“WE LEARNT THAT BEING TOGETHER WOULD GIVE US A VOICE”: GENDER PERSPECTIVES ON THE EAST AFRICAN IMPROVED-COOKSTOVE VALUE CHAIN

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ABSTRACT

Improved cookstoves (ICS) have been promoted for several decades, with little success. Advocates looking to drive uptake encourage greater involvement of women in ICS enterprises, on the largely unproven premise that women’s participation in the value chain will enhance their financial bottom line while giving a boost to ICS sales. This paper tests the validity of that premise, using qualitative evidence from East Africa. The analysis shows gender-differentiated outcomes for enterprises across the value chain. Women-led enterprises are significantly underrepresented at higher levels of the chain, where sales volumes are highest. Value-chain positioning also influences access to key inputs like finance, potentially reinforcing the gender divide in enterprise performance. The findings challenge the dominant narrative in the ICS field about the inevitability of the link between market participation and economic empowerment for women and indicate a need to look beyond conventional market models to enhance financial outcomes for women.

KEYWORDS

East Africa, energy, entrepreneurship, gender, improved cookstoves, value chain

JEL Codes: B54, D21, L26

INTRODUCTION

Women are involved in all stages of [the] ICS supply chain. We are trying to demystify this myth that ICS only is for men … Access to finance is a main issue owing to the traditional perception that women are supposed to be homemakers.

–Male ICS entrepreneur, Tanzania

Improved cookstoves (ICS) have long been promoted by a variety of actors as a solution to the environmental and health problems associated with...
the traditional use of biomass fuels (primarily wood and charcoal, but also relatively inferior fuels such as animal dung and crop waste; Saatkamp, Masera, and Kammen 2000). Women and girls often disproportionately bear the physical burden of gathering these fuels, sometimes over long distances and difficult terrain, with adverse implications for their well-being and economic productivity (Parikh 2011). Fueled by these concerns, concerted ICS promotion efforts began in the 1970s, largely led by traditional development actors such as state and donor agencies (Bailis et al. 2009). The ICS field has since widened to include market-oriented actors, reflecting an eschewal of the widely critiqued subsidy-enabled regime of the 1970s and 1980s and a more recent embrace of neoliberal ideology in the field and in international development generally (Barnes et al. 1994; Adriànsen 2010). The common aim uniting these approaches is the goal of realizing widespread ICS uptake in the poor regions that are most affected by the hazards of traditional biomass use. However, notwithstanding the diversity of efforts and the demonstrated benefits of many ICS technologies (notably, from a user standpoint, substantial reductions in fuel requirements), rates of uptake and use have remained obstinately low (Bensch, Grimm, and Peters 2015).

Against the background of increasing global-level attention to women’s increased agency in ICS enterprise (Global Alliance for Clean Cookstoves [GACC] 2012) and local-level narratives (like the quote by the Tanzanian entrepreneur above) that suggest a more nuanced picture on the ground, this paper takes a closer look at how and where women are involved in the East African ICS value chain, particularly relative to men.

Gender has been recognized as an important variable influencing the experiences of various actors within value chains (Barrientos, Dolan, and Tallontire 2003). Nevertheless, existing research on the gender-differentiated experiences of workers in value chains – especially at the local level – is inadequate (Riisgaard, Escobar Fibla, and Ponte 2010), making further inquiry into specific value chains a necessary knowledge enterprise. The dearth of gender analysis is particularly acute in the ICS value chain where, with the exception of research commissioned by a few major industry stakeholders (see, for example, ENERGIA [2015]; GACC n.d.a), attention has been scant. This deficit is all the more important given the sheer magnitude of the economic payoff that is expected to result from women’s involvement in the chain (Hart and Smith 2014).

Our paper addresses this gap by examining the content and outcomes of participation for women and men in the East African ICS value chain. In doing so, we challenge the dominant narrative regarding women’s empowerment in the sector and identify opportunities for advancing more substantive modes of participation among them. As Tali Mendelberg and Christopher F. Karpowitz (2016) recognize, the difference between the symbolic and the substantive representation of women in groups can mean
that women are physically present at the table but have less influence than men over the outcomes that are realized. It is therefore important to tease out, as our paper does, the value that is added to women in particular by their participation in specific enterprises. Our findings indicate that the global ICS narrative needs to move away from simplistic assumptions about the inevitability of ICS entrepreneurship resulting in women’s empowerment and give greater consideration to value chain configurations that might better align the global goal of increased ICS uptake with local expectations of benefit maximization.

GENDER, ENERGY, AND ICS ENTREPRENEURSHIP: A MULTILAYERED ANALYTICAL FRAMEWORK

The need for gender planning approaches that take account of the structural and practical differences between men and women in the design and delivery of projects is widely acknowledged in the literature (Moser and Levy 1986; Jackson 1996; Cornwall 2003; United Nations Development Programme [UNDP] 2004; Dunaway 2014). Not only are women and men recognized as having different needs that require different resource levels, they are also acknowledged as having different roles that are regarded and compensated differently by society (Moser and Levy 1986; Jackson 1993). Sylvia Chant and Matthew Gutmann (2000) point out that these differing roles, and their implications for access to resources by men and women, respectively, take on greater significance when they are considered in relation to one another and within the broader societal context.

This notion of relativity is particularly important because gender relations do not occur on a level playing field, but on one in which the balance of power is often tilted toward men (Chambers 1997; Guijt and Shah 1998). This is particularly problematic from an international development standpoint because, according to the United Nations WomenWatch (n.d.), women make up “the great majority” of the global poor. Men are generally acknowledged as having a higher starting-point than women at similar socioeconomic levels in critical areas such as access to finance, technical know-how, ownership and control of assets, freedom of movement, and access to energy (Clancy et al. 2016). This means that they are often better positioned than women to access the benefits of development programs targeted at households, groups, and communities. The same situation holds for more entrepreneurial interventions: Phyllis Kariuki and Patrick Balla (2011) note that while men and women face similar challenges in trying to set up businesses, the head start possessed by the former often puts them in better stead to overcome those challenges.

