18 Fair Work, Feminist Design, and Women's Labor Collectives

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The complexity of global supply chains has led to a lack of the transparency and monitoring practices meant to ensure fair working conditions (Arora and Thompson 2019). Factories producing goods for an international market often operate in developing countries where labor is cheap and regulations are weak or challenging to enforce. Some industries, like the garment business, handicrafts, sanitation, and salon services, are female-intensive, with women often constituting much of their workforce (Huq 2019). In such a global and gendered labor operation, communication between workers, employers, nongovernmental organizations, and other vested intermediaries remains a challenge, given the multiplicity of cultural, social, and political contexts spanned by such value chains. The many layers of disconnection and alienation between those who work at the bottom of the value chains—often informal labor—and these various intermediaries render invisible the complexities of lived experiences and situational dynamics that structure inequality into the workplace.

Negotiating fair work conditions and communicating needs become particularly challenging for women in these contexts, given the way globalized markets add a layer of precarity[1] over existing gender-related inequalities. Hazardous working conditions are a marker of the global sweatshop regime (Selwyn 2016). Complicating this, women are more vulnerable due to gender and traditional hierarchical structures, often facing harassment and violence—whether verbal or physical—and extreme pressure to increase their productivity. For instance, according to a 2019 report by the Centre for Policy Dialogue in Bangladesh (Moazzem and Radia 2018), 70–80 percent of female garment workers either experience or witness abuse at work. They are often subjected to sexual harassment, molestation or assault, and extreme verbal abuse within their working environments. Due to the dearth of bargaining agencies or worker unions (only around 10 percent of factories are unionized) and the fear of further harassment or losing their jobs, most of these workers avoid disclosing these incidents and openly collectivizing.

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In recent years, extraordinarily cheap data plans and mobile phones in low-income countries have paved the way for the "next billion users"—that is, first-time consumers of digital platforms[2]—to express and organize themselves (Arora 2019). Crowdsourcing platforms, social media, and mobile technology are creating novel opportunities for dialogue in which laborers can access information on rights and share grievances about their working contexts. Corporations and labor rights organizations can gain insight from these collective digital engagements to monitor working conditions and create more supply chain transparency. Moreover, novel digital storytelling campaigns have reenergized these dialogues, leveraging the creative collectivities and imaginaries of everyday people to mobilize and institute change (Hull and Katz 2006; Jiang and Esarey 2018). Not only have digital platforms become important sites for social activism and lateral communication within labor communities, but they also serve as novel matchmakers between laborers and employers, with a promise to professionalize otherwise informal services.

While these are encouraging developments, stringent sociocultural norms in dominantly patriarchal systems continue to act as barriers to women's ability to empower themselves through such digital infrastructures. According to the GSM Association 2020 report *Connected Women*, women in low-income contexts are 20 percent less likely than men to use mobile Internet (GSMA 2020). The reality among many of the women workers in these precarious working conditions is that they have limited access to mobile phones and the Internet; often have to share their phones with their family members; are mandated to request permission from their husbands, fathers, and brothers to use basic social media platforms; and can pay a high price for openly expressing themselves on the Internet, as their actions are closely tied to family and community honor (Arora and Scheiber 2017; Barboni et al. 2018).

For the Internet to become a critical humanizing and empowering tool for women workers as they seek fair work, it is essential to adopt a feminist approach to global development and design—one that would by default consider the lived experiences and contexts of a diverse range of users. Such an approach would inform both technological and social aspects of infrastructure in a manner that not only includes women and other marginalized identities but also the possibility of encouraging the formation of productive collectives. This chapter proposes a feminist approach to labor collectives and platform design by decentering the discourse and practice around global value chains and labor movements in ways that pay heed to the concerns, grievances, aspirations, tactics, and strategies of women workers in low-income contexts and precarious conditions and industries. We offer a conceptual roadmap for makers and implementers of communication technologies that imagines how design can be informed by

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the voices of female workers at the bottom of supply chains. Such technologies could afford (digital) collectivization, amplification, and redress, and thus become tools that redesign the planetary market as humane, ethical, and responsible sociotechnical infrastructures of care.

