

A Tale of Two Perspectives on Innovation and Global Equity

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Abstract

Both science and technology studies (STS) and innovation studies (IS) see great promise for technology to address global inequality, but they view it quite differently. This article compares the two approaches and examines whether and how they might learn from one another to achieve social equity and justice. To do this, I focus on the case of menstrual health innovation in India, an intervention highly praised as a clear example of potentially transformative “inclusive innovation.” The article argues that IS would benefit from understanding innovation as a sociotechnical system and taking the political dimensions seriously. Meanwhile, we STS scholars should learn to translate our grassroots-based, locally-sensitive solutions to policymakers oriented towards scalability.

Keywords

India; innovation; equity; menstruation; gender

Introduction

Not all is well in the world of innovation policy. For decades, governments have treated innovation as key to national success and global economic growth, which has shaped research and development policies, patent systems, and regulatory frameworks. But policymakers increasingly recognize that while innovation-based economies may have improved the fortunes of the highly skilled workforce and some in their surrounding communities, the benefits invariably do not go further. They worry that low-income and marginalized communities rarely participate as innovators, producers, or consumers. Likely as a result, there is growing social and economic inequality both within and between countries. In response, innovation studies (IS) experts, as well as business leaders and tech entrepreneurs, have proposed “inclusive innovation” as a solution. It is an umbrella and evolving concept, but it encompasses ideas, policies, and programs designed to diversify both innovators and innovation itself, from encouraging STEM training among underrepresented groups to fostering low-tech solutions to public problems ([Irani 2019](#); [Smith et al. 2016](#)).

This anxiety about innovation and inequality, and the growing attention to inclusive innovation and entrepreneurship, provides an opportunity for scholars of science and technology studies (STS) to consider

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the interventions we might propose to address global inequity and injustice in innovation. Many of us are critical of innovation hype and might prefer greater attention to infrastructure, maintenance, or non-technical solutions, but the excitement and resulting investment in innovation seem exceedingly difficult to displace. So what might an STS-informed approach to equity in innovation look like? And, considering Alan Irwin's provocation in the introduction to this edited volume ([2023](#)), how might STS and IS relate to, and even learn from, one another?

As a step towards answering these questions, in this brief article I examine how the two fields analyze one case, menstrual health technology—specifically, low-cost disposable sanitary pads—in India. I start with the inclusive innovation approach proposed by IS, and then explore how STS scholars might frame the menstruation problem and propose solutions. I use the comparison to identify the differences between IS and STS approaches and consider synergistic possibilities.

The Promise of Inclusive Innovation

Inclusive innovation is an amalgamation of a few ideas. In some ways, its origins can be traced to Mohandas K. Gandhi, who rejected the drive towards economic growth that he saw in the Western world, arguing that it was causing profound inequity. He suggested that the best way to address rural poverty was through the creation of “village industries” that would promote local skills development, jobs, and ultimately social and economic welfare ([Gandhi 1960](#)). However, the inclusive innovation initiatives that have developed over the last quarter century focus on the expansion of the global marketplace to include traditionally marginalized communities. New products and services are central to stimulating this additional economic activity, they argue, and they focus on supporting this development to produce market inclusion.

Some inclusive innovation programs draw from Silicon Valley's risk-taking ethos—moving fast and breaking things—and focus on high-tech to serve social needs. For example, the World Bank's Development Marketplace (DM), established in 1998, challenged the authority of traditional development experts by soliciting ideas from NGOs and others around the world, in the hope that they will bring new ideas that might be more effective ([Kuraishi 2010](#)).

These programs tend to privilege ideas that can be easily commercialized. USAID's Development Innovation Ventures (DIV), which “funds breakthrough solutions to the world's most intractable development challenges,” considers scalability through the market or public sector among its core principles ([DIV 2022](#)). VillGro, a social enterprise incubator based in south India, is more explicit:

Core to our work is the belief that market based models are a powerful way to solve social problems and create impact at scale. By capacitating these models with the right resources and knowledge, they are a sustainable way of creating lasting social impact. ([VillGro 2022](#))

One subset of these initiatives leverages new high-tech solutions that claim to disrupt traditional approaches to solving problems. Another reimagines existing products for lower-income or otherwise marginalized populations. This latter idea stems from the concept of the “fortune at the bottom of the

pyramid” developed by C. K. Prahalad and his colleagues at University of Michigan in the early 2000s ([Pralhad and Hart 2002](#); [Pralhad 2005](#)). To them, low-income and marginalized people, particularly in Southern countries, are an untapped market for multinational companies who are accustomed to focusing on the needs of a smaller group of comparatively wealthy customers. If these companies developed products for low-income communities, they argue, they would be able to not only increase their revenues but also produce goods that would lift millions of people out of poverty. By purchasing cheap, individually packaged shampoo sachets, for example, people with limited incomes might be able to afford, and better maintain their hygiene. Ultimately, this would help them maintain better-paying jobs and increase their purchasing power.