These gender disparities are evident in levels of access to employment in the energy sector, where women form a negligible percentage of
technical staff (6 percent) and an even lower percentage of managerial staff (1 percent; Baruah 2015). At the entrepreneurial level, women’s participation in the sector is constrained by many of the gender-specific challenges (notably access to credit and ownership of property and other assets) identified above (Baruah 2015).

In the ICS subsector, where women have long been accepted as active users of the technology, their integration into the value chain has been less straightforward (Shankar, Onyura, and Alderman 2015a). This is in spite of an array of programmatic efforts that have been targeted at realizing greater involvement of women in supply-side operations (Ramani and Heijndermans 2003). These efforts have registered a degree of success as measured by rates of women’s participation in energy enterprise; however, as Mipsie Marshall, David Ockwell, and Rob Byrne (2017) point out, there is still a long way to go in designing market and policy initiatives that neutralize the influence of repressive gender norms on the implementation and outcomes of clean energy projects in developing-country contexts.

The imperative to engage women in energy entrepreneurship is especially great due to an essentialist belief that “energy is women’s business” (Clancy et al. 2016: 25). This is especially the case in the area of household energy – the “reproductive” domain (Peterson 2003; United Nations 2003) – where women are traditionally ascribed a greater role than men. Women are the most negatively affected by energy deficits in this area, the logic goes, so they ought to be the most effective at promoting solutions to those deficits. Importantly, women, by virtue of their traditional roles, are thought to have higher social capital and relevant networks through which they can disseminate household energy products more effectively than men (Dutta and Muller 2015; Misra 2015).

This narrative of women-as-energy-purveyors is particularly potent in the ICS subsector where, in addition to their general role as household energy “managers,” women are mostly recognized and recruited for their role as “primary cooks” (Köhlin et al. 2011; Shankar, Onyura, and Alderman 2015a).

The current drive to increase women’s participation in the ICS value chain signals a transition from the previous paradigm of seeing women mainly as passive users of the technology to envisioning them as active participants, and even leaders, in its provisioning (Dutta 2015). Historically, gender analysis of ICS interventions has been focused on the power dynamics within households, particularly as they influence decision making about cookstove purchases. Less has been done to scrutinize gender relations on the supply side, at least prior to the recent wave of discussions around the potential that women’s involvement in the value chain has to meet their economic (“practical”) and broader
The two goals envisaged in the current women-centric movement – women’s empowerment and increased ICS uptake (GACC 2011; Clancy et al. 2016) – are assumed to be complementary, or at least mutually inclusive.

The GACC (hereafter, “the Alliance”) has been particularly active in promoting the agenda of increased women’s participation in the cookstoves value chain. Established in 2010 to “save lives, improve livelihoods, empower women, and protect the environment,” the Alliance sees women as being instrumental to its ambitious goal of distributing one hundred million improved (and “clean”) cookstoves through market channels by 2020 (Shankar, Onyura, and Alderman 2015b). The Alliance is not unaware of the gender-specific challenges that stand in the way of this lofty goal; indeed, it has attempted to address some of those challenges through evidence-based interventions. One such intervention was a 2013 randomized controlled trial (RCT) in Kenya in which the treatment group received, in addition to conventional entrepreneurship training, “agency-based” empowerment training aimed at overcoming the deeply rooted psychosocial inhibitions that prevent women in particular from maximizing opportunities open to them (Pick and Sirkin 2010; Shankar, Onyura, and Alderman 2015a). The findings of the RCT indicate that a considerable increase in agency was achieved for both male and female participants and that this was a strong predictor of higher ICS sales – suggesting that the Alliance’s psychosocial approach ultimately led to economic empowerment for the women.

Our paper contends, however, that the gains enabled by the Alliance’s psychosocial approach to empowerment training, with its focus on recruiting women as ICS retailers, come at the risk of losing sight of another critical dimension of empowerment – the economic dimension – that is consistent with its overall objective of increasing women’s influence in the ICS value chain. The rhetoric of empowerment in all its forms (social, political, economic, psychological, relational, and so on) fits especially well with gender equality objectives, as it presupposes a capacity to overcome the deficits that women start out with in the marketplace and other societal arrangements (Kabeer 1999; Arestoff and Djemai 2016; Cherayi and Jose 2016). Notwithstanding the visions of radical transformation it conjures, however, empowerment is often difficult to realize and measure in practice, and – as we will show in the case of the Alliance – gains made in one sphere or setting can be offset by losses or setbacks in another (Ganle, Afriyie, and Segbefia 2015; Lenao and Basupi 2016).

Crucially, as Shonali Pachauri and Narasimha D. Rao (2013) point out, the notion of economic empowerment is relative – particularly for women – and dependent on their positioning within larger occupational structures. This prompts closer scrutiny of where women are located within the ICS...
value chain and the implications of this positioning for how economically empowered they are relative to men.

