Finance and the Improved Cookstove Sector in East Africa; Barriers and Opportunities for Value-Chain Actors

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Abstract

Despite a long history of diverse approaches designed to increase the adoption of improved cookstoves (ICS), multiple barriers continue to exist which stunt their uptake in many developing countries. This paper focuses specifically on the financial barriers facing actors within the ICS value chain, such as manufacturers, suppliers and distributors. Examining data from interviews with twenty-nine ICS enterprises in Kenya and Uganda, this paper finds that limited access to credit services is a substantial barrier to increasing the capacity of businesses within the ICS value chain. In addition, data from twenty-seven financial providers including banks, microfinance institutions and savings and credit co-operatives (SACCOs) viewed the ICS market as relatively underserved and believed greater integration could be mutually beneficial. This paper explores the way in which this relationship plays out in current market conditions and how connections between the two sectors can be strengthened, with the objective of overcoming these financial challenges and expanding the capacity of ICS businesses as a mechanism to facilitate ICS uptake by local populations.

Keywords: Improved cookstoves, finances, value-chain, Uganda, Kenya.

Highlights:

- Examines the financial barriers faced by ICS value chain actors in Uganda & Kenya.
- Data analysis from interviews with ICS business and financial providers.
- Mechanisms to strengthen relationship between ICS and financial sector discussed.

Abbreviations:

CB – Commercial Bank

GACC – Global Alliance for Clean Cookstoves

ICS – Improved Cookstove(s)

IEA – International Energy Agency

MDI – Microfinance Deposit-taking Institution

MFI – Microfinance Institution

NGO – Non-Governmental Organisation

SACCO - Savings and Community Co-operatives

VSLA - Village Savings and Loan Associations

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1. Introduction

Globally, 2.7 billion people rely on using solid biomass fuels to meet their cooking needs (IEA 2015), predominantly using traditional cooking methods[1] (Kammen, 1995; Ezzati, 2005). In recent decades, global institutions and international development agencies have worked to promote the sustainable and permanent adoption of improved, cleaner, and more efficient cookstoves to mitigate the health, environmental and climate challenges of development (Sesan 2014; Perez-Padilla et al. 2010; Jan, 2012; Whitman et al. 2011). Since 2010, this has been spearheaded by the United Nations-led Global Alliance for Clean Cookstoves (GACC) with the aim of reducing the health and environmental impacts associated with using traditional cooking methods (Simon et al. 2014).

[1] Typically, three stone or mud-based cookstoves fuelled by wood, charcoal or animal waste.

However, as is well documented in the literature, the adoption of ICS has been slow in many of the countries they have been promoted in, with low rates of conversion to new technologies (Rehfuess et al 2014; Ray, et al. 2014; Watson et al 2012; Maniborg 1984). Over time, attempts have been made to understand the factors which interact to produce this outcome (Barnes et al. 1994), with researchers offering a number of explanations as to the reasons behind sluggish ICS uptake including a broad range of socio-cultural, economic, political and institutional barriers (Jan, 2012; Rehfuess et al. 2014; Levine, 2012). Many of the barriers that existed 20 years ago still exist today (Ray et al. 2014) and recent estimates suggest that by 2030, 1.8 billion people will still rely on solid biomass fuels for cooking (IEA, 2016).

Liquidity constraints for consumers in low-income countries have previously been identified as a substantial challenge within the field of poverty reduction (Banerjee, 2001; Winter-Nelson and Temu, 2005). Mobarak et al. (2012) identify the issue of liquidity as a significant factor underpinning the low demand for non-traditional cooking technologies in Bangladesh, while Beltramo et al. (2014) report liquidity constraints as fundamental to the adoption of ICS in Uganda; an issue which could be partly resolved through the availability of time payments (regular fixed payments over time following the adoption of ICS technology). Furthermore, Clough (2012) reports on GVEP (Global Village Energy Partnership)[2] International's efforts to create linkages and improve access to finance for small and medium-sized ICS businesses in East Africa, identifying the issue of limited credit as a barrier to the growth of such organisations and the subsequent lack of widespread adoption by poor populations.

