populations. Such terms are rare and rather cryptic, except for ‘inequality’. Therefore extra interpretation is necessary.

This paper argues that normative assumptions about inclusive innovation relate to two distinct theoretical camps of social justice, namely liberal-individualist versus social-collectivist. The liberal-individualist camp emphasises the need to more fairly distribute costs and benefits of innovation to individuals. Towards those aims, it advocates more high-tech investment, skills training, cheaper products and/or more favourable external conditions which will help lower-income people to gain greater access to innovation. By contrast, the social-collectivist camp advocates more equal relations of innovative production, seeking different conditions for distributing societal goods – or redefining them, e.g. through commons and public goods. Our theoretical distinction between the two camps highlights implicit choices and tensions within efforts towards inclusive innovation.

The paper is structured as follows. Section 2 surveys concepts of socio-economic inequality as injustice and its relevance to innovation. Section 3 explains how these concepts relate to the inclusive innovation literature as regards three binary questions: socio-economic inclusion (fairly distributing goods – or redefining them?); favourable conditions (contextual or constitutive?); and inclusion as empowerment (extra or conflictual?). Section 4 summarises those competing assumptions and links them to explanatory models, especially how they inform practice.

2 Socio-economic in/equity: theorising its forms, causes and responsibility

The ‘inclusive innovation’ literature has built upon critiques of dominant innovation models. To identify their normative assumptions, the two sub-sections below survey different theories of social justice and then models of innovation in its wider context.

2.1 Divergent theories of social justice

Diagnoses of socio-economic inequity correspond with various normative assumptions about social justice, especially what ought to be more justly distributed (Papaioannou, 2014a: 187). Likewise assumptions about ‘inclusion into what?’, e.g. accommodating or transforming dominant structures. In the next paragraphs we identify two distinct theoretical camps of social justice, namely liberal-individualist versus social-collectivist.

In the prevalent theory, the focus is individual distribution of societal benefits versus costs, e.g. income versus ill health, or fair processes to decide such distributional issues at global level (e.g. Brock, 2009). According to some advocates, this is a cosmopolitan framework for global justice, assigning distributive moral obligations to individual beneficiaries beyond state borders. For example, ‘the most contemporary cosmopolitans affirm that duties are owed to individuals’, not to states (Caney, 2005: 105). Cosmopolitanism has been defined in terms of three ethico-political pillars: individualism; universality; and generality (Pogge, 1994). Cosmopolitan thinkers differ as regards several issues: who should be included in the scope of justice; what should be fair amount of resources, utility and/or welfare; and how these ‘currencies of justice’ should be distributed (Caney, 2005).

Cosmopolitan theories of distributive justice have been critically analysed as liberal-individualist in several respects. Individuals' interests are effectively in competition to obtain benefits and avoid costs, thus obscuring public goods and collective struggles for them. Liberal-individualist approaches also reduce fairness to equal treatment, by regarding group-cultural differences as merely contingent. They abstract from non-ideal material differences – in social position, division of labour, socialized capacities, normalized standards and ways of living, etc. – thus ignoring how all these differences disadvantage members of historically excluded groups. For such reasons, formally equal treatment readily reproduces inequalities (Young, 1990; also 2000).

By contrast with the liberal-individualist camp, a social-collective camp attributes injustice to the prevalent production-consumption patterns which also extend beyond state borders. Towards a just arrangement, 'By restructuring the relations of production, these remedies would not only alter the end-state distribution of consumption shares; they would also change the social division of labour and thus the conditions of existence for everyone' (Fraser, 1995: 84). Here justice depends on recognising different aspirations: 'In the redistribution paradigm, the remedy for injustice is economic restructuring of some sort... In the recognition paradigm, in contrast, the remedy for injustice includes cultural or symbolic change' (Fraser and Honneth, 2003: 13).

Social-collective theories identify unequal power relations as a basis to overcome them. Such theories include, for example, global demands for 'environmental justice', aiming 'to render inequities visible'. They highlight the sources of injustice, especially wherever benefits and costs are defined in unjust ways (Martin, 2013). The concept demands recognition of differences in vulnerabilities, cultural identities and socio-political power (Schlosberg, 2004). Environmental justice 'shifts from resistance to reconstruction', aiming to transform unsustainable practices of innovative production and consumption (Schlosberg, 2013: 49).

Social-collective theories are transformative. They inform NGOs' efforts towards alternative futures through commons and public goods, rather than through procedures for more fairly distributing resources or consumer products to individuals. These theories help understand how prevalent innovation trajectories have generated various resistances. As a generic term, 'counterpublics' contest dominant models of the public and its interests (Hess, 2011). Counterpublics identify 'undone science' which has potential for public benefit, as a basis for efforts to fulfil that potential. Moreover, they create knowledge and innovations which challenge technocratic decision-making (Hess, 2015, 2016).

2.2 Innovation's relationships with its context

Innovation has always existed in the broad sense of applying novel methods to daily practices, yet over the past century the term 'innovation' has become more narrowly defined. This narrowing has been accompanied (even facilitated) by social innovations, especially various privileges and patent laws rewarding novelty. By the early 20th century, innovation was understood as commercial adoption of technological inventions, in turn causing socio-cultural change (Godin, 2008, 2015). In practice, technoscientific innovation has been dependent on such institutional change, but this relationship is obscured by the prevalent model.

Hence the concept 'innovation' came to underpin a technological determinist explanation of societal change. Although deriving from socio-economic innovations, power relations become reified as inherent properties of technoscientific innovation. Socio-economic aspects are seen as 'impacts' or (at most) as favourable contexts for a quasi-inevitable technological advance.

As critics have noted for a long time, R&D systems aimed at global competition have not addressed the needs of poorer people. Therefore citizens' solutions are necessary for 'the inclusion of those left behind in the race to the top' (Leach and Scoones, 2006: 66). Technoscientific inquiry and innovation often worsen socio-economic inequity, e.g. by eliminating, transferring and/or deskilling employment. In particular the manufacturing sector has lost jobs due to successful innovation in production technologies (Cozzens et al., 2002).

In such a context, any societal benefits have become more exclusive. To generate societal benefits for lower-income people, therefore, publicly funded scientific inquiry should be designed as a public good. Even with such a design, research 'does not always *remain* a public good', especially through appropriation by powerful business interests, e.g. through monopoly-market power or proprietary knowledge (Woodhouse and Sarewitz, 2007: 144). This appropriation is encouraged by regulatory frameworks, such as the 1980s Bayh-Dole Act, enabling commercial exploitation of technological advances resulting from publicly funded research (Block and Keller, 2011). The latter funds were invested in mission-oriented scientific projects, whose results were often privatised by powerful market actors (Mazzucato, 2014).