Following the call by Marshall, Ockwell, and Byrne (2017) for “urgent” research into the ramifications of clean energy initiatives from a gender perspective, this paper examines the gender-differentiated outcomes of market-based efforts to promote widespread uptake of ICS in three East African countries – Kenya, Uganda, and Tanzania. In juxtaposing the experiences of women-led and men-led ICS enterprises in the study countries, the paper evaluates the extent to which the normative goal of empowerment through market participation expressed in the ICS literature is a reality for women entrepreneurs in the sector. We consider empowerment in a strictly economic sense, in response to the dearth of gender-differentiated analyses of the distribution of financial gains in the sector. Anne Marie Golla et al. (2011) define economic empowerment as a complex process encompassing women’s access to resources (including skills, capital, assets, and networks), their ability to appropriate those resources competitively in the marketplace, and the degree of control they have over the inputs and outputs of their enterprise. Our analysis indicates that the focus on economic empowerment is warranted, as the financial outlook for the majority of women-led enterprises in the study appears more modest than the mainstream rhetoric would suggest.

METHODS

The qualitative interviews that provided the primary material for this analysis were part of a larger study, from 2013 to 2016, of barriers to the adoption of ICS in East and southern Africa in which cookstove users were the primary focus of investigation. The ICS enterprises involved in this “value chain” component of the work were selected to reflect a broad range of widely available, bestselling ICS in each country (the Kenya Ceramic Jiko, Jiko Kisasa, and rocket stove in Kenya; the Kenya Ceramic Jiko and LPG stove in Tanzania; and the Smart Jiko, LPG stove, and Ugastove in Uganda), as well as a handful of stove types in lower demand (such as the Envirofit stove in Tanzania and the Burn stove in Kenya). Questions were asked about the enterprises’ product profiles, target markets, sale volumes for the preceding year, organizational structures and norms regarding gender, external support structures, access to finance, and operational enablers/constraints.

Along the lines of the household interviews conducted in the larger study, the enterprises in the value chain sample were selected to be representative of those located in urban as well as rural areas. Small-, medium-, and large-scale enterprises (defined as businesses with annual sale volumes of less than 5,000, 5,000–10,000, and more than 10,000 ICS, respectively) were
Table 1 Final composition of ICS enterprise sample in the study countries

| Scale     | Kenya Rural | Kenya Urban | Uganda Rural | Uganda Urban | Tanzania Rural | Tanzania Urban |
|-----------|-------------|-------------|--------------|--------------|----------------|----------------|
| Small-scale | 3 | 0 | 9 | 8 | 2 | 5 |
| Large-scale | 2 | 1 | 0 | 2 | 1 | 1 |
| Medium-scale | 1 | 2 | 1 | 0 | 0 | 0 |
| Total      | 6 | 3 | 10 | 10 | 3 | 6 |

selected to represent the range of operational capacities available in each country. (Detailed sales data were only collected for the immediate past year, however, regardless of the size of the enterprise.) The final sample included a total of thirty-eight enterprises (nine in Kenya, nine in Tanzania, and twenty in Uganda). The much larger sample size in Uganda is reflective of a recent surge in ICS enterprise activity in that country, partly enabled by the presence of a relatively vibrant and accessible carbon finance market. Table 1 shows the breakdown of the final sample according to the main sampling criteria employed.

The interviews targeted the owners or production managers of each enterprise in the sample. A total of thirty-eight owner-managers (twenty-seven men and eleven women, a ratio of more than 2:1) were ultimately interviewed. The gender composition of the resulting sample is important because gender was not explicitly used as a criterion in enterprise or interviewee selection. The gender-neutral criteria of location and scale of enterprise employed make it possible to therefore draw valid gender-specific inferences from the data collected. The analysis of gender-differentiated patterns of specialization at firm level provided here constitutes an important first step toward understanding the extent and substance of female representation in the ICS sector.

RESULTS: GENDER AS A DRIVER OF OPPORTUNITY IN THE ICS VALUE CHAIN

The Alliance conceptualizes the ICS value chain as being separated into four main functions: research and design, manufacturing (or production), distribution and retail (including marketing activities), and end-user adoption (GACC n.d.b.). However, as the International Labour Organization (ILO 2011) recognizes, value chains (including some that span multiple countries and continents) often start with producers, many of whom are located in rural areas of developing countries. The present study focuses on the supply-side actors in the local ICS value chains in Kenya, Uganda, and Tanzania. The fieldwork conducted unearthed four distinct,
albeit overlapping, functions generally performed by ICS enterprises in these countries: production, (wholesale) distribution, marketing, and retail (including stove installation services).

While ICS retailing is a pivotal part of the value chain in the context of reaching “last-mile” communities in developing countries (Natural Capital Partners n.d.), there is little evidence that it occurs on a scale that is sufficient to deliver exponential financial gains to the actors involved. The findings reported below shed light on the magnitude and distribution of these gains by gender.

Women-led enterprises are overwhelmingly involved in the retail function of the value chain, where sale volumes and revenues are lowest

Tables 2 and 3 show the distribution of the four main value-chain functions among the men-led and women-led enterprises in the sample.

As indicated in the tables, many of the enterprises in the sample are engaged in multiple value-chain functions, lending support to the widespread observation (for example, by ILO [2009]) that many different types of activity can be concentrated within individual firms. The summary in Table 4 below shows that the women-led enterprises in the sample are overwhelmingly involved in retail – with over half the sample (six of eleven) engaged exclusively in retail. Many men-led enterprises also perform retail functions; however, only seven of twenty-seven enterprises – about a quarter – work exclusively in retail. Conversely, men-led enterprises are substantially better represented than their women-led enterprises counterparts at the higher levels of the value chain.