To make the argument for such an approach to design, we first provide an overview of the gendered nature of global value chains and the precarities that result, including those that emerge from new ways of accounting for and recognizing labor, and then proceed to discuss the possibilities of collectivization opened up by networked digital tools, leading into feminist approaches to technology design, particularly in the context of emerging economies. We then offer a roadmap for a new approach to the design of communicative interfaces that draws on an understanding of the lived experiences of women workers at the margins. This roadmap envisages a pathway to change driven by (1) insights from feminist perspectives, (2) a focus on engagement of the most marginalized, and (3) principles of feminist design.

Gendered Dimensions of Global Value Chains

While the most recent wave of globalization has had far-reaching impacts on ways of life and work, it is only in the past decade or so that the gendered nature of inequality stemming from transnational flows of labor, capital, and goods—as well as from processes of automation and mechanization—has been systematically documented (Bassett, Kember, and O'Riordan 2019). Decades of research on global supply chains has revealed that while global development and innovation have long rested on the linkup of local suppliers with transnational firms, these linkups have become "global poverty chains" (Selwyn 2016). Revelations include "how workers in these chains are systematically paid less than their subsistence costs, how transnational corporations use their global monopoly power to capture the lion's share of value created within these chains, and how these relations generate processes of immiserating growth" (Selwyn 2016, 6).

It is no secret that global capitalism has lost much of its legitimacy as a system that can be relied on to provide equal opportunities that enable self-mobility to improve human welfare and enhance livelihoods. The myth of the free-market system is realized through the hypermonopolization of industries, leaving behind many more people and widening income and opportunity gaps. For instance, global brands in the garment sector in South Asia have increasingly pushed wages below subsistence levels. The high-tech company Apple has come under fire for turning a blind eye to the military-style labor regime deployed by their partner in Taiwan, Foxconn—including the draconian monitoring of workers' movements, few to no toilet breaks, and intensification of the workday with

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little overtime compensation—which has led to suicides and a wave of public protests (Chan, Selden, and Pun 2020). This comes through viscerally in the numerous worker blogs that document their experiences at Foxconn for the world to see and feel their plight: “To die is the only way to testify that we ever lived. Perhaps for the Foxconn employees and employees like us, the use of death is to testify that we were ever alive at all, and that while we lived, we had only despair” (Chan, Selden, and Pun 2020, 3).

Multinational corporations are thus under pressure to rethink their strategies of disaggregation and reconstituting of human value. Advocacy from activists and humanitarian organizations has forced some companies to recognize that they cannot simply externalize their moral responsibility nor easily dehumanize and devalue their workforces, especially in this age of digital activism.

Despite an abundance of research in this area, there continues to be a significant gap in our understanding of how gender shapes the experience of work life, including but not limited to concerns around security, freedom from the threat of gender-based harassment, and child and elder care, all of which need to be factored into the workings of global value chains and the fashioning of labor conditions and rights (Maertens and Swinnen 2012; LeBaron and Gore 2020). This lacuna is surprising, given the fact that women serve as the backbone to several global industries in developing countries, from the food supply chain in Africa to the apparel industry in Bangladesh. The few studies done in this area have found that women’s status of informality and systemic exclusion from contractual work has misrepresented the extent of their contribution and participation in global supply chains (Maertens and Swinnen 2012; ILO 2018; LeBaron and Gore 2020). Recent surveys of the informal labor market by the International Labour Organization (ILO) and other multilateral agencies have brought to the fore the deeply gendered nature of disadvantage, particularly in the informal labor sector, which in the emergent economy is made up mostly of women (ILO 2018).

