How sanitary pads came to save the world: Knowing inclusive innovation through science and the marketplace

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Abstract
International development institutions, governments, and social entrepreneurs have become increasingly enthusiastic about ‘inclusive innovation’ which, to solve problems in low- and middle-income countries, focuses on the development of technologies for and by the poor. Inclusive innovation differs from previous development efforts by focusing on devices instead of infrastructure, claiming to be based on scientific evidence, and relying on market logics to achieve humanitarian ends. Proponents argue that, informed by grassroots efforts, these interventions have enormous potential to catalyze economic, social, and political change. How are the market and technological imperatives of inclusive innovation shaping the international development agenda? What do inclusion and innovation mean in this context? What can inclusive innovation tell us about the proliferation of initiatives that promote technology for public good, from responsible innovation to public interest technology? This article examines these questions through a case study of menstrual hygiene management (MHM) innovation in India. Rather than providing solutions to self-evident development problems, inclusive innovation shapes both development problems and solutions simultaneously, in areas where scientific and market ways of knowing converge. These ways of knowing claim to be legitimate because they are rooted in local knowledge and expertise. MHM in India became a problem, and low-cost disposable sanitary pads an inclusive innovative solution, because of the involvement of Indian researchers and innovators, and Indian girls and women as consumers and producers. However, in the process they reinforced narrow understandings of both inclusion and innovation in international development. Inclusion efforts may be wrapped up in political economies that shape and limit their transformational power by prioritizing scientific, technical, and market expertise.

Keywords
gender, India, inclusive innovation, menstruation, international development

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The world of international development is shifting. For decades, international organizations and Western governments invested in technically complex infrastructure projects to improve conditions in low- and middle-income countries. This undoubtedly produced benefits, but critics argued that these projects were simply extensions of cultural imperialism rendered seemingly apolitical through technology (Escobar, 1995; Ferguson, 1990). In addition, public health and environmental challenges persist and global economic inequality is increasing (OECD, 2013). A new generation of social enterprise incubators, venture funds, philanthropies, and NGOs, alongside traditional development institutions, have responded to these concerns with what many call ‘inclusive innovation’, an umbrella term that generally refers to technology for or by low-income and marginalized communities (George et al., 2012; Heeks et al., 2014).

Rather than attempting societal or environmental transformation through large-scale electrical grids, roads, or dams, inclusive innovation focuses on novel devices designed to benefit individuals quickly and directly often with humanitarian aims (Collier et al., 2017; Irani, 2019). Organizations invest in these devices on the basis of their projected utility and then aim to circulate them through markets. In the short term, the logic goes, marginalized communities have access to crucial items and jobs making them, and innovators gain revenues through economies of scale (Prahalad, 2005). In the long term, new markets will help low-income consumers participate in the larger economy and ultimately lift themselves out of poverty (Cross, 2013; Elyachar, 2012). Investors also suggest that inclusive innovation fosters technological solutions at their most efficient and effective. The US Agency for International Development’s inclusive innovation effort, Development Innovation Ventures (DIV), describes its mission as funding ‘breakthrough solutions to the world’s most intractable development challenges’ (USAID, 2021). ‘By funding innovation and focusing on rigorous evidence’, it states, ‘DIV impacts millions of lives at a fraction of the usual cost.’ Similarly, UNICEF’s Office of Innovation (2021) notes: ‘From climate change to gender equality to mental health, our goal is to move the needle at the intersection of issue and innovation … for meaningful, sustainable impact’.

Inclusive innovation’s proponents, including some science and technology studies (STS) scholars, also often characterize it as a democratic approach to the problems of development (Fressoli et al., 2014; Smith et al., 2016). It is decentralized, with participants from the public, private, and nonprofit sectors across low, middle, and high income countries. It often includes the contributions of indigenous ‘grassroots’ innovators who may have little formal technical training but who develop solutions based on their deep expertise about the local context (Dutfield, 2006; Gupta, 2012). Investors also seem to pay particular attention to local needs as they decide which ‘little development devices’ to support (Redfield, 2016). It thus joins a suite of initiatives promoted by governments, scholars, and the private sector around the world designed to prioritize public needs in technology development, including responsible research and innovation, public interest technology, and public participation in technological decision-making (Ely et al., 2014; McGuinness & Schank, 2021; Stilgoe et al., 2013).

This article examines the political economy of this turn toward inclusive innovation for international development. What counts as inclusive innovation? What do inclusion and innovation mean in this context? What kinds of knowledge does this approach
privilege? How is inclusive innovation shaping the international development agenda, and what are the implications for low-income and marginalized communities around the world?

Focusing on the case of menstrual hygiene management, specifically low-cost disposable sanitary pads in India, I argue that inclusive innovations are not simply responses to the self-evident problems of international development. Rather, inclusive innovation and the development problems they solve tend to be co-produced (Jasanoff, 2004), in areas where scientific and market ways of knowing converge. Put differently, this epistemic convergence shapes the definition of development problems and evaluation of the solutions. And, it constrains understandings of both inclusion and innovation in international development.

The case of MHM innovation

Today, menstrual hygiene management (MHM) is treated as a serious problem affecting girls and women across low- and middle-income countries, including India (Bobel, 2018; Bobel et al., 2020). There is worldwide concern that cultural myths and taboos, coupled with inadequate tools to manage menstrual blood, are affecting health and education in the short term, and gender equity and empowerment in the long term. Governments, civil society organizations, donor agencies, private companies, and academic researchers have invested heavily in addressing the issue. And it has stimulated great media interest, from news stories by the BBC, France 24, The New York Times, and The Hindu to a blockbuster Bollywood movie and an Oscar-winning documentary short.

But 20 years ago, the MHM problem didn’t exist. It was not mentioned at the 1995 World Conference on Women convened by the United Nations (UN) in Beijing, or in the UN’s Millennium Development Goals in 2000. How and why did it become a problem? Some researchers have suggested that the recent attention to MHM is the result of scientific evidence and successful political framing in terms of global priorities including gender equity, quality education, and access to sanitation (Sommer et al., 2015). But this assumes that MHM is an obvious problem that simply became more visible due to effective advocacy.

I argue instead that the type of scientific knowledge generated, combined with the epistemology of inclusive innovation, produced the MHM problem. STS scholars have repeatedly demonstrated how the knowledge used to inform policymaking shapes both what counts as a problem and how it is solved (Jasanoff, 2005; O’Connor, 2001; Parthasarathy, 2017a). As international development institutions relied more on economic expertise, for example, the problems of low- and middle-income countries (LMICs) were characterized as the fault of an overly active state and a constrained private sector (Babb, 2001; Goldman, 2005). The appropriate response then became deregulation and privatization. Similarly, I demonstrate how the MHM problem resulted from its convergent construction by public health researchers and inclusive innovation proponents as an urgent, widespread problem with a simple, market-generating solution: low-cost disposable sanitary pads. It benefitted from synergies between the scientific drive toward generalizability and the market orientation toward scale.
This construction of the MHM problem and its sanitary pad solution were particularly politically powerful because they rested on two forms of knowledge – science and the market – that claimed, in the words of Spivak (1999), to allow the subaltern to speak (Saffari, 2016). This was particularly important at the dawn of the 21st century, in light of frustrations among increasingly vocal civil society groups and LMIC governments that the interventions promoted by Western countries do not adequately consider local priorities (Halliburton, 2017; Khagram, 2004).