Similar issues are increasingly taken up in global political debate, as affluent workers too face threats to their livelihoods. According to a popular book, digital technologies are fast incorporating greater skills, thus marginalising workers who can offer only 'ordinary' skills (Brynjolfsson and McAfee, 2014). More subtly, any technoscientific development has multiple alternative designs. In particular, electronics were originally designed for more egalitarian social relations, but companies soon appropriated the technology for intensifying labour exploitation and market competition, thus demanding more environmental resources. As a causal explanation, new technology has socially and environmentally harmful outcomes within 'economic systems built upon inequality' (Hughes, 2016). These perspectives open up the issue of what causes inequality and how to overcome it, e.g. through a different technology design and/or systemic changes in the context.

How do techno-optimists explain innovation-led inequities? People advantaged by the status quo generally operate in a state of denial about the maldistributed costs and benefits of technoscience (Harding, 2006). In rare cases when inequitable outcomes are acknowledged, elite commentators ignore their sources in previous technoscientific research. Thus technology promotion has it both ways – prospectively making optimistic assumptions about the future context, and then retrospectively blaming an adverse context for socio-economic inequities. How to avoid these outcomes, alongside displacement of blame? A prior evaluation should appraise 'the socioeconomic context within which the results of research will be applied', as a basis 'to figure out what future fixes might actually be equity enhancing, and to target science policy in those directions' (Woodhouse and Sarewitz, 2007: 148-49).

Going beyond such anticipation, the socio-economic context should be understood as more than contingent. Technology promotion often includes socio-economic innovations of various kinds (Godin, 2008, 2015 above). In particular, since the 1980s technological innovation has been invoked as an imperative for various neoliberal policy measures – to extend protection of proprietary knowledge (as above), to flexibilise labour markets, to liberalise trade, etc. – as necessary means for society to gain the future benefits (e.g. Jessop, 2005). Hence, whenever socio-economic inequality is attributed to an adverse context, technology promoters disavow and displace their own responsibility.

As the term 'inclusive' is also appropriated by policy agendas, this warrants critical scrutiny of links between innovation and its context. The European Union's 2020 Strategy aims to achieve smart, sustainable and inclusive growth – where 'smart growth' means 'developing

an economy based on knowledge and innovation'. The strategy mentions non-technological innovation, e.g. social, institutional, organisational and behavioural; yet it emphasises capital-intensive innovation, while implying that only this is technological (CEC, 2010a: 3).

Within the EU's 2020 Strategy, the Innovation Union Flagship Initiative declares, 'Genuinely open innovation requires brokerage, intermediaries and networks in which all players can participate on an equal basis' (CEC, 2010b: 18). The strategy seeks to expand and strengthen marketable products, while simply assuming that these will provide environmental, social and economic sustainability, including better health, well-being and quality of life. The strategy associates such benefits with greater GDP, while denying or ignoring the long history of socially harmful innovations (van den Hove et al., 2012; citing CEC, 2010b). In the name of facilitating innovation, moreover, EU policy frameworks have promoted profit incentives for capital-intensive investment or even for novel financial instruments diverting investment from productive activity (Birch and Mykhenko, 2014).

An EU policy agenda, Responsible Research and Innovation (RRI) was meant to stimulate more socially inclusive forms of innovation. As originally formulated, RRI promotes 'an inclusive innovation process whereby technical innovators become responsive to societal needs and societal actors become co-responsible for the innovation process by a constructive input in terms of defining societal desirable products' (von Schomberg, 2013). If realised in practice, then such a process can change relations of power. 'Processes of inclusion inevitably force consideration of questions of power', so RRI should provide means of empowering social agency (Stilgoe et al., 2013: 1572-73).

As the RRI concept becomes widely taken up, however, the term 'responsible' is often reified as a characteristic of innovation, thus displacing the relational aspects. As another blind-spot, the European Commission promotes RRI by focusing on the 'needs and expectations of European society', linked with global market competitiveness (Schroder et al., 2016). These limitations exemplify the tendency to reproduce inequitable contexts across class and geopolitical differences.

3 Inclusive innovation: divergent normative assumptions and models

'Inclusive innovation' combines and re-labels various decade-long literatures under a common term (Chataway et al., 2014). This term encompasses various implicit models for identifying socio-economic inequities, for describing and explaining social exclusion from technoscientific innovation, and for avoiding or remedying these outcomes. For each issue below, the subheading poses a binary question: socio-economic inclusion (fairly distributing goods – or redefining them?); favourable conditions (contextual or constitutive?); and inclusion as empowerment (extra or conflictual?).

3.1 Inclusion: fairly distributing goods or redefining them?

Inequality has been a prominent rationale for redesigning innovation. According to an academic report, inclusive innovation 'is of increasing interest as nations look to use innovations to bring about more inclusive and equitable development' (Foster and Heeks, 2013: 2). Indeed, inequality has become an imperative for inclusive innovation and development, according to several global bodies (OECD, 2012, 2015; UNDP, 2014, 2016; World Bank, 2010). From this problem-diagnosis, they generally propose remedies through technology-driven economic growth for expanding societal goods and more fairly distributing them.

According to a report by the UN Development Programme, *Human Development for Everyone*, this aim needs economic growth to provide better employment:

For human development to reach everyone, growth has to be inclusive, with four mutually

supporting pillars — formulating an employment-led growth strategy, enhancing financial inclusion, investing in human development priorities and undertaking high-impact multidimensional interventions (win-win strategies). An employment-led growth strategy would focus on such measures as removing barriers to employment-centred development... (UNDP, 2016: 11).

Here the pervasive remedy is more equal access to information and technology, especially ‘the digital revolution’, as the basis for new or better employment. The report hardly diagnoses the sources of inequality.

Likewise the OECD (2012), which counsels people to upgrade their skills for better employability, as a means towards more fairly distributing higher-paid jobs. Here social inequity from technological innovation is attributed to a skills deficit, which must be overcome by low-income or under-employed workers, ideally with state assistance. To gain social inclusion they must catch up with the necessary education and skills to operate ‘more efficient’ capital-intensive technology, in order to make the impacts more equitable. This remedy complements a liberal-individualist model of market-led technological development whereby any losers bear the main responsibility. This model either ignores the political-economic context or disavows responsibility for it (cf. Woodhouse and Sarewitz, 2007).

Analogous assumptions arise when academics address ‘social inclusion problems’ by distinguishing between two types, each with a different remedy. Actors either need to overcome ‘justice and power asymmetries’, or else need to gain ‘new knowledge’ as part of the solution-building process; only the latter is amenable to innovation-oriented academic research (Alzugaray et al., 2012: 779). Like the OECD’s model above, this taxonomy artificially separates technology-skills-knowledge issues from political-economic sources of inequities.