Forced labor is widely acknowledged to be an endemic feature of the contemporary global economy, and women are particularly vulnerable and disproportionately impacted by this (LeBaron and Gore 2020). For instance, in the cocoa supply chain in Ghana, LeBaron and Gore (2020) found that women experience nonpayment, underpayment, withholding of payment, physical violence and verbal abuse, threats of dismissal, deception, nonphysical coercion (especially food deprivation), and sexual violence. The authors discovered that “women workers tend to experience more severe forms of labor exploitation within the cocoa industry than men, and that business models are configured to profit from women’s unequal position within the industry and society more broadly.” (1097). They argue that the way to dismantle such gendered regimes lies in restructuring labor norms, division of labor, payment practices, and

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income; increasing women's land access and ownership; providing clear avenues of redress and access to justice; and enhancing women's status within the household and family environment.

Surveys done on the gender dimensions of labor conditions in the agro-food supply chain in sub-Saharan Africa have revealed that women's labor is not formalized. This is due to patriarchal sociocultural norms dictating that they cannot work outside the home and family farm. Many women are thereby not registered and do not have a bank account, and are often not allowed to claim their personal income. Widespread illiteracy among the women further deters them from seeking contractual agreements (Maertens and Swinnen 2012). This finding builds on prior studies that point to occupational segregation as an issue (Anker 1997; Kabeer, Stark, and Magnus 2008), with men usually being given permanent positions and higher-skilled jobs while women get low-skilled and casual or seasonal jobs, resulting in indirect wage discrimination. However, compared to other forms of traditional employment for women, jobs within the global supply chain were nevertheless found by Maertens and Swinnen (2012) to be less discriminatory. With strategic interventions of upskilling, contractual assistance, and control over finances, there remains the promise of a pathway toward formalization and dignity of labor conditions.

With the rise of the gig economy and digital intermediation of labor, there is a question of whether gender inequities travel over to the digital space or are being reconfigured in the design of these platforms. Certainly, reinvention coexists with the pressure to maintain the status quo. Recent studies on gender differences within the platform economy reveal that the gender wage gap persists, as women desire more flexibility because of their higher domestic responsibilities than men, impacting their level of participation and hourly wages (Foong et al. 2018; Hunt and Samman 2019). Moreover, gender inequalities in pay and workplace evaluation in the broader labor market often persist in digital labor marketplaces.

For example, in marketplaces with platform-determined rates, women tend to earn less due to behavioral differences (e.g., how fast they drive, in the case of ride-sharing apps). On cloud platforms with varied rates that depend on reviews, women tend to receive fewer and less favorable reviews than men (Foong et al. 2018), impacting their position in search rankings and thereby their employability. Also, men tend to overestimate their value compared to women in their profiles and self-descriptions (Foong et al. 2018). At the same time, it is difficult to deny that these platforms allow an increased participation of women in the labor force through their remote work opportunities, and they also serve as an entry into diverse industries with the possibility of advancing and professionalizing one's services—more so than traditional work options.

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But what seems to be emerging is that even as opportunities are created, there remain significant gaps in access to fair work conditions and sensitivity to the lifeworlds that women must negotiate. If technology is the force that creates such opportunity, we argue, it can also become the tool that helps recreate the space of work.

Organizing Digitally and Formalizing Labor Solidarity

Digital information and communication technologies offer the potential to pioneer scalable solutions, where workers—both informal and formal labor pools—are included in information loops and can gain visibility and voice. A recent study analyzing three crowdsourcing tools designed for employer and worker dialogue in the garment industry argues for new forms of digital unionization to create systemic change in the labor movement of the twenty-first century (Arora and Thompson 2018). The authors recommend four elements that could strengthen monitoring systems for mitigation of labor exploitation: (1) the platform and its specific affordances; (2) design, which needs to be accessible, user-friendly, and based on workers' digital literacy skills; (3) marketing and engagement efforts through leveraging already-popular usage behavior such as Facebook use in addition to local radio advertisements; and (4) well-researched and dynamic content that covers the most important issues for workers to learn about and to report on, and that can be regularly updated to ensure user interest and motivation.