Scientific knowledge about MHM is generated almost exclusively through Knowledge, Attitudes, and Practices (KAP) surveys, developed in the 1960s to help family planning experts understand the circumstances of girls and women across Southern countries. Initially, these experts used KAP data to demonstrate community ‘desire’ for contraception, and ultimately justify a global population ‘problem’ to Western donors (Murphy, 2017). In the process, researchers taught these methods to their Southern counterparts, and it is now used across multiple areas of public health. In the MHM case, researchers used survey and interview data to identify ignorance about menstruation and related practices and opportunities for change. But unlike the first generation of studies, these studies also claim grassroots legitimacy because they were conducted almost exclusively by Indian researchers; as a result, they cannot be easily dismissed as Western neocolonial interference.

The market-based solution also seems fundamentally democratic. Girls and women seem free to purchase and use the pads, and participate in social enterprises to produce them. Furthermore, the primary innovator comes not only from India but from modest means, and thus is treated as having an authentic understanding of the best solution. Together, the scientific and market ways of knowing shaped the MHM problem as serious and based on local knowledge, large, familiar to elite Indian and Western audiences, and easily solved with a commodity.

India is a particularly important site for this analysis because it has long had a heterodox approach to innovation. While Western countries define innovation almost exclusively in terms of technically complex, novel, scalable, and commodifiable objects, India explicitly values makeshift innovation culturally with its own Hindi term (jugaad) as well as in scientific and business practices (Radjou et al., 2012; Sekhsaria, 2018). It has also always emphasized local innovation, from Gandhi’s attention to ‘village industries’ to the government’s import substitution policies that began with India’s independence and lasted into the 1990s (Chibber, 2003; Engel, 2015; Williams, 2018). More recently, Indian Institute of Management professor Anil Gupta built on these legacies by establishing NGOs that identified and amplified low-cost innovation developed by people with limited technical training or financial resources (Dutfield, 2006). This includes the National Innovation Foundation (NIF) funded by the Indian government. Finally, much of the Indian population integrates indigenous knowledge systems into their daily lives and health care, which the government validated in 2014 through the creation of a Ministry of Ayurveda, Yoga, Naturopathy, Unani, Siddha, Sowa-Ripga, and Homeopathy. This reverence for indigenous knowledge systems has only increased in recent years, with the dominance of Hindu nationalism in Indian politics (Subramaniam, 2019). Given this history, there was great potential flexibility in how the government approached inclusive innovation. It might have challenged the construction of a MHM ‘problem’ or
turned to a solution rooted in indigenous knowledge. But as we shall see, instead MHM became an opportunity for the Indian government, NGOs, and entrepreneurs to advance particular understandings of inclusion and innovation that centered Indians and aligned with the priorities of Western development organizations and ideologies, while excluding those it deemed inconvenient.

This case study analysis (Yin, 2017) is based on mixed qualitative methods including document review, interviews, and ethnographic observation, and is part of a larger study on inclusive innovation in international development. Document analysis included a systematic review of the academic, policy, private, and non-profit sector literature worldwide related to MHM, with a focus on the past 20 years of documents written by researchers, domestic and international NGOs, philanthropic organizations, social innovators, and social enterprise incubators involved in MHM in India. This includes 136 academic articles about MHM in low- and middle-income countries, with 40 focused on India. I also examined how the Indian media has approached and discussed menstruation over the same period. In analyzing all of these documents, I paid particular attention to how they characterized the MHM problem and possible solutions, including how this was reflected in the design of research studies, presentation of findings, introductions, and conclusions. I also collected and analyzed documents that outlined the turn toward inclusive innovation and its implementation more broadly, including policy reports from international organizations such as the OECD, international and domestic program websites, academic articles, and funding records. Here, I investigated imaginaries (Jasanoff & Kim, 2015) of both inclusive innovation and the problems it is trying to solve.

In addition to this document review, I conducted 50 open-ended, semi-structured, in-person interviews with researchers, entrepreneurs, and NGO and government personnel involved with menstrual health and hygiene management, primarily in India but also in the United States and Europe, from 2015 to 2019. I identified these subjects initially through document analysis, but as interviews proceeded I asked subjects who else they thought I should interview. This allowed me to understand MHM networks and develop a more complete picture of who was involved and understand their relationships. However, to prevent bias in this sample, I continued to use document review to identify additional individuals and potential MHM networks. In the interviews, I asked subjects about the history and scope of the MHM problem, solutions, possible challenges in implementing these solutions, and how they might be overcome. I also spoke with 10 individuals at social enterprise incubators and development organizations involved in promoting inclusive innovation either within India or at the international level about their vision for this work, the challenges they face, how they are overcoming them, and specific examples of success. Where relevant, I spoke with this latter group about MHM as an example of inclusive innovation. Finally, I visited two sanitary pad-making social enterprises and attended two MHM training sessions in different regions of India.

The interviews and ethnographic observations were crucial to my analysis, as they helped me understand the history of MHM and interpret the documents that I had already discovered. Often, they pointed me to additional important documents and events that I needed to incorporate into my analysis. Overall, they helped to ‘triangulate’ my findings, to ensure that I had developed a complete picture but also that my interpretations held across the different data sources (Luker, 2010). While interview and observational data
was crucial and validated my interpretation of the documents, I do not include any explicit quotes from interview subjects in this paper. This is largely because the documents provided extensive contemporaneous accounts of the emergence of the MHM problem, which I judged as more powerful than retrospective ones. In addition, in some cases I wanted to preserve interview anonymity, which can be challenging given the density of MHM networks in India.

The parallel births of inclusive innovation and a new development problem

The first attempts to highlight and address an MHM problem came in the mid-2000s, just as excitement about inclusive innovation was emerging in business and policy circles. For years, the Indian government had invested in initiatives to stimulate grassroots entrepreneurship, including microloans targeted toward people with limited incomes (Sharma, 2008). But in 1999, it established Swarnajayanti Gram Swarojgar Yojana (later renamed the National Rural Livelihood Mission, NRLM), which encouraged the formation of ‘self-help groups’ (SHGs) usually made up of 10–15 women with little wealth, who could use microloans to start small businesses. NRLM provided SHGs with microloan assistance, capital investments, and training in sewing, handicrafts, and other skills to support these enterprises (Lahiri-Dutt & Samanta, 2006; Radhakrishnan, 2022). At the same time, Indian Institute of Management professor Anil Gupta began to argue that, in order to truly uplift low-income and otherwise marginalized communities, they needed to be respected as innovators (Dutfield, 2006; Gupta, 2012; Parthasarathy, 2017b).