Yet those elements become implicitly linked in the authors’ own case studies. In particular, farm labourers are subjected to more intensive working conditions and are dangerously exposed to herbicide hazards; their trade union lacks the strength for effective resistance to protect workers (ibid: 783-84). Indeed, power asymmetries facilitate the hazardous technology choice. For a socially inclusive solution protecting their health, farm labourers need new knowledge about both aspects and their linkages.

Small-scale enterprise, which may be socially more inclusive, faces difficulties of market competition and access. How to diagnose the problem? Analogous to the OECD’s model, one problem-diagnosis attributes exclusion to a skills deficiency, while associating inclusion with individuals’ market access: ‘Poor people’s innovative abilities are constrained by, among other things, a lack of skills, inadequate provision of public services and an inability to access markets and assets on fair terms and to handle associated risk’ (UNDP, 2014: 12).

By contrast, other models attribute social exclusion to the market power of dominant actors. The informal economy can provide a route to more equitable development. ‘Low-tech’ industries can be transformed into ‘tacit knowledge-intensive industries’ gaining a competitive advantage. But they lack protection for intellectual property and thus even a temporary monopoly, thus obtaining less return on their inventiveness (Cozzens and Sutz, 2014: 13). This diagnostic model implies the need for a collective counter-strategy.

In the latter causal model, a dominant market power has greater influence on socio-economic inequity than technology level or skills in the production process. Likewise in plantation agriculture, the innovation system has multiple modes of exclusion (Joseph, 2014: 87), due mainly to organisational features rather than low-tech production methods. By properly designing and strengthening the former features, ‘knowledge intensification for innovation

could strengthen and reach sectors that are labour-intensive and labour-extensive in developing countries' (ibid: 73).

Similar issues arise in a report on Brazil's potential routes towards 'a more fair and equitable society'. In its problem-diagnosis, underdevelopment results from sub-optimal utilisation of existing capabilities. Social inclusion therefore depends on mobilising local capabilities for problem resolutions (Clara et al., 2008: 27). This remedy implies a collective task, by contrast with deficient capabilities as the putative cause.

Alongside production issues, inequitable consumption also attracts diverse normative assumptions. As a prevalent view, inclusive innovation offers a more fair or widespread distribution of benefits. 'Such innovations typically consist of producing cheaper (often simplified) versions of existing often sophisticated products for purchase by lower-income groups'. This is sometimes called 'frugal innovation', meaning that the production methods need relatively less investment or inputs, so the products are more accessible than their conventional counterparts in the global South (OECD, 2012: 16).

As a general definition, the frugal approach to innovation creates greater value (for customers, shareholders and society) from fewer resources (natural resources, capital, time). The process becomes more cost-effective, potentially disrupting conventional methods (Radjou and Prabhu, 2015: 11). 'By developing more inclusive mainstream products, manufacturers can also reach a wider market' (ibid: 195). Although its advocates rarely equate frugal with inclusive innovation, some academics have equated them, so these assumptions warrant scrutiny.

Long before 'inclusive innovation' became a prominent concept, a major report foresaw lower-cost ICTs as overcoming social exclusion, e.g. by 'making ICT continuously available, reducing its cost and global reach, and making social inclusion of poor and disadvantaged groups more feasible' (Juma and Yee-Cheong, 2005). Along similar lines, beneficial impacts are anticipated from ICT-based innovations targeted at lower-income groups (OECD, 2013: 11). As a counter-example, however, the One Laptop per Child project has reproduced the USA's legacy of racism (Fouché, 2011); this study casts doubt on cheaper technology overcoming social inequalities.

Oblivious to power relations, such remedies frame the task as wider access, implicitly for individuals rather than group activities. Those proposals for more socially accessible and therefore equitable consumption patterns assume or imply a liberal-individualist model of commodity purchase. The latter model complements neoclassical economics, equating freedom with a shift from public goods to individual purchases. From a critical perspective:

Although mainstream economics is now beginning to recognise that individuals are capable of altruistic behaviour, it is still largely wedded to the idea of the consumer as an individual... Clearly, the more [that] inclusive innovations reduce the acquisition cost of products, the more likely consumption decisions will be made at the individual or household level (Chataway et al., 2014: 42).

For such a shift, a prominent concept is the bottom-of-the-pyramid (BOP) market, which can be criticised on social and environmental grounds:

Marginalized households and communities are more likely to play the role of consumers than co-creators. Environmental considerations of the increased packaging and consumerism that the BOP marketing concept implies are almost never considered in the literature (Cozzens and Sutz, 2014: 10).

As regards social and environmental aspects, moreover, the production methods for individual products in the global South may involve different power relations. They may be less amenable to North-South solidarity linkages to strengthen workers' or environmental protest in the South. So low-cost products may have weaker prospects to force improvements in labour conditions and environmental protection. Given their competitive market orientation, moreover, such products may have disadvantages for local environments, producers and/or consumers (Chataway et al., 2014).

Despite the potential benefits of low-cost substitutes, 'in some development contexts, people resist being included as consumers of cheap and low-quality innovations' (Papaioannou, 2014b: 195). This is because basic needs (for food, clothes, shelter, etc.) cannot simply be met by cheap 'low tech' or low-cost modified innovations, as many people realise. For example, Tata's Nano motorcar was much less successful than predicted, mainly because of quality and safety shortcomings. It was marketed as 'cheap' car, which 'did not appeal to lower-income consumers in search of good-quality products' (OECD, 2015: 21).

More fundamentally for social inclusion, the liberal-individualist model potentially neglects or undermines public goods and community access to innovations. Those features are crucial for a social-collectivist camp model. Indeed, many low-income communities have generated grassroots innovations which create public goods and overcome socio-economic inequities (ibid).

In sum, socio-economic inclusion models have competing normative assumptions. The OECD's model has a normative imperative for more fairly distributing societal goods to wage-earners and/or consumers. In both respects, these are liberal-individualist models of inclusion into market-led processes. A different model emphasises more equitable participation, emphasising collective agency in co-creating innovation (Papaioannou, 2014b: 197; cf. Heeks et al., 2014), as in grassroots innovation movements (Smith et al., 2014) or innovation in informal economies (Cozzens and Sutz, 2014; see above). These imply a societal transformation (cf. Schlosberg, 2013) towards more fairly *defining* societal goods and bads (Martin, 2013).

3.2 Favourable conditions: contingent or constitutive?

The literature emphasises that inclusive innovation depends on favourable conditions, especially institutional support and policy frameworks to overcome inequality. For example, 'Inclusive innovation policy presupposes a change in institutional culture and mandates the involvement of the poor in identifying their development priorities and in providing incentives for various actors to serve their needs more effectively' (World Bank, 2010: 338).