These elements can open up the possibility for workers to receive information on their rights, factory standards, and other issues meaningful to them. A platform's design should allow workers to share grievances anonymously through open-ended messages or surveys. The collected and computed data can thus create transparency down the supply chain, which can hold corporations to account for their insufficient monitoring practices. This can be a scalable and less costly monitoring practice than traditional audits and a potentially more effective way to detect exploitation. However, these tools are not stand-alone mechanisms, and they operate within a regulatory environment that can either disincentivize or encourage their use. Therefore, enforcement mechanisms such as local labor laws and regulations both directly and indirectly affect workers' empowerment (Arora and Thompson 2018, 2326).

Even as technologies that encourage bottom-up reporting, collectivization, and administrative transparency promise social transformation,[3] there are questions about their use on the ground and their actual impact. The design of these platforms can strongly affect the ways in which they enable empowerment and outreach for social change. While digital tools can contribute to breaking the silence and help support expression of unfair treatment and human rights violations, systemic change can best

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occur when there is stakeholder buy-in to incorporate these changes into the material conditions (Graham and Woodcock 2018). Civic social and digital collectivities of volunteerism, while showcasing the virtues of solidarity, also reveal the designs of institutional practice that give rise to and even perpetuate such inequality. As Tolentino (2020) argues in the *New Yorker*, "We can be so moved by the way people come together to overcome hardship that we lose sight of the fact that many of these hardships should not exist at all." The recognition of structural inequalities thus begs reform at a much more fundamental level, in a manner driven by a different value system—one characterized by care and empathy rather than dominated by concern about efficiency and productivity.

Drawing on Feminist Thinking

The Asia Floor Wage Alliance (AFWA), a global coalition of trade unions and human rights organizations, reports that while women are the dominant work group in the textile and export industry, increasing and structural violations are risking their well-being; this demands a more feminist approach to reporting these matters (AFWA 2019). Global Labour Justice, in their reports to the ILO, have revealed that women factory workers in global supply chains are often forced to meet unrealistic productivity targets, and failure to do so results in verbal, sexual, and physical abuse (Rahim 2020). Moreover, gendered exploitation often intersects with caste- and religion-based discrimination. Human Rights Watch reports that there is a lack of meaningful implementation of laws and guidelines against sexual harassment in these settings, and that company audits rarely mention incidents of abuse despite evidence to the contrary (Huq 2019).

Women workers face specific vulnerabilities, such as the possibility of miscarriages due to long working hours, no access to sanitary pads, and sexual harassment. However, this limited, instrumental view does not recognize the deep sociopolitical and gendered values behind the physical, digital, and legal infrastructures in place for female workers (Prentice et al. 2018). It is therefore important to take a more holistic and multistakeholder approach to the context of work and measures of productivity to promote the well-being of female precarious workers.

We propose that, given the rich history of women's movements in diverse marginalized contexts (Shiva 2016; Badri and Tripp 2017), it is important to explore how women workers could use digital tools that enable lateral communication and administrative transparency to organize themselves and strengthen their positions at work. While the history of women's movements has been closely tied to issues of land, labor, and utility-driven justice, it would be instructive to understand how recent digital affordances could intervene and broaden these paradigms to allow aspirational justice of

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self-actualization and increased personal freedoms via stable, secure, and soul-fulfilling employment. In the next section, we describe how a feminist approach could help inform development and design in a way that accounts for the specific experiences of women in informal labor, particularly in conditions of precarity.

Applying the Feminist Lens to Development and Platform Design

At its core, feminist thinking seeks to redress equations of power to acknowledge the differential experiences of those at the margins. In the context of labor relations, questions of concern might include the following: How can female workers gain more direct access to information on rights and working conditions? How can platforms be designed to protect women workers in the gig economy from vulnerabilities associated with gender hierarchies and skewed sociocultural norms? Can precarious laborers trust crowdsourcing tools and social media groups so that they will share their plight and report on work-related injustices? Can cloud work and gig economy platforms be used to mitigate gender-based discrimination and create more equitable labor markets and supply chains?