Despite their limited resources, these ‘grassroots’ or ‘frugal’ innovators, as he called them, were developing scores of technologies to improve their lives that could produce broad benefits. They were, after all, experts in their own lives and circumstances. So, he created the NIF and other NGOs – based mostly in northwest India – to foster and amplify this innovation. Others followed Gupta’s lead, including for example the Rural Innovations Network (now VillGro), established in South India in 2001.

Meanwhile, two business school professors at University of Michigan, Indian immigrant C.K. Prahalad and Stuart Hart, published a 2002 article arguing that multi-national corporations were missing a huge ‘fortune at the bottom of the pyramid’ by not developing products and services for the poor (Prahalad & Hart, 2002). Companies could produce innovative products targeted to this market and not only profit, they suggested, but also expand the economy and eventually improve the purchasing power of low-income communities. They could, in sum, do well by doing good. Three years later, Prahalad published The Fortune at the Bottom of the Pyramid, which expanded the argument and included case studies (Prahalad, 2005). The book received glowing reviews in the business media, and praise from Bill Gates (‘a blueprint for fighting poverty’) who had recently created his foundation, and former Secretary of State Madeleine Albright (‘if you are looking for fresh thinking about emerging markets, your search is ended’). Prahalad then advised both multi-national corporations and the Indian government on ‘bottom of the pyramid’ strategies (Knowledge at Wharton, 2009; Merx, 2004).

Attention to MHM came from another corner of the international development world, but would quickly be interpreted in the context of inclusive innovation. Archana Patkar,
director of Indian consulting group Junction Social and an established expert in the water, sanitation, and hygiene (WASH) sector of international development, and her colleague Sowmyaa Bharadwaj, published the first paper in 2004 (Bharadwaj & Patkar, 2004). They reviewed the challenges that menstruating girls and women faced in developing countries, basing the analysis on a survey of 85 WASH professionals worldwide. However, they focused their attention on South Asia and drew on their knowledge of the region. Both were Indian development experts educated and based in India, so they could claim deep understanding of the disadvantaged girls and women they had served throughout their lives.

Based on these insights, Bharadwaj and Patkar (2004) concluded that girls and women across developing countries were susceptible to serious illness because they lacked the facilities to properly wash and dry either themselves or the recycled cloth (which often came from old garments) they commonly used to absorb menstrual blood. Girls and women were also hurt by cultural restrictions, ranging from avoiding certain foods to not going to the temple while they were menstruating. The few who used disposable sanitary napkins did not have the infrastructure to dispose of them properly, thus hurting the environment. They classified this as poor menstrual hygiene management and suggested that girls might miss or even drop out of school, compounding the problem.

They appealed to WASH professionals by linking menstruation to prevailing development priorities: Both gender equality and universal primary education were Millennium Development Goals, and there was growing attention to girls’ empowerment as the key to accelerating international development (Moeller, 2018; Murphy, 2017). And, they argued, there were simple solutions available. They recommended more inclusive latrine design, including private facilities with lockable doors, running water, and receptacles for safe disposal of menstrual products. As we will see, this option would quickly disappear in the MHM discourse perhaps because it required government involvement and could not produce a neat commercial solution.

Bharadwaj and Patkar were also the first to suggest the ‘production and social marketing’ of sanitary napkins, criticizing the customary approach. ‘Research and development efforts have been limited to commercial ventures that even today are unable to market products that are affordable for the poorest of the poor’ (Bharadwaj & Patkar, 2004, p. 4). While they did not explicitly refer to the ‘fortune at the bottom of the pyramid’, they emphasized the need to innovate to serve low-income communities.

Around the same time, two other international development experts were also focusing on MHM. American public health researcher Marni Sommer and Canadian development worker Jackie Kirk published a short article in a newsletter funded by the UK government’s Department of International Development, the University of London, and Oxfam, and a more detailed white paper that appeared on a number of NGO websites related to the WASH sector.

Like Patkar and Bharadwaj, Kirk and Sommer (2005, 2006) worried that poor MHM affected girls’ education. In support, they offered small case studies from India, Nepal, and Sudan to show that girls knew little about menstruation and hygienic management methods, and were often subject to incorrect ‘myths and taboos’ that restricted their lives in significant ways. But this evidence did not show a clear MHM problem with impacts on education. So, they called for more research, and emphasized the importance of
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capturing girls’ voices: ‘[MHM] solutions … should be developed based on the insights of the girls themselves … girls are “knowers” of their own lives, of the challenges they face and of possible solutions for these’ (Kirk & Sommer, 2006). Systematic scientific research, they suggested, could allow girls to express their preferences and identify interventions using systematic and objective methods that would be legible to Western experts and institutions.

Development institutions took notice. Patkar spoke at a 2005 UNICEF roundtable meeting focused on the relationship between WASH and education. With representatives from US, European, and LMIC governments, NGOs, and international organizations in attendance, she emphasized the link between poor MHM in schools and poor attendance:

Formal education is not accommodating to menstruating girls. The prospect of travelling long distances to school, sitting for long periods of time, staining their clothes with blood, and being noticed and teased by boys makes adolescent girls feel anxious and uneasy. Their psychological discomfort is compounded by physical symptoms such as stomach cramps, headaches and fatigue, which are often aggravated by malnutrition – resulting in frequent absenteeism, with a negative impact on school performance and completion. (UNICEF and IRC, 2005, p. 81)

Almost immediately, despite the various solutions proposed in the white papers, UNICEF and the South Indian state of Tamil Nadu established a low-cost sanitary pad donation program for adolescent schoolgirls in 2006. They purchased these pads from small vendors across the country, but primarily from SHGs (Business Standard, 2020; The Hindu, 2008, 2009). UNICEF and the Tamil Nadu government provided SHGs with training as well as sanitary pad-making machines and other materials to encourage the development of small enterprises. They then purchased the pads for heavily subsidized distribution through local schools but SHGs could also sell them independently.