In advocating *Human Development for Everyone*, the UN Development programme acknowledges that inequalities are often reproduced by the wider context. 'Group inequalities reflect divisions that are socially constructed and sustained because they establish a basis for unequal access to valued outcomes and scarce resources' (UNDP, 2016: 6), especially through information technology: 'The labour market does not require a traditional workplace, and the process has opened opportunities for many, while making work precarious or even vulnerable for many others' (ibid: 40). In the report, however, these exploitative pressures remain an external context to be bypassed through various fixes, e.g. better access to technology.

The literature has diverse assumptions about the role of technoscientific innovation in socio-economic inequities. According to the OECD (2012: 16), for example, income inequalities result from various causes, especially from less-efficient, obsolete technologies. This problem-diagnosis obscures labour exploitation strategies, instead emphasising technological

differences as the main determinant. From this causal model, more equitable benefits would come from 'larger value-added by engaging in more technology and knowledge-intensive activities' (ibid: 15).

In the OECD's subsequent report on inclusive innovation, income inequality is likewise attributed to technological change, which generally 'rewards skilled labour more than unskilled labour' or reduces the need for labour. More fundamentally, the report presumes an ordinal scale from non- to low- to high-technology innovation; it normatively favours 'technology-intensive' types, 'for which participation requires adequate skills' (OECD, 2013: 9, 15). Consequently,

... technological progress will lead to wider inequalities across skill groups unless workers' education keeps up with technological change... Moreover, the inherent uncertainty of the innovative process and the novelty of an innovation result in less formal workplace regulations which further affect income inequality (ibid: 10).

Although those euphemisms allude to class exploitation, the report focuses on individuals' skills; this causal factor thereby explains why more efficient technology may not provide greater socio-economic equality.

Further to the problem of under-employment: According to the World Bank (2005), labour markets in developing countries are overregulated, adversely affecting investment and growth. Conversely, the OECD (1994) has seen the US' greater labour flexibility as generating higher job creation compared with Europe. Skills development has been promoted along with labour-market flexibility, thus reconstituting the wider context (Froy et al. 2011; see also OECD, 2008 conference). This agenda facilitates greater managerial control over labour discipline and exploitation, while also degrading the skills of many jobs. Nevertheless the OECD can embrace a specific model of progress via an employer-employee common interest in skills upgrading, while attributing socio-economic inequity to a skills deficit, i.e. a contingent context.

To avoid such blame-displacement, it is necessary to understand various institutional interventions, to identify 'the conditions under which certain consequences appear' (Cozzens and Sutz, 2014: 25). As a key hypothesis, 'the more innovation is based on collective action, the more it will enhance social inclusion' (ibid: 19), especially because such action can reconstitute the context. By analogy, looking beyond the effect of specific interventions, development analysts rightly ask 'under what conditions' equitable outcomes may be gained (Oldekop et al. 2016).

Those questions have arisen from engagement with policymakers sympathetic to inclusive innovation. They have expressed interest in indicators for the necessary conditions and for evidence of benefits. As one such proposal, an 'Inclusive Innovation Readiness Index' evaluates institutional contexts in terms of facilitators and barriers, e.g. human capital, research, financial credit; these are seen as 'similar to conventional innovation indices' (Heeks et al., 2014: 22). Another version describes such conditions as 'infrastructure', e.g. legal, human, financial, etc. (Heeks et al., 2013: 22).

Although wider conditions have a crucial role, their framing as a contingent external context downplays the institutional responsibility for inequitable conditions. In particular, political agendas conceive technological innovation as an imperative for favourable policy or institutional change, e.g. for greater rights to intellectual property (cf. Godin, 2008), for labour flexibilisation (Jessop, 2005), etc. By default, social capacities and powers are reified as a property of external things such as policies, infrastructures, etc.

As a paradoxical case, US women's and African Americans' advocacy groups pursued greater inclusion in medical studies as a means to generate better health for their constituents.

However, new rules for inclusion in research implicitly assumed that health inequalities arise from race and gender differences, as a basis to emphasise the very differences that were meant to be eliminated. In the name of greater equality, race and gender differences were inadvertently reproduced as sociobiological categories (Epstein, 2007). These differences appeared as common-sense assumptions from and about the wider societal context.

Intrinsic links between socio-economic inclusion and its favourable conditions can be seen in a case study of supply-chain innovation, perhaps illustrating the upper levels of the ‘ladder’ schema (Heeks et al., 2013). In Argentina some farmers applied agroecological methods to grow cotton and sought markets for its final products. The producers’ economic viability depended on organisational innovation in accessing ‘fair trade’ markets, in turn dependent on political support and solidarity across the supply chain. But this access proved more difficult than the agroecological cultivation methods, whose economic viability thereby remained precarious (Arza and Zwanenberg, 2014).

The wider context was already constituted by the agri-industrial system. Like many other grassroots innovations, this agroecology initiative faced a pervasive dilemma: ‘To succeed, such alternatives must cope with various kinds of institutional, market and infrastructural selection pressures that tend to favour incumbent ways of providing goods and services’ (ibid: 69). Such initiatives face a tension between meeting basic needs of low-income community members versus accommodating market competition. Or else they can try to create their own solidarity market by reconstituting the context.

Surveying grassroots innovation movements (GIMs), an analysis identifies three kinds of empowerment: grassroots ingenuity via co-creation, grassroots empowerment via greater participation, and structural transformation via alternative pathways of innovation (Smith et al., 2014). The latter conflicts with the dominant regime, thus potentially transforming its own context and so (re)constituting the innovation. By contrast, the dominant narrative of technoscientific innovation displaces blame for socio-economic inequity to an external contingent context, as if this were causally separate. Thus the literature has divergent normative assumptions as regards whether ‘favourable conditions’ are a contingent context or else constitutive.

3.3 Inclusion as empowerment: extra or conflictual?

The literature recognises diverse forms of social inclusion, some more inclusive and empowering than others. Such ordinal scales have a long history. In the 14th century *Escala de l’enteniment*, or ladder of understanding, human cognition ideally ascends – from stones to plants, animals, humans, angels and finally Deu. These steps depict an ascent from the corporeal to the rational and then spiritual (Llull, 1304). Modern-day distinctions likewise have been depicted as an ordinal scale, implying a normative ascent. As the most famous, the ‘ladder of citizen participation’ moves upwards from manipulation to citizens’ participation (Arnstein, 1969).

Extending that model, a ladder of inclusive innovation shows ‘each succeeding step representing a greater notion of inclusivity in relation to innovation’. Its ordinal scale ascends from intention, to consumption, impact, process, structure, to post-structure. In the latter, participants develop an inclusive, transformative knowledge-frame (Heeks et al., 2014; also 2013, see Figure 1).