A feminist-informed approach to gender-related issues, including harassment and gender-skewed workplace affordances, requires looking at the context and culture of work, and the ways in which intermediaries—technologies, infrastructures, legal and regulatory systems—are planned and implemented, to gain insight into the gendered interactions between the human and nonhuman actors in a sociotechnical system. Undergirding such an approach is the recognition that technologies are inscribed with values (after Haraway 2013), including that of gender and that to build (rather than rebuild) structures and tools would require us to work from behind the interfaces and beneath the systems (Raman and Komarraju 2017). Proceeding from Sandra Harding's (1986) understanding of gender as an organizing principle that moderates—even creates—meaning, prefigures social relations, and structures identity, such a project of construction decenters technology while emphasizing the interactional and meaning-making processes that it affords.

Studies have shown that not only are existing technologies—platforms and social media tools in this instance—used differently across genders, but the social and cultural systems in which they are embedded privilege the male user (Wajcman 2007). This may be addressed in part by including women and other minority genders at the design and development stage (Faulkner 2001), but perhaps more effectively by including the perspectives and the lived experiences of women who use or could use such technologies. One would have to begin by understanding ownership and control of digital devices and access to networks, as well as modes and meanings of usage,

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before one could explore opportunities for participation and organization using such technologies. Ott (2018, 94) noted that "the technologies embedded in social media platforms contribute . . . to the formation of our networks," and the "presumed democratic environment" they offer is rarely realized, as users have limited opportunities and capabilities to participate in it.

The challenge, then, is how to apply feminist design principles (fostering openness, participation, and community) in building technology within a patriarchal system, with the affordances that will allow users without privilege to participate and gain from it. Exploring this in the context of Bangladesh, Sultana et al. (2018) found that designing technology for underprivileged women forced negotiations between the (absence of) feminist ideas in the community and the goals of the feminist design project. Women in such contexts, they noted, fearing possible backlash from their families, were reluctant to or simply could not make use of tools even when they were made accessible. Feminist principles have in recent times permeated the field of human-computer interaction, where a push to examine understudied cultures and geographies has led to the application of ideas such as Chandra Mohanty's feminist solidarity to technology design (Kumar et al. 2019). Key to this approach, which builds on commonalities while attending to the particular, is the incorporation of such values at every stage of technology design and deployment, a recursive process that imagines the user in context.

A feminist framework put forward persuasively by Anita Gurumurthy and Nandini Chami (2017) of the Bangalore-based IT for Change places the right to communicate at the center of a reconfiguration of the network economy, arguing that this can guide a more ethical, empathetic approach to thinking about digital technologies, development, and gender in a planetary economy. While research in the information and communication technology for development field has acknowledged the potential for digital technologies and networked media, including mobile phones and social media, to help share and amplify voice for women workers, there is a parallel recognition that given the commercial nature of these platforms, there is the distinct possibility of reproducing existing power hierarchies and maintaining the status quo at the macro level (Cummings and O'Neill 2015). As a result, even as research tells us that women participate in organically formed kinship and neighborhood communities, that they share communal and caregiving tasks, and that they have historically collectivized and accumulated power in numbers, platforms rarely afford such mobilization through their interfaces. This speaks to an urgent need to rethink the very structures of communication technologies—including their design and deployment—as intrinsic to challenging such patriarchally determined structures of power and to making voice amplification meaningful.

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A feminist approach has at its foundation a sensitivity to the local, disparate, lived realities of women and identifies and nurtures opportunities for collectivization that challenge the paternalistic, patriarchal structures of domination—in both mediated and proximate contexts. It is predicated on listening and allowing models of negotiation to emerge from the bottom up, and aims to build affordances into technologies that are responsive to women's needs, while allowing for a new imaginary of change.