This initiative – which soon spread across the country – engaged low-income women as both consumers and producers. The major global companies manufacturing disposable sanitary pads, like Procter & Gamble and Kimberly Clark, had been reluctant to expand their markets to low-income and rural areas in Southern countries (Shrivastava, 2010). (It is unclear why they made these decisions, but it is possible that these companies were concerned that if they produced cheaper, poor-quality sanitary pads their brands might be tarnished, and that offering higher quality products at a lower price would shift customers away from more expensive options.) UNICEF and state governments across India took advantage of this gap, and in the process created a program that would produce economic benefits in both the short and long term. Responding to the program’s expansion to a rural and low-income district in West Bengal, Lori Calvo, UNICEF’s state representative, observed: ‘It is a good initiative by self-help women’s groups of Purulia. It is helping them financially and also spreading awareness on hygienic menstrual practices, which otherwise gets neglected’ (Menon, 2008). Women would start businesses and gain income and thereby empower themselves immediately, while also destigmatizing menstruation by participating in its commodification. Girls would stay in school and eventually achieve better and higher paid employment thanks to low-cost disposable sanitary pads.
UNICEF’s state-level programs elevated the MHM problem in the Indian development policy landscape. But it also shaped the problem itself. It focused on the sanitary pad solution, rather than on better or private latrines or MHM training. And while there had been very little evidence that poor MHM affected education, the program’s focus on adolescent girls and distribution strategy in schools validated this framing. Lizette Burgers, who led UNICEF’s WASH program in India and had participated in the Oxford Roundtable where Patkar spoke, explicitly drew the connection as she described the program: ‘Given the fact that adolescent girls face a considerable amount of embarrassment due to lack of information on time, being not guided by even peers and lack of affordability for sanitary napkins, their school attendance and over all confidence level suffers’ (Burgers, 2008). For Burgers the problem was also widespread. And, although she defined the problem in cultural terms, with girls facing ‘embarrassment’, not being ‘guided’ by peers, not receiving proper ‘information on time’, it could be solved with an object.

The low-cost sanitary pad, and the problem it solved, seemed legitimate in part because it offered a seemingly simple, scalable, market-generating solution at a time when India and the world were becoming increasingly enthusiastic about the promises of inclusive innovation for international development. It addressed gender equity by helping girls stay in school and destigmatizing menstruation, and stimulating entrepreneurial activity among women. Thus, the market solution seemed fundamentally democratic. SHGs seemed to be free to make and sell the pads, and girls seemed to choose to accept them. Rather than a top-down, large-scale intervention like a hydroelectric dam, UNICEF and state governments seemed to be simply supporting the subaltern as they decided how to empower themselves. But this characterization also obscured how girls’ and women’s choices had already been constrained by those constructing the MHM problem and its solution.

**Producing a problem at scale, through science**

The MHM story had only just begun. As UNICEF, state governments, and girls and women started to invest in the technology, over the following few years public health experts established an evidence base that constructed an MHM problem that was similar across contexts. This would help justify the potential benefits of the sanitary pad solution, because it could be easily standardized and scaled (Pfotenhauer et al., 2022).

The Gates Foundation, the UK’s Department of International Development, universities, and small NGOs funded this work. Researchers presented their findings widely, in scholarly journals but also in venues that would attract attention from development professionals, including policy reports and meetings such as a new annual conference on ‘Menstrual Hygiene Management in Schools’ convened by UNICEF with leadership from Marni Sommer. In these venues, they emphasized that the MHM problem was urgent, global, and based in girls’ and women’s ignorance, but could be solved quickly and easily with a commodity.

MHM research could have gone in multiple directions, given the diversity of cultural and religious practices related to menstruation around the world (Buckley & Gottlieb, 1988; van de Walle & Renne, 2001) and the recent adoption of some LMIC menstrual
practices in Western countries (Castro, 2020; Koskenniemi, 2021). In the United States, for example, decades after switching to disposable products to manage their menstruation, young women are now demanding cloth absorbents as an environmentally sustainable alternative (Makhijani, 2022). Anthropologists might have investigated how girls and women managed their menstruation on a day-to-day basis, including the logics and indigenous knowledge systems that underlie them. This could include attention to management tools and their social and cultural meaning, and the variations in menstrual practices across regions and lifestyles including celebrations (Good, 1982). They could have examined the guidance that Ayurveda and other knowledge systems offered on how to manage menstrual problems including dysmenorrhea (Karunagoda et al., 2011; Patil et al., 2015). Or, given the explicit attention to the centrality of girls’ and women’s voices in Sommer and Kirk’s papers, researchers might have paid particular attention to how these girls and women innovate to manage their menstruation while still adhering to cultural expectations. We could have seen social scientists use deliberative methods to elicit community needs and priorities in an open-ended way. Historians might have uncovered how Indian and other women had approached and managed menstruation over time, valuing the intellectual work they had performed over centuries. They might have also investigated whether and how colonial governments or international development institutions had influenced sanitation infrastructure. But such studies would have required far greater investments of time and resources, and may not have provided the authority and generalizability that comes with quantitative scientific methods. They also may not have concluded that there was a problem at all.

Instead, virtually all of the research in the emerging MHM field adopted the knowledge, attitudes, and practices (KAP) method that, as mentioned above, had originated in the field of family planning and population studies in the late 1960s and since spread across international development and public health (Cleland, 1973). KAP methods primarily involve surveys, but occasionally include interviews and focus groups; it is viewed as a rigorous approach that can capture the status and needs of populations and allow development professionals to justify programs. Study design, including the queries, is usually standardized across contexts. This makes it easier for local researchers in under-resourced areas to assume leadership roles and for the studies to be implemented in a range of contexts. It also produces quantitative assessments whose findings can be statistically verified and that are often characterized as being generalizable to a larger population. This then facilitates interpretation and comparability of research results. Its proponents claim authority to inform development decisions on the basis of the method’s scientific credibility and apparent capacity to elicit the needs and preferences of the targets of development interventions, as well as the inclusivity of the research community.

This method shaped the MHM problem itself. Framed by the early agenda-setting papers by Patkar, Bharadwaj, Sommer, and Kirk, KAP researchers in India and elsewhere asked respondents about their knowledge regarding menstruation, management tools used, restrictions and prohibitions during menstruation, and school attendance and performance. In other words, they started with the assumption that there was a problem and that it was an individual one. It also had the same characteristics across contexts, including ignorance and lack of access to appropriate management tools. The purpose of the surveys and interviews was then to assess severity. There was no case where MHM
was not seen as a problem at the outset. Consider, for example, the most comprehensive survey in India to date, including 1800 adolescent girls across three geographically disparate states. Summarizing adherence to cultural myths and taboos, it observed that 88% of girls observed religious ‘restrictions’ (e.g. not going to the temple), 83% observed ‘restrictions’ on exercise, 20% described different sleeping arrangements, and 7% had restricted food choices (Sivakami et al., 2019). The data analysis did not note the clear differences in adherence to restrictions. Instead, it concluded: ‘Most girls were not aware of menarche and faced barriers and restrictions when menstruating, consistent with past studies across India’ (p. 10). Similarly, a survey of 160 rural girls in West Bengal found that 86.25% of respondents believed menstruation was a physiological process, while others saw it as a curse of God (6.25%), a disease (5%), or a sin (2.5%) (Dasgupta & Sarkar, 2008). Instead of seeing this data as a positive sign, the study authors focused on other signals of ignorance. ‘It was observed in this study that 86.25% girls believed it to be a physiological process whereas in a similar study conducted in Rajasthan by Khanna et al., nearly 70% believed that menstruation was not a natural process. It was very sad to observe in the present study that most of the girls did not know about the source of menstrual bleeding and more than half of the girls were ignorant about the use of sanitary pads during menstruation’ (Dasgupta & Sarkar, 2008). It was unclear why the findings varied, as there were no major differences in the study samples. But to researchers, the differences didn’t seem to matter much. Instead, they shifted attention to other areas of documented ignorance.