Although the ladder was meant simply as a descriptive heuristic, it implies normative distinctions as regards forms of inclusion. Moreover, it implies wider dynamics: Near the bottom of the ladder, more equitable consumption patterns may be compatible with dominant systems and incumbent interests. By contrast, the most inclusive innovation

process depends on structural transformation, towards a normatively more equitable outcome. Left ambiguous, however, is whether this depends on a shift in power relations.

In an OECD report on ‘scaling up inclusive innovation’, scale-up complements and depends on current socio-economic arrangements. For example, waste can be turned from an environmental burden into an economic benefit (OECD, 2015). More generally, education helps to integrate individuals into the formal economy: ‘Inclusive innovations in education can be particularly valuable, as they allow children and adults from socio-economically disadvantaged backgrounds to gain the knowledge and skills necessary to participate fully in the economy’ (OECD, 2015: 5). Although mentioning grassroots innovation as empowerment (citing Heeks et al., 2013), the report remains silent about this aspect, implying that it simply adds power.

By contrast, a creative-equality model seeks to expand social capabilities, potentially transforming inequitable conditions:

The big question is which types of progress towards ... less inequality are self-sustaining in the sense that they in turn foster growth and innovation. When this reinforcement occurs, we may speak of proactive or creative equality, i.e., equality that creates more equality by activating innovation capabilities. This refers to processes that, by diminishing inequality in some particular way, expand the social capabilities for social, technological and institutional innovation (Arocena and Sutz, 2003: 178).

In the above models of social empowerment through greater capabilities, there is silence about societal conflict, as if it would be avoidable or undesirable.

Other models acknowledge potential conflict, given that any innovation process undergoes interactions with the mainstream system. Such relationships have been studied for grassroots innovation movements (GIMs), often in tension with their wider contexts. They face three enduring challenges:

Attending to local specificities whilst simultaneously seeking wide-scale diffusion and influence. Being appropriate to existing situations that one ultimately seeks to transform, and Working with project-based solutions to goals (of social justice) that fundamentally require structural change (Smith et al., 2013: 120).

Given those challenges, GIMs’ interactions have been modelled as two different modes of engagement: either insertion adapting to the mainstream, or else mobilisation resisting the mainstream through a transformative agenda. Without the latter, more inclusive processes may achieve greater participation but still lack the power to reshape innovation agendas in a given field (Fressoli et al., 2014: 12). Gaining such power depends on grassroots innovators acting as counterpublics, claiming to represent the public interest and benefit better than official constructions (Hess, 2011). This alternative agenda’s empowerment potentially undermines the dominant power.

Thus, diverse engagements with the mainstream complicate any ordinal-scale model towards greater inclusion (e.g. Heeks et al., 2013, 2014). Inclusive empowerment can merely add extra power in the margins, or generate power conflicts, or seek to avoid them, or undergo tensions among those roles. Such competing assumptions may inform practitioners’ self-understandings.

4 Conclusion

Surveying literature on inclusive innovation, this paper has identified various assumptions about socio-economic inequity, especially its forms, causes and remedies. In doing so, it has argued that each issue has competing normative assumptions. After summarising them, the concluding paragraphs suggest implications for explanatory models and their practical roles in inclusive innovation.

4.1 Competing normative assumptions and models

The literature survey was structured around three issues, each with a binary question: socio-economic inclusion (fairly distributing goods – or redefining them?); favourable conditions (contingent or constitutive?); and inclusion as empowerment (extra or conflictual?). For each issue, normative assumptions correspond to different theoretical camps of social justice, as summarised here.

Greater inclusion has been associated with socio-economic equity in different ways. A liberal-individualist camp frames equity as a fairer individual distribution of societal benefits versus costs (or societal goods versus bads). From this normative assumption, more high-tech investment, skills training and/or cheaper products will help lower-income people to gain greater access. By contrast, a social-collectivist camp frames equity as a different basis for collectively constituting societal benefits along transformative lines. From this normative assumption, producers and users seek equal social relationships in knowledge-exchange, alongside means to counter or bypass the dominant market power.

Alongside different understandings of socio-economic in/equity, such outcomes have competing causal explanations. A liberal-individualist camp attributes social exclusion and inequity to ‘impacts’ – e.g. of obsolete inefficient technologies, or of a skills deficit for more efficient technology, or of unfavourable conditions, as if the latter were merely contingent. This linear technological-determinist model obscures or naturalises neoliberal agendas which have reconstituted wider contexts, e.g. around skills degradation and labour flexibilisation. Looking beyond an ‘impact’ model, a social-collectivist camp highlights collective capacities and struggles to transform the constitutive conditions which perpetuate socio-economic inequity.

There are likewise different assumptions about how people may be empowered for and through inclusive innovation. Many perspectives advocate greater social capacities for individual or group empowerment through inclusive innovation, while leaving ambiguous the consequences for power relations. Yet such initiatives always engage with mainstream innovation in some way, e.g. through adaptation or resistance. Illustrating the latter mode, grassroots innovation initiatives often seek structural change. From a social-collectivist camp, such transformative agendas more fairly *define* societal goods and bads (Martin, 2013). By contesting the dominant innovation agenda, they generate power conflicts.

4.2 Explanatory models as a reflexive resource

As shown above, different theoretical camps of social justice inform explanatory models of inclusive versus exclusive innovation. Although rarely explicit, they underlie choices and tensions arising in specific practices. They are made explicit in the three binary questions above. In each binary question, the former answer frames the problem more narrowly, thus more compatibly with current political-economic arrangements. By contrast, the latter answer contests them, thus opening up agendas for social-collectivist forms of inclusion.

Why do such models matter for practice? On the one hand, theoretical models warrant caution because they readily play a constraining role (Ostrom, 2008: 215). On the other hand, if concepts are useful, they lead to models that can be tested as hypotheses about how particular innovation processes arise and move forward (Cozzens and Sutz, 2014: 26).

Yet a model is more than a device for testing cause-effect hypotheses. Although ostensibly descriptive and explanatory, any model is inherently normative, thus potentially shaping outcomes. In this sense, explicit models can inform means to clarify the role and aims of

inclusive innovation. Such models should avoid a single heuristic: ‘Seen as part of a pathway, models can be re-conceived as part of processes that constitute spaces of experimentation for different approaches, networks and socio-technical arrangements’ (Fressoli et al., 2014: 13).

Extending those insights about explicit models, this paper has explored a converse relationship – how implicit models likewise bear normative assumptions. When made explicit, these can inform experimentation in the sense that practitioners are ‘testing’ their own normative aims, aspirations and relationships. Like practices, models of them unavoidably have implicit normative assumptions and choices. As shown here, different framings emphasise individual redistributive outcomes or else collective actions challenging the dominant production-consumption system; likewise they favour inclusion into a dominant system or else alternatives contesting it.