Finally, while most of these initiatives focus on innovation for the poor, a handful seek to increase innovation by the poor. Many try to diversify science and engineering education and entrepreneurship programs, but a handful try to expand the definition of innovation itself, to include low-tech interventions created by those with modest resources. This idea originated in India with Anil Gupta, from the Indian Institute of Management in Ahmedabad, Gujarat. Over the last two decades, he has created multiple NGOs designed to recognize what he calls “frugal” or “grassroots” innovation ([Gupta et al. 2003](#); [Parthasarathy 2017](#)). Just because people have limited financial resources or formal education, Gupta suggests, does not mean they lack the expertise to tinker and develop technologies to improve their lives. Such interventions might be frugal, but they can have the same—or more—transformative potential as technically sophisticated interventions.

Inclusive innovation programs have invested in a variety of technologies, from low-cost water filtration systems to using blockchain to improve digital connectivity in schools. One of the most lauded success stories is menstrual health innovation, specifically low-cost, disposable sanitary pads. For generations, girls and women in low-income (including rural) areas have relied primarily on new or recycled cloth pieces to absorb menstrual blood. But over the last two decades, public health experts, development organizations, and national governments in low and middle income countries have argued that this practice is exacerbating global poverty and constraining development. They worry that girls are missing—and sometimes even dropping out of—school in large numbers because they lack proper means of managing their menstruation. Cloth pads are not conducive to sitting all day, they suggest, and many schools lack proper toilet and handwashing facilities to change them. In addition, they assert that cloth pads increase the risk of reproductive tract infections and other diseases. The solution, they argue, is disposable sanitary pads that can serve development goals of gender equity, education, sanitation, and hygiene ([Parthasarathy 2022](#)).

But sanitary pads in low and middle income countries are expensive, and the companies that sell them are reticent to lower their prices or make them at lower cost. And, rural girls and women are reluctant to purchase them (they are usually sold in market stalls staffed by men). Enter Arunachalam Muruganantham. Although he had less than a high-school education, the story goes, he had always been a tinkerer. After he became aware of the costs of disposable pads, and how his wife managed her menstruation, he spent years developing low-cost, disposable sanitary pads and a machine to manufacture them. In the early 2000s, he

received financial support and guidance from VillGro and one of the NGOs established by Anil Gupta, the National Innovation Foundation (NIF). They helped him patent his inventions, establish his company Jayaashree Industries, and develop a sustainable business model.

Muruganantham's technologies have become iconic examples of "inclusive innovation." The disposable sanitary pads and machine to make them addressed crucial development goals, particularly at a time of growing attention to gender equity ([Moeller 2018](#)). The pads showed how old technologies could be re-engineered for new markets at the bottom of the pyramid. Muruganantham himself demonstrated how even those with limited economic resources could produce important interventions. And, they didn't just create a new innovator and consumers, but a new labor force as well. UNICEF, and later the Indian government, bought Muruganantham's machines and other needed materials, and gave them to small "self-help groups" (each made up of 10–15 women) across the country so they could create small businesses making and selling the pads. They then purchased some of the pads, for donation to adolescent girls living below the poverty line. But the women were also free to sell their pads to other consumers as well, increasing their own revenues.

Everyone seemed to win. Girls could better manage their menstruation, which would allow them to stay in school and eventually get better jobs. Women producing the pads could become economically self-sufficient and ultimately empower themselves socially and politically. And public, private, and non-profit institutions promoting inclusive innovation could demonstrate how markets—with a little help—served the public good. A 2015 report from the Organization for Economic Cooperation and Development, for example, described how funding from India's National Innovation Foundation helped Muruganantham, "an uneducated worker ... apply for intellectual property rights and provided the means for the innovation to reach scale," ultimately facilitating widespread availability of a technology that "improves women's health and provides them with economic activity" ([OECD 2015](#)).