Researchers also saw the problem as global. There were MHM KAP studies across Latin America, the Middle East, Africa, and South Asia, often conducted by researchers based locally. After all, KAP’s standard battery of questions about menstrual knowledge and practices allowed researchers from across the world to participate easily and contribute to a global field, which would provide them with opportunities to publish and present their findings in both national and international venues. The UNICEF-sponsored MHM conferences often featured country-specific reports on KAP findings, which reinforced the idea that poor MHM had standard attributes and was simply more severe in Southern countries. Indian research reports usually began by characterizing a single, widespread problem and then focusing on a specific Indian site. One survey of adolescent girls in Delhi, India’s capital, published in the International Journal of Reproduction, Contraception, Obstetrics, and Gynecology and co-authored by India-based researchers began,

Menstrual hygiene management (MHM), practices related to menstrual hygiene during periods, is a serious problem for adolescent girls in low and middle income countries (LMICs). The sustainable development goals are influenced directly or indirectly by poor menstrual hygiene, the achievement of the same is indeed very crucial for the overall development of these young adolescents and the nation at large. (Sharma et al., 2017).

The papers also constructed the MHM problem as urgent; in the short term, it affected girls’ and women’s safety. Multiple surveys showed that menstruators often used washed and recycled cloth, either from old clothing or previous menstrual cycles, to manage their menstruation (Dasgupta & Sarkar, 2008; Jothy & Kalaiselvi, 2012). They might also
reuse this cloth during a single period, washing and drying it overnight. Researchers deemed these methods ‘unsafe’ or ‘very poor’, arguing that such methods were improper and produced reproductive tract infections:

[I]t is observed that more of rural participants dried them inside the house because menstruation is considered as impure and dirty and meant to be hidden which reflects the taboos found in the society …. The secrecy associated with the reproductive health issues hitherto considered taboo are some of the underlying reasons for the silent spread of RTIs. (Kamath et al., 2013)

Another study supported this claim by producing logistic regression analyses that correlated ‘unsafe’ management tools – defined as recycled cloth use – with a variety of bodily impacts during menstruation including white discharge, pain in the lower abdomen, and irregular periods (Khanna et al., 2005).

The studies treated MHM as consequential in the long term because of effects on education and ultimately, women’s empowerment. One introduction began,

Additionally due to its indirect effects on school absenteeism and gender discrepancy, poor menstrual hygiene and management may seriously hamper the realization of [Millennial Development Goal]-2 on universal education and [Millennial Development Goal]-3 on gender equality and women’s empowerment. (Jothy & Kalaiselvi, 2012)

However, in open-ended interviews about the restrictions practiced during menstruation, girls did not volunteer that they were prohibited from going to school (Dhingra et al., 2009; Khanna et al., 2005). And when asked through standard surveys, the results varied dramatically: 16–58% of girls (depending on the study) reported ever missing school during menstruation (Dasgupta & Sarkar, 2008; Jothy & Kalaiselvi, 2012). Thus, it was unclear how much MHM was really linked to educational outcomes. But here too, researchers didn’t question their assumption that MHM affected education. Any school absence was a problem.

Finally, these studies framed the MHM problem as easily solvable, with disposable sanitary pads. This started with the very structure of the KAP questionnaires. As suggested above, almost all asked about the menstruator’s method of absorbing blood, whether disposable pads, new cloth pieces, or recycled cloth. They then treated any evidence of recycled cloth use (and often, any use of cloth at all) as a problem. After all, one concluded, ‘Sanitary napkins, if manufactured in hygienic manner, are universally accepted as a safe method of menstrual hygiene’ (Mahajan & Kaushal, 2017). By contrast, they rarely asked about access to private toilet facilities. Menstrual hygiene management, in other words, was an individual challenge rather than an institutional one. One study of adolescent girls in Maharashtra state concluded, ‘The girls expressed willingness to use sanitary napkins if they are available at more economical rate. Hence making low cost napkins available to the girls, can prevent many cases of infections arising from unhygienic material/cloth used by girls’ (Mudey et al., 2010). The sanitary pad possibility also seemed feasible with the rise of inclusive innovation. ‘Universalized use of sanitary pads can be advocated to every girl only by making it available at affordable prices (social marketing)’, concluded authors of a survey conducted in West Bengal.
state (Dasgupta & Sarkar, 2008). Even those who acknowledged the Western trend toward cloth and other reusable absorbents argued that such solutions were untenable in the LMIC context, where girls were ignorant and susceptible to stigma, and lived in unsanitary conditions (Scott et al., 2013).

Overall, the structure and focus of these KAP studies defined the MHM problem as urgent, widespread, and consequential in terms of women’s health and education and ultimately for equity and empowerment. And they constructed it as a problem of individual ignorance and poverty that could be easily fixed through social entrepreneurship. For donor agencies, governments, and as we will see, even publics to invest in low-cost disposable sanitary pads, they needed to trust that the MHM problem was large and uniform, so that the market could keep growing. KAP studies provided this evidence.

Interestingly, they generated virtually no criticisms, perhaps because few other scientific fields or methodological perspectives were involved, because KAP studies had such a long and stable history in international development, or because the Indian researchers could claim cultural legitimacy. Researchers had also, of course, constructed the situation as dire. A rare exception came from American economists Emily Oster and Rebecca Thornton, who questioned the relationship between poor MHM and school attendance. After a randomized evaluation in Nepal, they found that although school records data was somewhat incomplete, menstruation had limited impact on attendance (Oster & Thornton, 2011). They also showed that increasing access to disposable sanitary pads had no effect. This departed from the emerging consensus that girls were missing and even dropping out of school due to improper means of menstruation. However, these contradictory findings were barely acknowledged. MHM researchers only cited this study to justify their calls for more research.

As they constructed the MHM problem, the KAP studies also claimed to represent the subaltern accurately. Most papers painstakingly described their efforts to represent a large group of girls or women. They explained sample construction and size, the resonance between their results and other KAP studies, and in the case of surveys, the statistical significance of their findings. However, they also privileged scientific rigor over validating the knowledge of low-income and marginalized menstruators; rather than asking open-ended questions that might produce diversity in the results, their surveys and interviews were heavily structured so they could be compared. In other words, research subjects could not inform the structure of the study, whether its focus or the questionnaire. And as discussed above, the use of the KAP method itself erred on the side of constructing an MHM problem. This could have produced a crisis of legitimacy, particularly in an environment of growing cries to ‘decolonize’ global health (Büyüm et al., 2020). However, Indian researchers’ prominent role likely allowed them to avoid critiques that the MHM problem was merely a Western imposition.