Beyond the binary schema above, any practices for inclusive innovation may undergo tensions among different models, e.g. as regards defining societal goods, creating more favourable contexts for socio-economic inclusion and engaging with the dominant market power. These issues involve normative questions: inclusion into what? remedying what sources of socio-economic inequity? towards which aims and futures? By making such models explicit, they can serve as a reflexive resource for strategic debate, opening up practices to more conscious political choices.

Figure 1: Levels of Inclusive Innovation (Heeks et al., 2013)

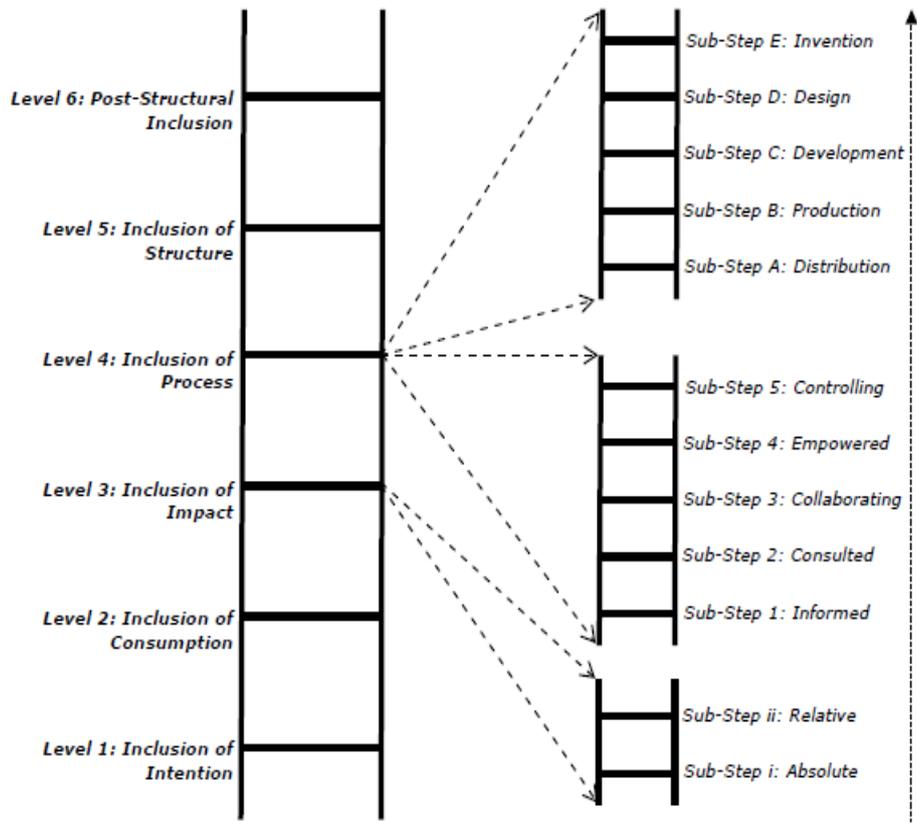


Figure 3: Understanding the Different Levels of Inclusive Innovation

References

- Alzugaray, S., Mederos, L., Sutz, J. (2012) Building bridges: social inclusion problems as research and innovation issues, *Review of Policy Research* 29(6): 776-96.
- Arnstein, S.R. (1969) A ladder of citizen participation, *Journal of the American Institute of Planners* 35(4): 216-224,
<http://www.participatorymethods.org/sites/participatorymethods.org/files/Arnstein%20ladder%201969.pdf>
- Arocena, R. and Senker, J. 2003. Technology, inequality, and underdevelopment: The case of Latin America, *Science, Technology, & Human Values* 28(1): 15-33.
- Arocena, R. and Sutz, J. 2003. Inequality and innovation as seen from the south. *Technology in Society* 25: 171–82.
- Arocena, R. and Sutz, J. 2012. On structural change and democratic knowledge policies, http://www.redesist.ie.ufrj.br/ga2012/textos/Judith/Lecture%2013_FoArocena&Sutz.pdf
- Arocena, R., Goransson, B. and Sutz, J. 2015. Knowledge policies and universities in developing countries: Inclusive development and the ‘developmental university’, *Technology in Society* 41: 10-20.
- Arza, V. and Zwanenberg, Patrick van. 2014. Innovation in informal settings but in which direction? The case of small cotton farming systems in Argentina, *Innovation and Development* 4(2): 55-72.
- Birch, K. and Mykhenko, V. (2014) Lisbonizing versus financializing Europe? The Lisbon Agenda and the (un)making of the European knowledge-based economy, *Environment and Planning C: Government and Policy* 32: 108-128.
- Block, F. and Keller, M., eds. 2011. *The U.S. Government's Role in Technology Development*. London: Routledge.
- Brock, G. 2009. *Global Justice: A Cosmopolitan Account*. Oxford University Press.
- Brynjolfsson, E. and McAfee, A. 2014. *The Second Machine Age*. NY/London: W.W. Norton,
<https://tanguduavinash.files.wordpress.com/2014/02/the-second-machine-age-erik-brynjolfsson2.pdf>
- Bound, K. and Thornton, I (2012) *Our Frugal Future: Lessons from India's Innovation System*. London: Nesta.
- Caney, S. (2005) Cosmopolitan justice, responsibility, and global climate change, *Leiden Journal of International Law* 18: 747–775.
- CEC. 2010a. Europe 2020: A strategy for smart, sustainable and inclusive growth. Communication from the Commission of the European Communities, COM(2010)2020.
- CEC. 2010b. Europe 2020 Flagship Initiative: Innovation Union. Communication from the Commission, COM(2010)546 final.
- Chataway, J., Hanlin, R. and Kaplinsky, R. (2014) Inclusive innovation: an architecture for policy development, *Innovation and Development* 4(1): 33–54.
- Clara, M. Couto Soares, José E. Cassiolato. 2008. *Innovation Systems and Inequality: The Experience of Brazil*. Paper presented in the VI Globelics Conference at Mexico City, 22-24 September 2008.
- Cozzens, S. 2007. Distributive justice in science and technology policy, *Science and Public Policy* 34: 85–94.
- Cozzens, S.E., Bobb, K. and Bortagaray, I. (2002) Evaluating the distributional consequences of science and technology policies and programs, *Research Evaluation* 11(2): 101–107.
- Cozzens, S. & Sutz, J. (2014) Innovation in informal settings: reflections and proposals for a research agenda, *Innovation and Development* 4(1): 5-31.
- Cozzens, S. and Thakur, D. (2014) *Innovation and Inequality: Emerging Technologies in an Unequal World*. London: Elgar.
- Epstein, S. 2007. *Inclusion: The Politics of Difference in Medical Research*. Chicago: University of Chicago Press.
- Eubanks, V. 2007. Popular technology: Exploring inequality in the information economy, *Science and Public Policy* 34: 127–38.
- Fraser, N. (1995) From redistribution to recognition? Dilemmas of justice in a ‘post-socialist’ age, *New Left Review* 212: 68-93.
- Foster, C. & Heeks, R. (2014) Conceptualising inclusive innovation: modifying systems of innovation frameworks to understand diffusion of new technology to lowincome consumers, *European Journal of Development Research* 25(3): 333-355.