In this respect, the ICS sector has an opportunity to better integrate with financial providers given the promotion of the financial inclusion movement as a means of reducing poverty by global development agencies over recent decades (Chibba, 2009). This has been predominantly driven by the expansion of the microfinance sector, but also by growth of the mainstream banking industry and increased formalisation of community-based savings and credit groups. These financial institutions have provided greater levels of access to financial products and services for previously excluded, low-income groups across the developing world (Ghate, 2007; Rhyne, 2001; Lapenu and Zeller, 2002). The financial inclusion agenda has attracted considerable criticism, in particular the role and

[2] GVEP is now formally known as Energy 4 Impact (E4I)

effectiveness of microfinance institutions (MFIs) in poverty reduction strategies (Roy, 2010; Marr, 2012), however the availability of credit services, especially to small and medium-sized enterprises (SMEs), has created new opportunities for the expansion of businesses, contributing to the development of local economies and reducing poverty (Khandker, 2005).

This paper seeks to explore the relationship between these two dynamic sectors, particularly focusing on the role financial providers have in helping to overcome economic barriers which have decelerated the rate of ICS adoption. Focusing on the role of manufacturers, distributors, and retailers, we highlight existing challenges faced by ICS enterprises and the ways in which financial providers can best serve these organisations. Section 2 will explore the context of this research, discussing both the existing ICS and microfinance sectors in Kenya and Uganda while Section 3 provides an explanation of the methodological approach employed. The results of the study are presented in Section 4 and suggest that although many ICS value chain actors are keen to increase engagement with financial institutions as a means of developing their business, these connections remain largely nascent. Financial institutions, while recognising these opportunities and the potential for financial returns, remain cautious in regard to these relationships, often due to fears of illegitimacy and the risk of default amongst such businesses. The paper's originality lies in its investigation of key financial barriers facing actors within the ICS value chain, such as manufacturers, suppliers and distributors, along with identification of the potential mutual benefits that could result from greater integration between ICS producers and financial service providers. These potential co-benefits are poorly understood and our findings are therefore novel as well as having relevance in identifying potential ways of stimulating the expansion of both sectors. In addition to their significance for key sector stakeholders and financial and enterprise-related policy making more general, the findings have relevance for researchers and practitioners working on household energy access, ICS and health as well as environment-related impacts of biomass fuel dependence in low and middle income countries.

2. Background and Literature Review

The challenge of improving access to clean energy technologies in the global South is well established. Development practitioners have long employed strategies designed to increase the

availability of clean energy with mixed results. The centralised service delivery model, in which local and national governments as well as development NGOs have assumed responsibility for the funding and implementation of such programmes, have proved expensive and difficult to organise, while failing to provide a universal level of services (Zerriffi, 2011). Similarly, the strategy of subsidising clean energy projects has produced disappointing results, with, for example, resources being channelled towards particular groups at the expense of the intended recipients (Zerriffi, 2011; Simon et al. 2014). These relative failures have led to the development of new ways of thinking about how the world's poor can efficiently access improved energy technologies.

A number of approaches have sought to utilise the abilities of accessible credit to promote growth in the improved cookstove sector (Rippey, 2012; Zerriffi, 2011). More recently, there has been a focus on market development, with an increasing role on the private sector to share risks and costs (Tigabu et al. 2017, Piebalgs 2012). These models each vary considerably, focusing on different stakeholders and the creation of alternative credit relationships including, though not limited to, enterprise or business finance, carbon financing and end-user finance (ibid), with the strengths and limitations of each approach outlined subsequently. The following subsections seek to outline three of the most prominent approaches to using credit as a catalyst for growth in the improved cookstove sector.

2.1 Supply Chain Financing

An alternate approach to engaging financial institutions in the ICS industry is through extending provision of credit to actors within the ICS supply chain (Rippey, 2012). This strategy consists of financial providers such as commercial banks and microfinance institutions lending directly to manufacturers, distributors, retailers and other businesses. According to Shrimali et al. (2011:7545) "Such 'enterprise' financing can help reduce the cost structure of the stove enterprise and enable it to generate positive returns at a lower price point for stoves". This enables ICS enterprises to provide products which are affordable to end-users at a price point which is sustainable to the business. Enterprise financing can also provide vital funding for the development of a cookstove business, particularly in the early stages of its existence (Shrimali et al. 2011). This form of credit can support "the appreciable up-front time and money spent on customer research, stove design and establishment of a supply channel" (Shrimali et al. 2011:7551), increasing the likelihood of these emerging enterprises achieving economic viability. Gujba et al. (2012) argue that accessing finance

from different sources will be key to enabling the development of a low-carbon energy framework, and enterprise finance provides an avenue through which this may be achieved.

However, the effectiveness of this approach to overarching developmental aims has been questioned. Drawing on research in India, Shrimali et al. (2011) report that, even with significant enterprise financing, cookstove businesses have failed to engage with the poorest individuals at the bottom of the economic pyramid. Very low income groups (those earning under $2 per day) represent a primary target for organisations such as GACC so their absence from the groups benefiting from such programmes is significant. Additionally, Shrimali et al's paper on enterprise financing focuses predominantly on finance targeted at new business, with little attention given to the ability of finance to improve and expand existing businesses.