It is also clear from Tables 2 and 3 that low sale volumes correlate with “lower” functions in the value chain, especially retail. With a few exceptions (notably UG_M4 and UG_W3), enterprises that deal solely in retail were more likely than others to have recorded sales in the tens and low hundreds. This effect seems to hold even when retailers channel their wares through local supermarkets and stores: one enterprise (UG_W6), for example, sold only 192 units of a particular type of ICS in the past year through “supermarkets and exhibitions.” In their analysis of the charcoal value chain in Uganda, G. Shively et al. (2010) highlight the importance of scale (defined in terms of sale volumes) for the profitability of different functions in the value chain. In general, the greater the number of units a firm or individual can sell, the higher the financial returns they can receive. The implication here is that the women-led enterprises in the sample, with their high rate of representation in low-volume retail, reap lower returns overall than the enterprises in the men-led category.
Table 2 Firm descriptors, inputs (finance), and outputs (sales) for men-led enterprises in the sample

| #  | Enterprise code | Form of organization | Value-chain positioning | Total firm size | Number of male workers | Number of female workers | Access to finance | Units sold in the past year | Total revenue in the past year (USD) |
|----|----------------|----------------------|-------------------------|----------------|------------------------|------------------------|-------------------|-------------------------------|---------------------------------------|
| 1  | KE_M1          | Limited liability company | Production, distribution, marketing | 70             | Not specified          | Not specified          | Credit from international sources | 50,000                        | 1,250,000                            |
| 2  | KE_M2          | Community-based organization (CBO) | Production, retail | 120            | 47                     | 73                     | Community-based savings and loan groups | 1,000                         | 7,840                                |
| 3  | KE_M3          | Commercial enterprise | Production, distribution | 15             | 7                      | 8                      | No credit history | 10,000                        | 31,450                                |
| 4  | KE_M4          | Commercial enterprise | Production, distribution | 8              | 5                      | 3                      | No credit history | 16,000                        | 280,000                               |
| 5  | KE_M5          | Commercial enterprise | Production             | 13             | 6                      | 7                      | No credit history | 10,000                        | 24,200                                |
| 6  | KE_M6          | Social enterprise | Production, distribution, retail | 8              | 7                      | 1                      | Credit facilitated by NGO | 2,500                         | 22,411                               |
| 7  | KE_M7          | Government organization | Production, distribution, marketing, retail | 28             | 16                     | 12                     | Publicly funded | Not specified                 | Not specified                        |
| 8  | TZ_M1          | Non governmental organization | Production, distribution, retail | 100            | Not specified          | Not specified          | No credit history | 1,000                         | Not specified                        |

(Continued).
| #  | Enterprise code | Form of organization | Value-chain positioning | Total firm size | Number of male workers | Number of female workers | Access to finance | Units sold in the past year | Total revenue in the past year (USD) |
|----|-----------------|----------------------|-------------------------|-----------------|------------------------|--------------------------|----------------|-----------------------------|--------------------------------------|
| 9  | TZ_M2           | Commercial enterprise | Production, retail      | 10              | 6                      | 4                        | Commercial bank loan   | Not specified               | Not specified                        |
| 10 | TZ_M3           | Commercial enterprise | Production              | 30              | Not specified          | Not specified            | Commercial bank loan   | Not specified               | Not specified                        |
| 11 | TZ_M4           | Commercial enterprise | Retail                  | 1               | 1                      | 0                        | No credit history      | Not specified               | Not specified                        |
| 12 | TZ_M5           | Commercial enterprise | Retail                  | 1               | 1                      | 0                        | No credit history      | Not specified               | Not specified                        |
| 13 | TZ_M6           | Commercial enterprise | Retail                  | 2               | 2                      | 0                        | No credit history      | Not specified               | Not specified                        |
| 14 | TZ_M7           | Commercial enterprise | Retail                  | 1               | 1                      | 0                        | No credit history      | Not specified               | Not specified                        |
| 15 | UG_M1           | Commercial enterprise | Production, distribution, retail | 145             | 51                     | 94                       | Microcredit            | Not specified               | Not specified                        |
| 16 | UG_M2           | Commercial enterprise | Production, marketing   | 38              | 36                     | 2                        | No credit history      | 5,400                       | 57,540                               |
| 17 | UG_M3           | Commercial enterprise | Retail                  | 2               | 1                      | 1                        | No credit history      | 170                        | 47,090                               |
| 18 | UG_M4           | Commercial enterprise | Retail                  | 6               | 6                      | 0                        | Commercial bank loan   | 6,000                       | 49,920                               |
| 19 | UG_M5           | Commercial enterprise | Production, distribution | 7               | 7                      | 0                        | No credit history      | 125                        | 2,150                                |

(Continued)
| #  | Enterprise code | Form of organization | Value-chain positioning | Total firm size | Number of male workers | Number of female workers | Access to finance | Units sold in the past year | Total revenue in the past year (USD) |
|----|----------------|----------------------|--------------------------|----------------|------------------------|--------------------------|-------------------|-----------------------------|-------------------------------------|
| 20 | UG_M6          | Commercial enterprise | Production, distribution  | 5              | 3                      | 2                        | Commercial bank loan | 970                         | 1,358                               |
| 21 | UG_M7          | Commercial enterprise | Production               | 1              | 1                      | 0                        | No credit history    | Not specified               | Not specified                       |
| 22 | UG_M8          | Commercial enterprise | Marketing, retail        | 2              | 2                      | 0                        | No credit history    | 950                         | 1,330                               |
| 23 | UG_M9          | Commercial enterprise | Retail                   | 4              | 2                      | 2                        | Commercial bank loan | 120                         | 3,000                               |
| 24 | UG_M10         | Commercial enterprise | Production, distribution  | 1              | 1                      | 0                        | No credit history    | 100                         | 278                                 |
| 25 | UG_M11         | Non governmental organization | Production, distribution | 41             | 40                     | 1                        | No credit history    | Not specified               | Not specified                       |
| 26 | UG_M12         | Commercial enterprise | Production, distribution, marketing, retail | 6              | 6                      | 0                        | Microcredit          | 780                         | 1,980                               |
| 27 | UG_M13         | Commercial enterprise | Production               | 3              | Not specified           | Not specified           | No credit history    | 100                         | 600                                 |
Table 3 Firm descriptors, inputs (finance), and outputs (sales) for women-led enterprises in the sample