- Fouché, R.. 2011. From black inventors to One Laptop Per Child: exporting a racial politics of technology, in Lisa Nakamura and Peter Chow-White, eds, *Race after the Internet*, pp.661–83. New York: Routledge.
- Foster, C. & Heeks, R. (2015) *Policies to Support Inclusive Innovation*. IDPM, SEED, Univ. of Manchester.
- Fraser, N. and Honneth, A. (2003) *Redistribution or Recognition? A Political-Philosophical Exchange*, Verso: London and New York.
- Fressoli, M., Elisa Arond, Dinesh Abrol, Adrian Smith, Adrian Ely & Rafael Dias (2014) When grassroots innovation movements encounter mainstream institutions: implications for models of inclusive innovation, *Innovation and Development* 4(2): 277-292, special issue at http://www.tandfonline.com/loi/riad20?open=4&repitition=0#vol_4
- Froy, F. et al. (2011) *Building Flexibility and Accountability into Local Employment Services: Synthesis of OECD Studies in Belgium, Canada, Denmark and the Netherlands*, OECD Local Economic and Employment Development (LEED) Working Papers, 2011/10, OECD Publishing, <http://dx.doi.org/10.1787/5kg3mkv3tr21-en>
- Godin, B. (2008) *Innovation: History of a Category*, <http://www.csiic.ca/PDF/IntellectualNo1.pdf>
- Godin, B. (2015) *Innovation Contested: The Idea of Innovation Over the Centuries*. London: Routledge.
- Harding, S. (2006) *Science and Social Inequality: Feminist and Postcolonial Issues*. Champagne: University of Illinois Press.
- Heeks, R., Amalia, M., Kintu, R., Shah, N. (2013) *Inclusive Innovation: Definition, Conceptualisation and Future Research Priorities*, Univ. of Manchester: Development Informatics Working Paper Series, [https://www.research.manchester.ac.uk/portal/en/publications/inclusive-innovation-definition-conceptualisation-and-future-research-priorities\(3841f638-2bf1-4ec1-9107-0ff816ffecf\).html](https://www.research.manchester.ac.uk/portal/en/publications/inclusive-innovation-definition-conceptualisation-and-future-research-priorities(3841f638-2bf1-4ec1-9107-0ff816ffecf).html)
- Heeks, R., Foster, C. and Nugrohoa, Y. (2014) New models of inclusive innovation for development, *Innovation and Development* 4(2): 175-185.
- Hess, D. 2011. To tell the truth: on scientific counterpublics, *Public Understanding of Science* 20(5): 627-641.
- Hess, D. (2007) *Alternative Pathways in Science and Industry*. Cambridge, MA: MIT Press.
- Hess, D. (2013) Industrial fields and countervailing power: the transformation of distributed solar energy in the United States, *Global Environmental Change* 23(5): 847-855.
- Hess, D. 2015. Public as threats? Integrating Science and Technology Studies (STS) and Social Movement Studies (SMS), *Science as Culture* 24(1): 69-82.
- Hess, D. et al. 2016. Structural inequality and the politics of science and technology, Chapter 11 in Ray Fouché, Clark Miller, Lauren Smith-Doerr, and Ulrike Felt, eds, *Handbook of Science and Technology Studies*, Fourth Edition. Cambridge, MA: MIT Press (Chapter 11 authors: David J. Hess, Sulfikar Amir, Scott Frickel, Daniel Lee Kleinman, Kelly Moore, and Logan D. A. Williams), <https://mitpress.mit.edu/books/handbook-science-and-technology-studies-0>
- Hughes, B. 2016. *The Bleeding Edge: Why Technology Turns Toxic in an Unequal World*, <http://thebleedingedge.dustormagic.net/>
- Joseph, K.J. 2014. Exploring exclusion in innovation systems: case of plantation agriculture in India, *Innovation and Development* 4(2): 73-90.
- Jessop, B., 2005. Cultural political economy, the knowledge-based economy, and the state, in A. Barry and D. Slater, eds, *The Technological Economy*, pp.144–166. London: Routledge.
- Juma, C. and Yee-Cheong, L. Coordinators (2005) *Innovation: Applying Knowledge in Development*. UN Millennium Project Task Force on Science, Technology and Development. <http://www.unmillenniumproject.org/documents/Science-complete.pdf>
- Kaplinsky, R. (2011) Schumacher meets Schumpeter: Appropriate technology below the radar, *Research Policy* 40(2): 193-203.
- Kaplinsky, R; Chataway, J; Hanlin, R; Clark, N; Kale, D; Muraguri, L; Papaioannou, T; Robbins, P and Wamae, W. (2009) Below the radar: What does innovation in emerging economies have to offer other low-income economies?, *International Journal of Technology Management and Sustainable Development* 8 (3): 177–197.
- Layne, L., Vostral, S. and Boyer, K., eds. 2010. *Feminist Technology*. Champaign, IL: University of Illinois Press.
- Leach, M. and Scoones, I. (2006) *The Slow Race: Making Technology Work for the Poor*, London, Demos, <http://www.demos.co.uk/files/The%20Slow%20Race.pdf>