**Low-cost disposable sanitary pads: The ideal solution**

As KAP studies constructed a single MHM problem using scientific methods, the Indian government, social enterprise incubators, NGOs, and philanthropic foundations reinforced its importance as they fostered the market-generating solution. They, too, defined MHM as urgent, standard across the country, and solvable with a simple technology that
could produce a range of cascading benefits for the economy. And as we will see, the solution seemed more legitimate because it not only engaged women across the country as newly empowered economic actors but also highlighted the contributions of a grassroots innovator.

Indian NGOs and entrepreneurs had addressed the needs of low-income menstruators on a small scale for years, from offering clean cloth absorbents to educating them about hygiene (Finley, 1999). But this work had received little attention or funding; after all, MHM had not been a development problem. But as KAP studies proliferated, and there was growing interest in social entrepreneurship, investment in MHM technology for the poor grew. In 2006, the year that the UNICEF-Tamil Nadu program began, the prestigious Indian Institute of Technology in Chennai, the capital of Tamil Nadu state, recognized a small-scale machine that manufactured low-cost sanitary pads as that year’s ‘best innovation for the betterment of society’. VillGro helped the inventor, Arunachalam Muruganantham, establish Jayaashree Industries and develop a business model selling his machine to women’s self-help groups (VillGro, 2008).

Muruganantham fit both Anil Gupta’s vision of grassroots innovation and conventional Western ideas about invention and inventors. From Coimbatore in Tamil Nadu, Muruganantham had developed the machine after getting married and learning about menstruation and the high cost of disposable sanitary pads (Sandhana, 2011; Venema, 2014). Although he had less than a high school education and worked lower skilled jobs, he had always been a tinkerer. After years of trial and error, and risking both his marriage and social ostracism because of his obsession with the taboo subject of menstruation, he developed a machine that would produce affordable, disposable sanitary pads. The machine was inventive both because it was small in comparison to the huge factories used by multinational corporations, and it produced cheaper pads.

Muruganantham’s invention validated the MHM problem. He, like the Indian researchers performing KAP studies, claimed to represent the needs of the subaltern through his own experiential knowledge. But Muruganantham also translated these priorities into a market-generating technology that would interest the growing number of entities interested in inclusive innovation. Indeed, the UNICEF-Tamil Nadu sanitary pad donation program purchased Muruganantham’s machines to help SHGs produce the pads.

By 2009, NIF had further certified Muruganantham’s solution and the MHM problem by giving him a grant from its Business Development and Micro Venture Innovation Fund and helping him patent the invention. In describing his invention for NIF, Muruganantham emphasized its emancipatory potential, bringing together rhetoric from the UNICEF-Tamil Nadu initiative and the KAP studies: ‘This [sanitary-pad making] machine heralds a new revolution in personal hygiene, for women across all sections of society, while creating [a] potential perennial revenue stream for small scale entrepreneurs, and self help groups by deploying a self-sustaining micro-enterprise model’ (National Innovation Foundation, 2009). It is notable that the description emphasizes the economic impacts on small scale entrepreneurs as much as the benefits for personal hygiene.

In 2010, India’s central government announced that it would take over UNICEF’s program and expand it nationwide (INVC, 2010). All girls would have access to heavily
subsidized disposable sanitary pads: Girls living below the poverty line could purchase a pack of six for 1 rupee, while girls above the poverty line would pay 5 rupees. As with the smaller scale programs, SHGs would produce the pads with initial capital investment and training from the government.

This program validated both the MHM problem and how the KAP studies had defined it. P.K. Pradhan, director of the National Rural Health Mission that oversaw the program, observed that the scheme ‘marks a step forward in the adolescent reproductive and sexual health programmes in the country. Promoting menstrual hygiene will yield several dividends. Apart from addressing the very real need of ensuring the comfort and dignity of girls, it could promote school attendance and retention’ (National Rural Health Mission, 2010, p. 7). To the Indian government, MHM had serious consequences for girls’ health and education.

Of course, just as MHM research could have taken multiple directions, so too could solutions. The Indian government could have provided menstruators with cloth absorbents, aware that girls already using recycled cloth might find them easier to adopt (or easier for their mothers to teach them), and that disposal of synthetic sanitary pads could create environmental and other challenges particularly in rural areas (Kaur et al., 2018). It could have focused on better hygiene education. Or, it could have chosen to build better toilets; after all, it was in the midst of the Total Sanitation Campaign, which promoted latrine construction to address open defecation (Hueso & Bell, 2013). But these options were more complicated. The sanitary pad route allowed the government to invest in an Indian grassroots innovation and SHGs while agreeing with the hygiene concerns generated by development organizations both at home and abroad. The solution wouldn’t just provide short term benefits, but would help women become entrepreneurs and leaders. According to Minister of Health and Family Welfare Ghulam Nabi: ‘Building on existing experience in the country, this scheme also promotes the active participation of women self help groups in the manufacturing of sanitary napkins. It will not only generate economic livelihood for the people in the villages, but will also promote local demand and distribution at a relatively low cost’ (INVC, 2010, p. 5). In sum, the market-generating solution helped MHM become a problem in India. The national government (and later, the states, which took over implementation) purchased Muruganantham’s machine and donated it along with materials and training to local self-help groups, who would then sell the pads back to the government. Some SHGs also secured microloans, which allowed them to sell these pads independently to local women, thereby expanding the low-cost disposable sanitary pad economy.

The central government encouraged local health workers known as ASHAs, who would distribute the pads, to provide girls with MHM awareness training. But in practice, the sanitary pad was the main mechanism for societal transformation.

In its totality, the scheme aims to increase awareness among adolescent girls on Menstrual Hygiene, increase access to and use of high quality sanitary napkins to adolescent girls in rural areas and will ensure safe disposal of sanitary napkins in an environmentally friendly manner. At the community level, ASHA will be responsible for ensuring an adequate supply of Sanitary napkins for adolescent girls who require them. The Sunday meeting by ASHA would be the key forum to enable this regular supply. ASHA will also contact girls in their homes who are unable
to attend meetings to ensure that they have a supply of Sanitary Napkins. The role of ASHA in supplying the sanitary napkins is one suggested option. States are free to select other mechanisms in keeping with local context. Incentive for ASHA is built in the scheme, she will get [1 rupee] for every pack she sells. (INVC, 2010)

The Indian media reinforced this approach in 2011 by giving wide attention to a survey conducted by international polling firm AC Nielsen with support from Plan India, a large NGO focused on the rights of children. The results seemed credible not only because of its scope (surveying 1033 girls and women of menstrual age and 151 gynecologists across nine Indian states) but also because it resonated with both the design and findings of MHM KAP research and seemed to allow girls and women to speak. However, its results suggested a much more severe problem than had been published in the academic literature. The Times of India reported that the study found that ‘only’ 12% of India’s menstruating women used disposable sanitary napkins, characterizing this as a serious problem (Sinha, 2011). It observed further that the others used ‘shocking alternatives’ like ‘rags’, ashes, and husk sand. And it reported that girls missed 5 days of school in a month due to menstruation, and 23% actually dropped out completely after they started menstruating. It also suggested that on average women missed 2.2 days of work during their periods. These statistics were outliers compared with other KAP study findings, and were much more alarming. But nobody questioned them, perhaps because the experts who might have raised questions hoped they would produce action.