| #  | Enterprise code | Form of organization (CBO) | Value-chain positioning | Total firm size | Number of male workers | Number of female workers | Access to finance | Units sold in the past year | Total revenue in the past year (USD) |
|----|----------------|----------------------------|-------------------------|----------------|------------------------|--------------------------|-------------------|-----------------------------|-------------------------------------|
| 1  | KE_W1          | Community-based organization (CBO) | Distribution, retail | 15             | 6                      | 9                        | Low-interest community loans | 3,980                       | 27,182                              |
| 2  | KE_W2          | Community-based organization (CBO) | Production, distribution, marketing | 20             | 6                      | 14                       | Group loan, individual microcredit | 36,350                      | 160,010                             |
| 3  | TZ_W1          | Commercial enterprise | Production | 6              | 5                      | 1                        | Commercial bank loan | 220                          | 4,936                               |
| 4  | TZ_W2          | Commercial enterprise | Retail | 3              | 2                      | 1                        | No credit history | 120                          | 3,600                               |
| 5  | UG_W1          | Commercial enterprise | Retail | 1              | 0                      | 1                        | No credit history | 100                          | 1,940                               |
| 6  | UG_W2          | Commercial enterprise | Production, retail | 1              | 0                      | 1                        | No credit history | 500                          | 868                                 |
| 7  | UG_W3          | Commercial enterprise | Retail | 1              | 0                      | 1                        | No credit history | 1000                         | 8,320                               |
| 8  | UG_W4          | Commercial enterprise | Retail | 2              | 0                      | 2                        | No credit history | 120                          | 720                                 |
| 9  | UG_W5          | Commercial enterprise | Production, distribution | 4              | 3                      | 1                        | No credit history | 70                           | 420                                 |
| 10 | UG_W6          | Commercial enterprise | Retail | 3              | 2                      | 1                        | No credit history | 312                          | 1,872                               |
| 11 | UG_W7          | Commercial enterprise | Retail | 1              | 0                      | 1                        | Commercial bank loan | 400                          | 2,000                               |
### Table 4 Proportion of men-led and women-led enterprises across main value-chain functions

|                    | Men-led enterprises (n = 27) | Women-led enterprises (n = 11) |
|--------------------|-----------------------------|-----------------------------|
| Production         | 19 (70%)                    | 4 (36%)                     |
| Distribution       | 12 (44%)                    | 3 (27%)                     |
| Marketing          | 5 (19%)                     | 1 (9%)                      |
| Retail             | 15 (56%)                    | 8 (73%)                     |

**Women-led enterprises are relatively small in size, but socially centered forms of organization can boost their productivity and sales**

The ICS enterprises in the sample generally have small numbers of staff: the majority of them have twenty paid workers – the maximum number for the women-led enterprises – or less. However, seven of the enterprises, all of them men-led, run relatively larger operations, hiring 30–120 paid workers each. Firm size matters because, in the context of developing countries, energy businesses that have fewer staff have been shown to be at a disadvantage relative to their higher-staffed counterparts in terms of the proportion of benefits that accrues to them – even when they operate at higher levels of the value chain (see, for example, Baumert et al. [2016]).

The data presented in the tables above further suggest that having women in leadership roles does not necessarily translate into greater employment opportunities for their peers: among the eleven women-led enterprises in the sample, only two (KE_W1 and KE_W2) have more women than men working in them.

It is perhaps instructive that the two women-friendly employers identified above are the only ones in the women-led enterprise category that are structured as community-based organizations (CBOs), rather than as conventional businesses. It is also instructive that these two enterprises are the largest in the women-led category both in terms of size and sale volumes, suggesting that the model does give a boost to substantive women’s participation, relative to other types of organization. The men-led enterprises in the sample, on the other hand, seem to thrive under a variety of organizational models, including the CBO model.

CBOs, by definition, are formalized social networks that bring members together with the explicit aim of advancing a set of shared goals, which, though often socioeconomic in nature, tend to be mediated by their focus on “bonding” relationships (Molyneux et al. 2007). A CBO may be set up in the first instance by members of a community with common interests or problems (Barr, Dekker, and Fafchamps 2015), or at the prompting of external development actors responding to identified challenges within the community (Yakubovich et al. 2016). The ubiquitous women’s groups in
Kenya in particular and East Africa in general are examples of the former (Gugerty and Kremer 2002; Nzomo 2005).

The case of KE_W2 illustrates how such a model works in practice. The group started out in the early 1980s as a rotating savings and credit association with five women. Membership quickly grew to twenty-five women, at which point the group was registered with the Kenyan government as a CBO. When asked why the women in KE_W2 opted to formalize their group into a CBO, the group representative responded: “We realized and we learnt that being together would give us a voice, would give us some bargaining power in our activities and in whatever we do” (Woman ICS entrepreneur, KE_W2). Subsumed within the broad notions of solidarity and collective empowerment suggested by this quote are more specific expressions of cooperation that link directly to the productivity and profitability of individual members:

There are cases where maybe your stuff is not ready from the kiln and a customer comes. So another advantage of the group is, you can go and borrow from somebody and then you use until, when yours is ready you can pay back. So that your customer doesn’t go away because your stuff is not ready. (Woman ICS entrepreneur, KE_W2)

Like now we’re in a group and I can ask you to assist me, we will finish faster. But if it is just me alone, it could even take me a week. (Woman ICS entrepreneur, KE_W2)

The quotes above highlight a very important dimension to the CBO model: Although individuals take responsibility for their productivity and profits in principle, the social component leaves room for members to fall back on one another for support when it is needed – in the process helping to fill gaps occasioned by the women’s inadequate access to important inputs such as labor. As the ILO (2011) highlights, this kind of cooperation is particularly beneficial for small-scale enterprises in rural areas operating within value chains dominated by more powerful external players.