- Leach, M., and Scoones, I. 2007. *Mobilising Citizens: Social Movements and the Politics of Knowledge*. IDS Working Paper No. 276. Brighton, <https://www.ids.ac.uk/files/Wp276.pdf>
- Llull, R. (1304) *Escala de l'enteniment*, <https://www.flickr.com/photos/43527863@N03/7341082272>, <http://idd0098d.eresmas.net/ASCYDESC.HTM>
- Martin, A. (2013) Global environmental in/justice, in practice: introduction, *Geographical Journal* 179(2): 98–104.
- Mujinja, P., Mackintosh, M., Justin-Temu, M. and Wuyts, M. (2014) 'Local production of pharmaceuticals in Africa and access to essential medicines: 'urban bias' in access to imported medicines in Tanzania and its policy implications', *Globalization and Health*, 10(12): 1–12.
- OECD (1994) *Jobs Study: Evidence and Explanations*. Paris: Organisation for Economic Cooperation and Development (OECD).
- OECD (2008) Conference on labour market policy, Venice, Italy, 17-19 April 2008.
- OECD (2012) *Innovation for Development*, <http://www.oecd.org/innovation/innno/50586251.pdf>
- OECD (2013) *Innovation and Inclusive Development*, discussion report from 2012 conference.
- OECD (2015) *Innovation Policies for Inclusive Development: Scaling Up Inclusive Innovations*.
- Oldekop, J. et al. 2016. 100 key research questions for the post-2015 development agenda, *Development Policy Review* 34(1): 55-82.
- Ostrom, E. 2008. *Governing the Commons: The Evolution of Institutions of Collective Action*. Cambridge: Cambridge University Press.
- Paunov, C. (2013) *Innovation and Inclusive Development: A Discussion of the Main Policy Issues*, OECD Science, Technology and Industry Working Papers, 2013/01, OECD, <http://dx.doi.org/10.1787/5k4dd1rvsnjj-en>
- Papaiouannou, T. (2011) Technological innovation, global justice and politics of development, *Progress in Development Studies* 11(4): 321-338.
- Papaiouannou, T. (2014a) Innovation and development in search of a political theory of justice, *International Journal of Technology and Globalisation* 7(3): 179-202.
- Papaiouannou, T. (2014b) How inclusive can innovation and development be in the twenty-first century?, *Innovation and Development* 4(1): 187-202.
- Prahalad, C.K. (2005) *The Fortune at the Bottom of the Pyramid*. New Delhi: Pearson Education/Wharton School Publ.
- Radjou, N. and Prabhu, J. (2015) *Frugal Innovation: How to Do Better with Less*. London: The Economist/Hachette India.
- Rodgers, G. 2007. *Labour Market Flexibility and Decent Work*, NY: UN Department of Economic & Social Affairs (DESA) Working Paper No. 47, http://www.un.org/esa/desa/papers/2007/wp47_2007.pdf
- Schlosberg, D. (2004) Reconceiving environmental justice: global movements and political theories, *Environmental Politics* 13(3): 517-540.
- Schlosberg, D. (2013) Theorising environmental justice: the expanding sphere of a discourse, *Environmental Politics* 22(1): 37–55.
- Schroeder D. and Pogge, T. (2009) Justice and the convention on biological diversity, *Ethics & International Affairs* 23: 265–278.
- Schroeder, D., Dalton-Brown, S., Schrempf, B. & Kaplan, D. 2016. Responsible, inclusive innovation and the nano-divide, *Nanoethics* 10: 177, <https://link.springer.com/article/10.1007/s11569-016-0265-2>
- Smith, A. Fressoli, M and Thomas, H. (2014) Grassroots innovation movements: challenges and contributions, *Journal of Cleaner Production* 63: 114-124.
- Srinivas, S. and Sutz, J. 2008. Developing countries and innovation: searching for a new analytical approach, *Technology in Society* 30: 129-140.
- Stilgoe, J., Owen, R., Macnaghten, P. (2013) Developing a framework for responsible innovation, *Research Policy* 42(9): 1568-1580, <http://dx.doi.org/10.1016/j.respol.2013.05.008>
- STEPS Centre. 2010. *Innovation, Sustainability, Development: A New Manifesto*. Brighton: The STEPS Centre (Social, Technological and Environmental Pathways to Sustainability).
- UNCTAD. 2014. *Innovation Policy Tools for Inclusive Development*. United Nations Conference on Trade and Development.
- UNDP (2015) *Innovation for 2030*, NY: United Nations Development Programme, [http://www.undp.org/content/dam/undp/library/innovation/IF%202015%20Report%20For%20Web%20final\(1\).pdf](http://www.undp.org/content/dam/undp/library/innovation/IF%202015%20Report%20For%20Web%20final(1).pdf)

- UNDP (2016) *Human Development Report 2016: Human Development for Everyone*, NY: United Nations Development Programme,
http://hdr.undp.org/sites/default/files/2016_human_development_report.pdf
- van den Hove, S., McGlade J., Mottet P., Depledge, M.H. 2012. The Innovation Union: A perfect means to confused ends?, *Environmental Science & Policy* 16: 73-80.
- Von Schomberg, R. (2013) A vision of responsible innovation, in R. Owen, M. Heintz and J Bessant (eds), *Responsible Innovation*, pp. 51–74. London: John Wiley,
<https://renevonschomberg.wordpress.com/implementing-responsible-research-and-innovation>
- Woodhouse, E. and Sarewitz, D. 2007. Science policies for reducing societal inequities, *Science and Public Policy* 34(3): 139–150,
http://ww3.comsats.edu.pk/hnsd/Files/DANIELSAREWITZ_SciencePoliciesForReducingInequality.pdf
- World Bank. 2005. *World Development Report: A Better Investment Climate for Everyone*. Washington, D.C.
- World Bank. 2010. *Innovation Policies: A Guideline for Developing Countries*. Washington, D.C.
- Young, I.M. 1990. *Justice and the Politics of Difference*. Princeton Univ. Press.
- Young, I.M. 2000. *Inclusion and Democracy*. Oxford: Oxford University Press

Biographical notes

Les Levidow is a Senior Research Fellow at the Open University, UK, where he has been studying technoscientific development issues since the late 1980s. A long-running case study was the agbiotech controversy, focusing on the European Union, USA and their trade conflicts. This research was summarised in three special issues of journals, as well as two co-authored books: *Governing the Transatlantic Conflict over Agricultural Biotechnology: Contending Coalitions, Trade Liberalisation and Standard Setting* (Routledge, 2006); and *GM Food on Trial: Testing European Democracy* (Routledge, 2010). Later his research topics expanded to controversy over biofuels, bioenergy and waste incineration, e.g. as regards the waste hierarchy. Another study analysed Life Sciences and agroecology as divergent trajectories for a European bioeconomy. These themes have been case studies in broader issues around sustainable development, R&D priorities, governance, European integration, regulatory expertise and the precautionary principle. He is also Editor of the journal *Science as Culture*.

Theo Papaioannou is Professor of Politics, Innovation and Development at the Open University, UK and Deputy Director of the Strategic Research Area in International Development and Inclusive Innovation (SRA-IDII) there. His research is in the areas of public policy and political theory with a specific focus on innovation and development. Recent publications include: ‘Sen and Marx on incentives and justice: implications for innovation and development’, *Progress in Development Studies* (2016); ‘To lobby or to partner? Investigating the shifting political strategies of Biopharmaceutical Industry Associations in innovation systems of South Africa and India’, *World Development* (2016); ‘National Innovation Systems and the intermediary role of industry associations in building institutional capacities for innovation in developing countries: a critical review of literature’, *Research Policy* (2015) ‘How inclusive can innovation for development be in the 21st century?’, *Journal of Innovation and Development* (2014); ‘Innovation and development in search of a political theory of justice’, *International Journal of Technology and Globalisation* (2014).