Muruganantham soon inspired inclusive innovation on a broad scale. In 2014, he shared the stage with Bill Gates and US National Institutes of Health Director Francis Collins on a panel focused on "Creating Cultures of Innovation" at a Gates Foundation Grand Challenges meeting. In 2016, a profile in *The New York Times* established his global importance by referring to him as a "popular" innovator who could cater to previously ignored constituencies. That year, he also won the Padma Shri, India's fourth-highest civilian honor. By 2020 his story had been featured in multiple films, including Bollywood's *PadMan* and the Oscar-winning documentary short *Period. End of Sentence* ([Balki 2018](#); [Zehtabchi 2018](#)). And he has inspired the development of an innovation ecosystem for disposable sanitary pads in India, with entrepreneurs developing a variety of interventions including biodegradable pads, special incinerators, "smart" disposal and recycling systems, and automated production of low-cost pads.

An STS Approach to Menstrual Health Innovation

STS scholars also have a long record of concern related to equity in innovation ([Jasanoff 2004](#); [Winner 1986](#)). However, whereas IS experts tend to have management and economics backgrounds and view innovation

and equity through the lens of the marketplace, their STS counterparts are humanists and social scientists who look inside the “black box” of technologies to understand how social norms and biases shape even the most technical details, and how innovation can stabilize particular moral and political orderings. We also challenge the perceived boundary between technology and society, demonstrating how “users” profoundly shape the design and implementation of technologies, and how “laypersons” often produce crucial innovation ([Birchneil 2011](#); [Oudshoorn and Pinch 2003](#); [Rajan 2021](#)). We thus call attention to how characterizations of producer, consumer, innovator, layperson, and expert are politically laden. And while IS scholars, focused on economic growth, treat technology as overwhelmingly beneficial, their STS counterparts are taught to take a neutral—and often, more critical—position. They understand technologies as part of complex social and political systems, which helps them anticipate how they might transform societies in both negative and positive ways ([Schot and Rip 1997](#); [Stilgoe et al., 2013](#); [Okerlund et al., 2022](#)). However, this perspective makes it more difficult for us to participate in technology policy processes because we do not share the same enthusiasm for technical solutions or credulity of instant results. However, some participate in community-driven innovation according to social justice principles ([Costanza-Chock 2020](#)). Others have observed that our innovation policies and systems can be transformed to consider equity in priority-setting and decisionmaking, better incorporate public insights, and incorporate greater expert diversity ([Parthasarathy 2023](#)).

With this orientation, we might expect that STS scholars would be excited about a technology developed by a lay innovator who is focused on the needs of marginalized girls and women. After all, it seems to challenge conventional definitions of “innovation” and demonstrate how taking lay knowledge seriously can have enormous public benefits. But, they would maintain their skepticism. First, STS scholars might question how Muruganantham and the institutions supporting inclusive innovation know the “problem” of menstruation in India. They would argue that community knowledge should be central. Did researchers organize open-ended conversations with girls and women to understand their priorities, concerns, and hopes? If so, was menstruation a high priority? To what extent were community priorities similar across local contexts? If the need for menstrual health innovation was based on quantitative data, what did it consider and how comprehensive was it? Answers to these questions would likely reveal how the drive towards technological innovation itself shapes our understanding of menstruation as a problem.

If menstruation surfaces as a major concern, an STS scholar might then investigate how girls and women have managed it for generations. What are the cultural practices related to menstruation? What kinds of technologies are used to manage menstrual blood? How are these material objects tied to particular social practices and constraints—i.e., if the system seems to limit gender equity, have girls and women found ways to make sense of or overcome them? This approach takes social context seriously and problematizes conventional understandings of innovation as focused on synthetic, scalable technologies. Understanding the malleability of technology, it imagines how innovation can be molded to fit local context rather than the other way around. And, by viewing the menstrual health technology as part of a sociotechnical system, STS scholars would likely question whether a new technology—even if accompanied by an extensive

“educational” strategy—could ever work because it may require a wholesale transformation of social norms and cultural practices.

While IS scholars tend to see the generation and diffusion of innovation as the primary goal, STS scholars are more ambivalent. To them, equity is not simply about access but about ensuring that technologies—in their very design—promote the public interest and social justice goals. Thus, they might consider the consequences of inclusive innovation’s market orientation ([Elyachar 2012](#)). How does the attention to novelty ([Silbey 2014](#)) shape Muruganatham’s supposed genius? What does the focus on access and scalability obscure? Without quality standards, for example, any health and education problems associated with poor menstrual hygiene will persist and women might reject the technology. This could also amplify community distrust towards elites and government officials, which could have far-reaching consequences. STS scholars would also consider the life cycle of the technology. Cloth absorbents are organic and recyclable. How are sanitary pads disposed, particularly in a country with limited sanitation infrastructure? While the Indian government promised to install incinerators in schools to manage this waste, STS might examine whether this solution works in practice including investigating the new kinds of air pollution that might emerge.