The advantage for the women-led CBOs in our sample is heightened by the observation that, although production and distribution functions typically suggest access to mass markets and consequently high sale volumes (Thurber et al. 2014), it would appear that it is not sufficient for women-led enterprises to simply be involved in those functions – or indeed in other “lower” ones: Outside of the two women-led CBOs, sale volumes are generally low for women, both in absolute and relative terms.

These observations are important for ICS practice as they indicate that, notwithstanding the current enthusiasm among donors and practitioners over the possibilities of empowering women through market-based enterprise, more socially centered models may be better equipped to achieve the goal.
The CBO model has been critiqued for its tendency to exacerbate existing socioeconomic inequalities within groups and consequently skew benefits toward more privileged individuals (Sesan 2014; Swapan 2016). The evidence presented here, however, though based on a limited sample, provides support for recent calls in the literature to adopt a “push through community based organizations” (Banerjee and Prasad 2015: 37) and an emphasis on “community centric institutional arrangements” (Chaurey et al. 2012: 54) if the benefits of energy access initiatives are to reach the poorest.

Whatever the specific shortcomings of the CBO model, the analysis here points to the need to reimagine the forms of organization that are suitable for the women who are often the subject of ICS entrepreneurship initiatives, rather than campaigning for their participation in the market on the basis of externally conceived imperatives to increase ICS adoption rates among their peers.

**ICS sales are determined more by value-chain hierarchy than by gender**

As highlighted above, KE_W2, one of two women-led CBOs in Kenya that produces ICS wholesale and sells to distributors across provincial lines, is one of the most productive and profitable enterprises in the sample. However, this is the only woman-led enterprise in the sample that operates at that scale and level; the other enterprises in the category are generally further down in the value chain – that is, at the level of retail. The volume of production for the preceding year reported by this CBO was exceeded by only one other enterprise in the sample – a man-led international organization (KE_M1) that also uses a distributorship model for its sales. The CBO is composed of fourteen full-time members, bringing its reported sales volume of 36,350 ICS to nearly 2,600 stoves per person in the past year.

That the sales performance of the woman-led CBO highlighted above was significantly higher than those of all but one of the nineteen men-led enterprises operating at the same level suggests the lack of a gender-based advantage for the latter. As alluded to in earlier sections, what does seem to matter for performance is an enterprise’s position in the value chain: When we compare the sales of all enterprises at the producer/distributor level with those of all enterprises only retailing to individual customers, we find that the former sold more stoves in the immediate past year (in the thousands and high hundreds), though there is considerable disparity in the distribution of sales among them. This indicates that the position of an enterprise in the value chain is a better predictor of sales, and by extension, profits, than the gender of its owner-manager.

A question then arises from a gender perspective: Are men-led enterprises more likely to be operating at the producer level than women-led ones, or vice versa? The evidence presented in Tables 2 and 3 above
appears to support the former: Nineteen out of the twenty-seven men-led enterprises (well above two-thirds) have a production and/or distribution component to their business. This is compared to just over half of the enterprises in the women-led category that produce and/or distribute ICS on some scale.

While it is clearly useful to have men and women working synergistically within particular job functions, it is important to pay attention to the types of arrangement that could potentially deliver equitable benefits across both genders. As discussed above, CBOs would appear to offer one such platform, particularly for the substantive employment of women across roles. The evidence further suggests that these CBOs, whether they are men- or women-led, tend to employ relatively high proportions of women in production roles: The two CBOs in the sample involved in production (KE_M2 and KE_W2) employ more women than men in the role – in the case of KE_M2, thirty women to ten men. This is in contrast with only one of the thirty-five conventional enterprises in the sample (UG_M1) that involves far greater numbers of women than men in production roles (eighty-four women to thirty-six men), though it is not clear from the data how much of the economic gains accrue to individual women in the organization. This distinction is important to make because, as described earlier, higher-up production roles have the potential to deliver greater economic benefits to men and women alike – and are thus important for fulfilling expectations of economic empowerment for both genders.

**Access to credit is a corollary of the relationship between gender and value-chain hierarchy**

Limited access to credit for business expansion is a cross-cutting theme among all the enterprises in the sample: all the interviewees, whether or not they had obtained some form of credit in the past, cited inadequate financing as a major barrier to increasing their production and/or sales volumes.

The enterprises that have gained access to credit have been able to do so in spite of the considerable difficulties experienced: the excessive bureaucracy involved in applying for formal loans, the high cost of such loans, short repayment periods, “unreasonable” collateral requirements, and slow turnaround times. Some of these challenges are evident in the following quote from a male interviewee in Tanzania:

I have borrowed from a commercial bank but the interest rate was too much … The process was cumbersome and lengthy and in the end they provided 50 percent of what I was requesting … The collateral required to get financing and the cost of that credit to small entrepreneurs like us is punitive. (Male ICS entrepreneur, TZ_M2)
Four out of the eleven women-led enterprises in the sample have accessed microfinance or some other form of credit in their history. The corresponding access numbers for the men-led category are ten out of twenty-seven. This ratio (slightly more than one in every three men-led enterprises) is roughly equal to that for the women-led enterprises, providing no evidence of gender bias in access negotiation. Rather, the factor that unites both subsets is that the majority (three out of four women-led and eight out of ten men-led enterprises) are producers and/or distributors, which is to say that they are relatively high up in the value chain. While the relationship between value-chain hierarchy and access to credit is not a deterministic one (two women-led producer enterprises in the sample have not succeeded in gaining access, while one retailer has gained access, for instance), it is apparent that the majority of the enterprises in the sample that have obtained credit at some point operate at higher levels of the chain. This indicates that, while there are stringent barriers to entry across the board, it is even more difficult for enterprises near the bottom of the value chain to gain access to finance, whether they are men-led or women-led. Nevertheless, since the data show that men-led enterprises are more likely than women-led ones to be ICS producers/distributors, it follows that the former are more likely than their women counterparts to be able to access credit for business expansion.