Gender Bias in Data Governance

To understand and disrupt the gendered dimensions of algorithmic injustice (where computer code predetermines relationships of power), it is important to attend to how women are represented and computed on the Internet, not just as individuals but as a group. Discriminatory practices on the Internet often stem from the continued sharing of stereotypes and traditional framings of women that become the data feed, fueling such reproductions. Hence, we need to critically attend to these meaning-making processes and allow for a more flexible imaginary of digital belonging as part of feminist design.

It matters how women are conceptualized as a group, as a category, and as a cluster in today's algorithmic age, as data collectives enable the amplifying of a narrative, an audience, and even policymaking. Take for instance the gender-based policies that the Peruvian and Panamanian governments instituted at the onset of the COVID-19 pandemic to regulate the number of people out in public. They passed a policy that allowed only men or only women to travel on alternate days (Woskie and Wenham 2021). It turned out that this measure forced women to gather in large groups on their given days, as domestic work such as household shopping was relegated to them. Moreover, there was backlash from LGBTQ+ activists because transgender and nonbinary people faced increased street harassment by police. Within a few weeks, both governments were compelled to get rid of this policy, recognizing its uneven impact.

Glorifying women hardly works either. When Barack Obama, in solidarity with and support for women, announced that women are better leaders than men (Asher 2019), he inadvertently tapped into the long-standing, unreasonable expectations women have faced to "doing it all" and being the "superwoman"—as hard workers, good savers, moral guardians of society, the virtuous gender, bearing the burden of all that is best and pure of a community (Ross 2017). When they fail, they often receive severe social punishment in the form of loss of their job, loss of their reputation, loss of status, and even loss of life to preserve the community's honor.

Other forms of misrepresentation pervade the masculinization of certain work sectors. A typical image of a farmer or a construction worker is male. The pervasive media narrative builds empathy for the male worker struggling to put food on the table for his

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family. The reality, however, is that women constitute a dominant or at least a substantial part of the construction and agricultural sectors across the Global South (Williams, Devika, and Aandahl 2015). For instance, half of India's 30 million construction workers are women. Women hold the key to food production in most parts of the world, including Africa, where women grow 70 percent of the food (Agarwal 2018). According to the UN Food and Agriculture Organization, women account for an estimated two-thirds of the world's 600 million poor livestock keepers.[4] These misrepresentations of sectors such as construction, agriculture, and livestock as being male dominated have added consequences during COVID-19 times, as national bailouts are often tied to formalized arrangements of labor and mediated through the datafication of welfare systems.

When work is feminized—such as in the increasingly recognized "care economy," where healthcare and education take precedence—we often find a devaluation of women's labor, reflected, for instance, in pay gaps between women and men and lower-status jobs (Dengler and Strunk 2018). This stands as a remarkable irony, given that the rise of automation in work already signals that such caregiving is hard to automate and will become more desirable and in demand as economies adapt to this technological future.

The fact is that any simplistic dichotomy prompted by concepts such as the gender divide and the digital divide is problematic, as it denies the fact that being human is essentially a contradiction of roles, statuses, and interests, reflecting the complexity of social life. It is simplistic to believe that access to technology, upskilling, or bridging the pay gap alone can achieve gender equity. Gender equity is very much a "wicked problem," where the solution of one problem, for example increasing women's participation in the workforce, can—especially in patriarchal societies—create other issues, such as the rise of violence against women due to spousal jealousy and the imposition of other regressive gender norms. In our approach to designing feminist systems, both socioeconomic and digital, we need to first demystify the framing of women groups/clusters and allow them the chance of being diverse, and even—dare we say it—ordinary.