Media outlets and NGOs fixated on the low rate of disposable sanitary pad use identified in the survey. An article in the Press Trust of India observed, ‘The figure is abysmal, compared to countries like China, where majority of women use sanitary napkins …’ (Press Trust of India, 2011; see also Sandhana, 2012). The study generated domestic NGO activity as well, including a Sanitary Pad Bank established by The Tee Foundation, which mobilized urban Indian women to donate disposable pads (Tee Foundation, 2019).

Meanwhile, both Indian and international organizations interested in inclusive innovation, including the World Bank and Ashoka Foundation, responded with grants and fellowships to sanitary pad entrepreneurs in India and elsewhere including Muruganantham (EcoFemme, 2019; Goonj, 2018; World Bank, 2021). Prominent Indian philanthropic foundation Dasra issued a report validating the inclusive innovation approach (Dasra, 2014).

[S]ocial businesses in this sector are filling the critical gap of availability of material to manage menstruation. They are undertaking research to either develop low-cost, good quality and biodegradable material, or develop machines that can be used by self-help groups to manufacture sanitary napkins locally. Most of them partner with non-profit organizations to complement their efforts of demand generation within communities. They are currently at an early stage and require funding and capacity building support to develop their models and business strategy as well as procure grants for research and innovation. Supporting social businesses and non-profit organizations to complement each others’ work will result in a more comprehensive and scalable solution that capitalizes on the strengths of both entities. (p. 80)

Just ten years after the first agenda-setting paper, the availability of a simple, market-generating solution coupled with the KAP studies had established MHM as a crucial
problem of international development. KAP researchers and traditional development actors in UNICEF and the Indian government, but also institutions focused on market-generating innovation like VillGro and NIF, had now certified it. It seemed to provide the perfect opportunity to leverage a grassroots way for India to catch up to modernity. But at its heart there was a paradox. On the one hand it allowed India to engage in economic development on its own terms and claim an independent approach to innovation. But on the other, the innovation itself was a synthetic solution that embodied a Western worldview.

Managing critique

One might imagine resistance to the tightly coupled MHM problem and solution from multiple groups, most notably girls and women from low-income and marginalized communities. But they were the least powerful, and had few choices about, for example, the types of enterprises they might start or whether they would accept free sanitary pads from schools. Meanwhile, public health experts, international organizations, and the Indian government claimed that they were simply amplifying these voices. It is perhaps not surprising, then, that there was little opposition to the growing MHM-based sector.

One exception was Sinu Joseph, from Indian NGO Mythri Speaks. She began her work as a menstrual health educator in 2010, providing both training and low-cost disposable sanitary pads to adolescent girls in free government schools in her home state of Karnataka. But she became increasingly uncomfortable with her work and the assumptions it embodied. When she ran out of disposable pads to donate and resources to purchase more, she began to ask girls about their use of menstrual absorbents. Many, she found, believed that the disposable pads were ‘super absorbent’ and used them for extremely long periods of time, changing them only once or twice a day (Mythri Speaks, 2013). She worried that this use would actually create the health problems she was trying to solve. She also observed that many low-cost disposable sanitary pads were of poor quality. Pads made by Muruganantham’s machine, for example, seemed to last for a short period of time (some reported only an hour), the material inside clumped, and sometimes didn’t come off properly (the glue sticks) so it rips apart messily (Mythri Speaks, 2016). Another Indian NGO, the Menstrual Health Alliance, echoed these observations and asked the government to establish and enforce quality guidelines. Joseph also wondered about the environmental impacts of sanitary pad disposal especially when India already had serious sanitation issues. Others have since validated this concern, worrying that disposable pads would stress India’s already limited sanitation infrastructure and increase health risks for those (including manual scavengers) who collect and sort waste (Garikipati & Phillips-Howard, 2019).

Finally, Joseph questioned the conventional characterization of indigenous practices as unfounded myths and taboos. This began after girls repeatedly asked her why they were restricted from certain foods and activities during their period, and hearing other menstrual health educators dismiss such concerns. She wondered, ‘With what right do we dismiss someone else’s belief when we neither know the origin of such practises, nor its significance in the practitioner’s family? … What if there was indeed some ancient story of menstrual magic hidden in these rituals, which we would lose out on in our
arrogance of rubbishing these questions?’ (Mythri Speaks, 2014) These questions led Joseph, a Christian, to spend years investigating ancient Ayurvedic and other indigenous practices. She ultimately changed her approach to menstrual education, focusing on how these practices empowered Indian women, and published a book on indigenous knowledge related to menstruation (Joseph, 2019).

We might expect that these user responses might modulate the enthusiasm of MHM and sanitary pad proponents (Oudshoorn & Pinch, 2003; Sharma, 2020). In fact, Joseph has repeatedly tried to bring these concerns to development experts and policymakers through blog posts and in public talks. But her concerns are largely dismissed. Her TED talk on Ayurvedic knowledge about menstruation was removed from YouTube because it purportedly spread misinformation (Mythri Speaks, 2018). Similarly, in 2015, she articulated some of her concerns at the International Conference on Menstrual Health and Reproductive Justice in Boston. Boys dropped out of school at even higher rates when they reached puberty, she noted. Should they, too, receive disposable sanitary pads? Attendees responded with polite applause, but she was largely ignored. One NGO representative suggested that she ‘modulate’ her remarks to build allies (Joseph, 2017). Even though Joseph represented a contrary subaltern voice, by then science and the market had stabilized a grassroots-driven innovative solution to a global problem. They did not need Joseph’s support, and had the power to define her perspective as untruthful.

Inclusive innovation as the way forward

Low-cost disposable sanitary pads in India, and specifically Muruganantham and his machine, soon became an iconic example of the promise of inclusive innovation for international development. In 2014, Muruganantham 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. *Time* magazine named him one of its 100 most influential people in the world (Gupta, 2014). In 2016, he won the Padma Shri, India’s fourth-highest civilian honor. In 2019, the Women Leaders Global Forum, co-chaired by the OECD, World Bank, and World Economic Forum, awarded him the ‘Power, together’ award. By 2021, Muruganantham had installed more than 1300 machines in 27 Indian states and seven other countries (Jayashree Industries, 2020).