This credit bias is reflected in the broader picture of external support given to women-led versus men-led enterprises in the sample: While the former overwhelmingly receive in-kind support from mostly international donor organizations in such areas as entrepreneurial training, marketing, and transportation, the latter receive support from a broader range of sources, including government and academic institutions, with more of a credit component (such as the facilitation of commercial loans and the extension of credit lines for stock acquisition) to the support. Indeed, the two enterprises in the sample that cited access to credit as having enabled expansion of their production/distribution operations are men-led producers (KE_M6 and TZ_M3), both of which operate on a relatively large scale (defined in terms of sale volume and firm size, respectively). While the direction of causality is not clear from the data, it is interesting to note the correlation between access to credit and business expansion that is apparent here.

This correlation is borne out by the findings from a recent study conducted in East Africa (including in our three study countries of Kenya, Uganda, and Tanzania) by the Global Village Energy Partnership (now Energy 4 Impact), in which the effects of loans on the performance and sustainability of ICS and other energy enterprises were evaluated (Nolan 2016). The study found that enterprises that received commercial loans in addition to entrepreneurial training geared toward improving their financial literacy were more likely to expand, and to do so by a wider
margin, than those that received other elements of entrepreneurial support but no loans.

It is noteworthy that the CBO model described previously can provide an advantage to enterprises in this regard, especially those that do not have sufficient collateral to access conventional forms of credit. As the quote below from KE_W2 illustrates, individuals can use the social capital inherent in group membership to obtain credit for their businesses in lieu of financial or material resources:

So I’ll go to the [microfinance] bank and say I want a loan to boost my business. They’ll have to come and check and see the business, what I’m doing. And then use the group as security. So it’s like once they see what I’m doing, then on the basis of that, like, okay, I’m in an established group and all. And you know what I sell, a certain percentage goes to the group. You work as an individual, yes, but you give a certain percentage to the group. So it is easier for them when they come and see that I’m a member of the group and the group is active. Then it will be easier for me to access the loan. Then the group is sort of security. (Woman ICS entrepreneur, KE_W2)

The utility of this model for establishing access to group-based loans is illustrated by the observation that all three CBOs in the sample (KE_M2, KE_W1, and KE_W2) have obtained this sort of credit at some point in the past and paid back at low interest rates (1 percent in the case of KE_W1). Mixed results have trailed the establishment of group-credit platforms in various developing country contexts (see, for example, van Bastelaer and Leathers 2006; Giné and Karlan 2014; Widiarto, Emrouznejad, and Anastasakis 2017); nonetheless, the data in this case show that they can provide some improvement over the absolute lack of access to finance experienced by many small-scale enterprises in those contexts. Importantly, the relative affordability of group-based loans can give such enterprises an opportunity to compete more favorably with bigger ones in the value chain while keeping their businesses viable (Ksoll et al. 2016).

**DISCUSSION AND CONCLUSIONS**

This paper has critically examined the current emphasis in the ICS sector on leveraging the relational and entrepreneurial skills of women in the global campaign to achieve widespread uptake of ICS. Advocates see an opportunity to empower women economically by engaging them actively in supply-side operations, particularly marketing and retail – effectively casting them in the role of “last-mile” entrepreneur. The premise of this focus on women is that they have greater influence over women users who traditionally do most of the cooking and are assumed to have greater
relevance in ICS adoption decisions. A number of recent interventions have attempted to bolster the capacity of women ICS entrepreneurs, one of the most notable being an Alliance-sponsored “empowerment training” program that addressed the psychosocial roots of individual agency (or the lack of it), with encouraging results for the women involved (Shankar, Onyura, and Alderman 2015b). The paper argues that this approach to empowerment, while innovative and important, does not reflect crucial dimensions of gender-based disparities in the sector – notably, where women-led enterprises are placed relative to men-led enterprises in the value chain. This is important because, as our analysis shows, value-chain hierarchy is positively correlated with sale potential, and women-led enterprises are underrepresented at the higher levels of the chain (that is, production and distribution) where mass markets are more likely to drive higher sales and revenues.

There are a number of limitations to the study. First, the analysis was done on the basis of a relatively small but geographically representative sample of ICS enterprises in East Africa. Further, it focused on comparison at the level of the firm, leaving unexamined important intra-firm dynamics that could shed light on how gains are distributed among male and female workers within those firms. And finally, while the analysis has shown that more needs to be done by mainstream actors to expand opportunities for women-led enterprises in the ICS sector, what is less clear from the dataset is how the women themselves conceive of empowerment, and the tensions with established social norms that may become apparent in the process (see, for example, Mayoux 1998; Khandelwal et al. 2017). Nevertheless, the analysis is novel for the contribution it makes to the understanding of women entrepreneurs’ relative positioning and potential for growth in the ICS sector.