Roadmap for Feminist Development and Design

Networks of labor—both formal and informal—are intricately linked to the myriad webs of power and consumption that fuel the planetary system. The digital and data infrastructures that drive the world economy, and shape and funnel information flows, also affect the lives of workers far removed from Wall Street and Silicon Valley. As socioeconomic and financial systems become digital in the Global South, we need to ask who and what determines how women workers are represented and reproduced on the Internet, how communities are formed and sustained, and whether and what kinds of change are possible.

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Feminist design has at the heart of its objective the reordering of the social and political world, a refashioning of the tools we use to see, explain, and interact with it. At a more fundamental level, designing communication infrastructures that realize such a vision would draw directly from the lives of women and other marginalized groups that occupy the peripheral regions of the network. Shifting the conversation and the action to an inclusive approach to technology development would require the active participation and reeducation of multiple actors across the value chain, from policymakers to corporations to developers. This roadmap would possess the following three characteristics:

1. Insight driven Feminist design recognizes the complex and layered realities of the most disadvantaged workers in global value chains—women—and understands how communication technologies could both empower and complicate their lives. For instance, among the poor, mobile phones are often a shared resource, with the woman having the least right of access and little privacy or control over use. Carving out time and acquiring the capacity for meaningful and productive use of technology would necessitate advocating for contextual change. In other words, design would need to account for the social and cultural dimensions of use while imagining the consequences of shifting power dynamics within the home, in workspaces, among peer groups, and in relation to the state.

2. Engagement driven Based on a deep understanding of vocabulary and affect, how might we cocreate a narrative of change with marginalized women? Can visual and aural forms be used to include these women in setting terms with and demanding responsibility from employers? Can such vocabularies then become elements of technological interfaces that engage rather than alienate? Action research and digital storytelling can be powerful tools to aid in this process. Audiovisual and immersive storytelling plays an important role in building collaboration by highlighting key messages from the marginalized majority (Arora 2019), showcasing different points of view and signposting blind spots that can otherwise be left out of purely textual formats. We can take a page from Kolb's (2014) five steps of design—empathize, define the problem, ideate, prototype, and test—to translate insights into outreach for change.

3. Design driven Traditional design assumes a thinking-from-above mindset, an approach that architects change from above. However, feminist design is about bottom-up thinking. It begins with the imagination of social justice as it may be experienced, not conceptualized. In practical terms, for women in the informal labor force, it is prompted by questions of fairness, equity, and care, and the infrastructures that would have to be put in place that realize these values. This addresses specific issues, from making visible the cultures of servitude that limit professionalization (such as in

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the domestic work sector in Southeast Asia), to working through the oppressions of family, to broader questions of privacy, data gaps, and algorithmic control.

Women workers at the bottom of global value chains are in fact the most crucial links in the global poverty chain. Creative use of technology that is thoughtfully designed and sensitively implemented can go a long way in building women's capacity to create nurturing work communities. Such collectives can advocate for changes that are collaboratively agreed upon and can build toward a more just, equitable future.

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Notes

1. The 2013 collapse in the Dhaka District of Bangladesh of the multistory Rana Plaza garment factory, which supplied multinational companies like JCPenney and Walmart, has become emblematic of the precarious work conditions occupied by many women workers at the bottom of global supply chains.

2. In this chapter, we use *platforms* to mean the wide range of communication interfaces now available on mobile devices, ranging from social media such as Facebook to messaging services like WhatsApp, as well as more narrowly focused tools developed for business-to-consumer or business-to-business communication and exchange.

3. Some examples of bottom-up digital tools for collectivization include Ushahidi, a crowdsourcing platform initially developed in 2008 for people to report violence during the elections in Kenya but now used for other grassroots initiatives; LaborVoices and Quizrr, nonprofit companies that launched platforms among factory workers to gather insights about their working experiences to inform brands and pressure them to improve work conditions; and Kamako Chhnoeum (Outstanding Worker), a crowdsourcing project run by the nonprofit organization Better Factories Cambodia, part of the International Labour Organization.

4. See http://www.fao.org/reduce-rural-poverty/resources/resources-detail/en/c/468431/.

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