Taking lay knowledge seriously and approaching innovation in terms of sociotechnical systems requires time and resources, and may not lead to any technological intervention at all. In addition, the STS scholar’s primary focus on social and political empowerment may come at the expense of scale. With an approach prioritizing community expertise and values, STS scholars are less likely to converge on a standardized solution that can be diffused across contexts. This, of course, makes it less likely that the interventions identified by STS scholars will interest organizations focused on large-scale, rapid, and market-based change, or companies seeking to “do well by doing good” by selling high volumes of products that have low profit margins.

Given the landscape of international development, STS scholars have rarely had the opportunity to do this kind of open-ended, bottom-up, examination and use the findings to inform either policy or the development of innovation itself. But the research available suggests that it would be enormously insightful. An ethnographic analysis of the installation of solar micro-grids in rural northern India, for example, demonstrates significant variation in how developers and users understand both problem and solution ([Sharma 2020](#)). While the Indian government, national NGOs, and even local elites believed the solar technologies would provide crucial, clean energy resources while reducing environmental pollution, lower-income residents with the most urgent energy needs were the most opposed. Oriented by their previous experience with development interventions, they saw an unreliable stopgap measure that could not meet their growing demand.

Table 1. Comparing Approaches to Technological Innovation and Global Equity

Topic	Innovation Studies	Science and Technology Studies
Orientation	View from the market	View from the ground
Methodological approach	Quantitative metrics, economic methods, illustrative case studies	Qualitative, interpretive case studies
Understanding of Innovation	Overwhelmingly beneficial (or, at least, neutral); created by technical experts	Reflecting, and often reinforcing, social norms, values, and biases in design, development, implementation
Ideal interventions	Scalable and commodifiable material technologies	Community-driven and sensitive to context
Technology-Society Relationship	Technology “diffuses” through society, often through exhaustive marketing	Technology is both shaped by and shapes society; technologies become dominant through networks and “sociotechnical” systems
Understanding of equity	Power and dignity through access to technology; efficiency	In addition to access, considering community knowledge and expertise in decisionmaking, ensuring technological design promotes social justice
Social Goal	Macroeconomic growth; social and political empowerment through economic participation	Societal and political empowerment of marginalized communities
Understanding of Expertise	Technical, economic, and industrial knowledge	Community and multidisciplinary knowledge
Influence on policymaking	Significant	Minimal

Conclusion

While both are increasingly concerned with innovation and inequality, IS and STS approach the issue with rather different perspectives and solutions (as summarized in [table 1](#)). IS views it through the lens of the global marketplace and assumes that policies and programs that foster economic inclusion through access to technology will produce community empowerment. STS scholars understand innovation much more critically, usually noting that it reflects the values and blindspots of developers as well as deep-seated social structures and cannot easily create the social and political landscapes that IS scholars and policymakers imagine. The case of menstrual health innovation helps identify the differences between the two approaches. While mutual learning requires far more discussion, at this stage we might draw a few conclusions. If we want to ensure that innovation alleviates inequality in Southern countries, then IS scholars must think critically not just about increasing innovation and innovative capacity among low-income and marginalized communities but also about which innovations communities want and what their social impacts might be.

Meanwhile, STS scholars must consider what contributions we might make at the global level; while we might be deeply skeptical of attempts to standardize and circulate technologies for the public good, we limit our influence by focusing on local contingencies when innovators, policymakers, and even IS scholars have global ambitions. In addition to providing scalable best practices for fostering community-driven, socially responsible innovation, we must try to influence innovation policymaking. This will require us to not only demonstrate how the economic growth mindset drives societies to invest—often unknowingly—in technologies that have negative social, political, environmental impacts, but also to explain the costs of narrow definitions of innovation, innovators, and expertise. We might also offer constructive frameworks for assessing investments in innovation policy. Moving beyond critique in these ways will be uncomfortable, but policymakers' growing attention to social equity and justice provides a unique opportunity for us.

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Data Availability

Data published in this issue can be accessed in STS Infrastructures at: <https://n2t.net/ark:/81416/p4ds3n>.

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