Drawing on data from three East African countries – Kenya, Uganda, and Tanzania – this paper analyzed the inputs (especially finance) and outputs (measured in sale volumes for the immediate past year) of thirty-eight ICS enterprises through the lens of gender – specifically, the gender of the owners or managers of those businesses. Our findings show that gender does seem to matter for performance, but only so far as it relates to the ability of individual entrepreneurs to enter the ICS value chain at the higher levels, which in turn influences key outcomes, such as access to mass markets and access to finance for business expansion. The findings indicate that greater attention needs to be paid to where women-led enterprises in particular are located in the value chain, as it is this relative positioning – rather than the gender of individual managers per se – that determines the profitability (and, by extension, the efficacy as a tool of for economic empowerment) of ICS enterprises.

The finding of the study that men-led enterprises are better represented than women-led ones at every level of the value chain (with the exception of
retail) could be interpreted as providing justification for just getting more women into the sector, like mainstream actors advocate. The argument in this paper goes a step further: If economic empowerment for women is a corollary objective of engaging them in ICS enterprises, then greater emphasis should be placed on involving them at higher levels of the value chain.

The association between positioning and profitability is an important one to make given that many of the recent efforts to integrate women into ICS markets have been focused on engaging them in last-mile operations, a strategy which inevitably situates them at the lower end of the value chain (Wright 2013; Gill et al. 2015; Shankar, Onyura, and Alderman 2015a, 2015b). To better harmonize the economic empowerment goals of global advocates and the profit aspirations of local entrepreneurs, this focus on the bottom needs to be complemented by a greater push toward the top of the chain for women.

It is perhaps noteworthy that a closer reading of the findings of the Alliance-sponsored randomized controlled trial described earlier suggests that the Alliance’s emphasis on employing women as last-mile agents may not be as essential for increased ICS uptake as assumed, as the study found that the effect of location on sales to be similar to that of gender. Though the results show that “[w]omen outsold men by a margin of nearly 3–1” (Shankar, Onyura, and Alderman 2015a: 67), this finding appears less impressive when a distinction is made between “active” sellers (men and women who sold more than eight ICS over the eight-month monitoring period) and “non-active” sellers (those who sold just one ICS or none at all over the same period). According to the authors, the primary predictor of participants emerging as active sellers was empowerment training: those who had gone through the treatment were nearly thrice as likely as the control group to sell more stoves, regardless of gender. Gender did have an effect – women were more likely than men to be active sellers overall – but it seemed to be the same as the effect of operating in an urban context: “being female or living in an urban area more than doubled the likelihood of being an active seller” (Shankar, Onyura, and Alderman 2015a: 73, emphasis added).

The above argument does not detract from the thesis that women have an advantage in selling ICS to their peers. Indeed, the Shankar, Onyura, and Alderman (2015a) study highlights what may be the most convincing case for involving women in ICS marketing and sales: They found that customers had more positive impressions and experiences of the product in the immediate and long term when they purchased it from a woman (rather than a man) entrepreneur. It is important, however, to distinguish the qualitative impacts evident here from expectations of an exponential increase in ICS adoption rates delivered by women working on the home stretch. Once this distinction is made, it becomes clear that
the widely acclaimed peer-to-peer sales model may not be the short cut to simultaneously achieving the twin goals of economic empowerment and widespread ICS uptake that many mainstream actors believe it to be. To reiterate, women do make an important contribution to the sector as last-mile purveyors of ICS technologies, but the most substantial impacts on uptake appear to be qualitative and may not necessarily be compatible with the goal of economic empowerment simultaneously targeted by mainstream ICS actors.

Indeed, the most productive and prosperous women entrepreneurs in this study sample work in a group with access to markets beyond their immediate locality, selling mostly to regional and national distributors rather than to their peers in neighboring villages. This arrangement has resulted in greater evidence of economic empowerment for the women (as well as far-reaching stove diffusion) than that shown by the peer-to-peer model. It is worth noting that this has taken place in the context of a CBO structure that encourages flexibility and mutual support at work while protecting profits for the women. Further research would go beyond making the case for individual agency to scrutinizing the broader societal and structural frameworks that circumscribe participation in ICS enterprise, as entrenched inequalities at this level can constrain women’s ability to benefit from seemingly inclusive community-based schemes (see, for example, Fraune 2015). This would be an especially valuable addition in an era where market orthodoxy dominates the ICS discourse regardless of how the gains are being distributed.

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ACKNOWLEDGMENTS

This work was made possible by the Department for International Development, the Department of Energy and Climate Change, and the Engineering and Physical Sciences Research Council’s joint grant
EP/L002639/1: “Understanding the Barriers to the Introduction and Uptake of Clean/Improved Cookstoves in Sub-Saharan Africa.” Additional grants provided by the Integrating Global Society priority research group at the University of Nottingham and the British Council Researcher Links program facilitated desk research and writing. Engagement with participants at the Association of American Geographers conference in March 2016 helped to sharpen the themes developed in the paper. Data collection in the study countries was led by Practical Action Consulting, with fieldwork conducted by Fredrick Ochieng, Jecinta Nyambura, Evance Orodi, Elphas Ochieng, Brian Odhiambo, and Daniel Abonyo (Kenya); Emmanuel Okalebo, Ann Grace Apiita, Isaac Okoc, and Angelo Okalebo (Uganda); Mohammad Said, Fatma Mohammed, and Philemon Kibet (Tanzania); and coordinated by Kennedy Muzee.

FUNDING

This work was supported by British Council; the UK’s Department for International Development; the UK’s Department of Energy and Climate Change; University of Nottingham; the UK’s Engineering and Physical Sciences Research Council.

NOTES

1 The GACC changed its name to the Clean Cooking Alliance in October 2018.
2 All personal information that would allow the identification of any person(s) described in the article has been removed.

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