Muruganantham’s story validated Anil Gupta and NIF’s ideas that there was untapped genius among those with modest means and a limited technical background, and that harnessing it would produce broad social and economic benefits. It underscored C.K. Prahalad’s emphasis on untapped markets at the ‘bottom of the pyramid’. And of course, it resonated with the stories of famous Western innovators: men who had experienced extreme hardship to bring their crucial inventions to the world. A *New York Times* profile referred to Muruganantham as a ‘popular’ innovator who could cater to previously ignored constituencies (Bhattacharjee, 2016; Venema, 2014). And the Gates Foundation and other development organizations could use his technology to demonstrate how markets could be leveraged to address poverty. Muruganantham’s website embraced this role. It noted his origins ‘from a poor background in the South of India’, and identified two problems his machine solved: the high cost of disposable
sanitary pads, and ‘the issue of rampant unemployment amongst the poor in rural, urban and semi-urban areas of all developing nations.’ (Jayashree Industries, 2020) He characterized his machine as ‘Small is beautiful’, using the title of economist E.F. Schumacher’s (1973) book, which had launched the appropriate technology movement in the 1960s (Cherlet, 2014; Pursell, 1993).

But unlike appropriate technology, which also focused on small scale interventions as the key to international development, inclusive innovation saw market generation as crucial. Multiple movies and documentaries showcasing Muruganantham’s machine underscored this dimension. The Oscar-winning documentary short film Period. End of sentence highlighted a self-help group in Uttar Pradesh, in North India, that received one of Muruganantham’s machines and other training and equipment to start a disposable sanitary pad-making business. These materials came from The Pad Project, a US-based NGO established by educators and students who learned about the problem of ‘period poverty’ and Muruganantham’s machine at the UN’s Annual Commission on the Status of Women in 2013 (The Pad Project, 2022). Like the KAP studies, the 26-minute film demonstrates adolescent girls’ lack of knowledge about menstruation and sanitary pads, and highlights statistics about the link between inadequate MHM and education. But it also showcases the stories of SHG members, and how participation in the social enterprise is transforming their lives. It opens, for example, with an interview with a young woman who dreams about becoming a special investigator with the Delhi police, and suggests that the confidence and resources created through the sanitary pad-making enterprise will allow her to follow her dreams. Later, the filmmakers emphasize that the SHG decided to brand their sanitary pads under the name ‘Fly’, because they want women to ‘soar’. The film’s success – in addition to its Oscar win, it is distributed globally by Netflix – has allowed The Pad Project to expand its activities, including placing nine of Muruganantham’s machines in two countries.

The film’s strength lies in how it establishes the legitimacy of inclusive innovation for international development. Like both KAP studies and the Indian government, it demonstrates how the technology represents the desires of Indian girls and women who have been traditionally disadvantaged. It provides evidence that girls and women readily embrace it and use it. The market becomes a catalyst for them to achieve their dreams, underscoring the idea that the technology is rooted in democracy.

As the MHM case became the iconic example of inclusive innovation, it reinforced the idea that science and the market represented the public interest better than the government. After all, the technology was no panacea and the government could have regulated it in multiple ways. India’s government deployed incinerators at schools to facilitate disposal, but of course menstruators discarded the pads everywhere. Furthermore, incinerating plastics could create new, and potentially more toxic, forms of air pollution (Chadha, 2015). And, there was essentially no quality control for these low-cost pads. UNICEF, the Indian government, and the other organizations involved in promoting the pads often referred to the importance of ‘high quality’ materials, but the Bureau of Indian Standards (BIS) maintained only a voluntary certification system on the physical composition of sanitary pads, and the menstrual hygiene program left additional standard-setting and oversight up to states (Bureau of Indian Standards, 1980). But none of these
shortcomings were seen as important enough to require regulation or otherwise modulate uptake. The public, it seemed, had determined that the risks were not significant. In this view, role state’s role was simply to create the conditions to foster innovation and the marketplace, which would ultimately benefit society.

**Conclusion**

This analysis shows that inclusive innovation does not simply provide grassroots solutions to the obvious problems of international development. Rather, it is shaping our understanding of development problems themselves. MHM became a development concern not just because it had been identified in the scientific literature and then promoted by policy entrepreneurs (Kingdon, 1984). Rather, the scientific and market ways of knowing the problem made a difference. Public health researchers quickly converged on the KAP approach, which brought with it the assumption that MHM was a global problem, and then focused on characterizing it. Meanwhile, MHM became a more urgent concern when UNICEF, the Indian government, and organizations dedicated to inclusive innovation identified the low-cost disposable sanitary pad as an ideal solution not only because it helped low-income girls and women with their menstruation but also because it could stimulate gender equity and economic empowerment through the participation of SHGs. The KAP studies took advantage of this growing support, and used emerging sanitary pad entrepreneurship to argue that the problem they had identified was important, singular, and easily solved. This surely helped to increase MHM’s profile in the international development world, as an opportunity to score an easy win. But the KAP studies and low-cost disposable sanitary pad solution were also able to amplify MHM because they seemed politically legitimate. KAP studies claimed to capture the voices of the subaltern in quantitative, often statistically significant ways, while sanitary pads became successful because they were produced and consumed by Indian girls and women and invented by an Indian man.

These scientific and market ways of knowing also shaped inclusion and innovation. In some ways they expanded definitions of both by including more LMIC experts and institutions, even those like Muruganantham who lacked formal technical training. And innovation now included seemingly mundane interventions that had been reimagined for new audiences. However, they also largely excluded girls and women as knowers or innovators. While the KAP methodology claimed to represent their voices, it pathologized traditional practices and characterized their behaviors as ignorant. Practitioners of indigenous knowledge systems, and girls and women’s innovations to manage their menstruation for centuries, were rendered primitive. Simultaneously, the epistemology of inclusive innovation made it impossible to consider interventions that might not generate markets but might sustainably serve the needs of Indian girls and women, like better latrines. Overall, it was a missed opportunity to value the knowledges of Indian girls and women, which could have produced a different kind of empowerment. Ultimately, even in a place like India that has a more expansive view of technology, inclusive innovation is driving development toward problems that have not just easily measurable, but also commodifiable, solutions. And gender equity is defined by participation in these markets as producers or consumers.
These findings should concern STS scholars and others dedicated to bringing the public interest more explicitly into technological design and implementation even beyond the domain of international development. This includes those invested in enhancing public participation in technological development in order to ensure political legitimacy and societal benefit, as well as those anticipating the ethical, social, and equity dimensions of emerging technology in order to inform its governance. The analysis provided here suggests that efforts at inclusion cannot escape the prevailing political economies of innovation that tend to privilege scientific, technical, and market perspectives. It should force us to reflect on how this context constrains our understandings of innovation, inclusion, responsibility, and participation, and then consider how we might free ourselves to develop more democratized approaches.

Acknowledgements

I am grateful to Sergio Sismondo, Monamie Bhadra Haines, Kelly Moore, and two anonymous reviewers for their invaluable comments on this manuscript, and to Dina Emam for her research assistance. Thanks also to audiences at York University, University College London, Northwestern University, and Hong Kong University of Science and Technology, where I presented previous versions of this article. Finally, I deeply appreciate the time and insights my interviewees provided.

Funding

The author disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by University of Michigan’s Institute for Research on Women and Gender, Office of Research, and Ford School of Public Policy.

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