For those established supply chain actors, credit can be used for a variety of purposes, such as purchasing stock, improving manufacturing processes and developing marketing strategies, dependent upon the size and type of business. However, a primary challenge associated with this approach is the identification of businesses which are ready for expansion through these means (Gujba et al. 2012). In community settings, understanding which enterprises are most likely to benefit from accessing finance is difficult for financial institutions to judge due to lack of information and experience. Furthermore, a financial injection in the form of credit in isolation is unlikely to sustain growth if "business and financial technical advisory services are not built into programmes" (Gujba et al. 2012:67). Such initiatives have therefore only demonstrated a limited degree of success and are yet to underpin the rapid scaling-up of ICS production and distribution desired by institutions such as GACC.

A limited number of studies have been conducted on the most efficient ways to develop relationships between financial providers and energy enterprises, though one example can be found in research by Winiecki et al. (2008). This study investigated the ways in which the microfinance and energy sectors could be more successfully and sustainably coordinated to support the growth of clean energy business in the developing world. Winiecki et al. (2008) argue that both types of institution should follow a set of guidelines which can facilitate greater connectivity. These include, on the part of energy enterprises, development of a respectable reputation, having an awareness of the local business

environment and offering training to both individual consumers and representatives from the financial institution (Winiecki et al. 2008; Gautam, 2011).

Financial providers, specifically MFIs, should be flexible partners, offering a variety of loan schedules and collateral requirements for example, while demonstrating a willingness to offer unconventional products and remaining knowledgeable on demand for energy amongst households (Winiecki et al. 2008; Gautam, 2011). Much of the success of such energy-lending schemes relies upon the strategic partnership between financier and enterprise (Winiecki et al. 2008; Morris et al. 2007), and a deeper understanding of the ways in which this can be achieved specifically in the case of ICS holds considerable potential for the expansion of the sector.

2.2 Carbon Financing

As an alternative to the acquisition of credit amongst value-chain actors as a means for growing production, the role of carbon financing has gained increased popularity (Simon et al. 2012). Indeed, for some stakeholders within the improved cookstove industry, carbon financing "is seen to be the key strategy for facilitating household adoption [of advanced stoves and fuels] (Jeuland and Pattanayak, 2012:10). This form of funding, built on the foundations of emission offsetting by developed countries in the Global South, has the potential to attract millions of dollars' worth of funding into the improved cookstove sector. Indeed, of the 8.2 million improved cookstoves distributed and tracked by GACC in 2012, 50% received carbon financing, while in 2013, carbon-financing represented the "single largest financier of cookstove projects", accounting for 36% of funding (Aung et al. 2016).

Freeman and Zerriffi (2014) analyse the perceived 'win-win' scenario through which carbon financing provides investment into ICS sector. Win-win refers to the way in which carbon financing can co-benefit both developmental and environmental objectives, at the local and the global scale, through supporting greater adoption of improved cooking technologies. Focusing predominantly on stoves used Mexico, India and China, Freeman and Zerraffi (2014) highlight the potential benefits of the carbon credit model while cautioning against the assumed co-benefits of this approach, with complicating factors such as cost and fuel efficacy impacting on projected outcomes. Similarly, drawing on research in rural India Aung et al. (2016:7235) argue that while the "carbon financing of rural energy interventions has great potential to change the landscape of household energy in the developing world…achieving them can be complex in reality".

Reflecting these outcomes, Simon et al. (2012) highlight a number of exciting opportunities and significant drawbacks of this emerging mechanism for accelerating growth in the ICS sector. In Peru's Qori Q'oncha Project, a partnership between Swiss NGO *myclimate* and Microsol, a French-Peruvian social enterprise, project leaders reported that the "inclusion of carbon finance had made scaling up stove distribution considerably easier, thus generating greater development dividends within the project area" (Simon et al. 2012:282). This was despite challenges associated with managing the supply chain interactions involved.

Furthermore, the Ugastove Project in Uganda benefited from carbon financing, allowing the programme to expand, whilst also underpinning "an affordable price, a quality guarantee and a warrant system" (Simon et al. 2012:282), which according to project leaders, benefits organised and competent businesses. Furthermore, Bumpus (2011) references the ability of carbon financing to up-scale operations in the improved cookstove sector in Honduras as part of the broader carbon offsetting agenda. Additionally, Lambe et al. (2015) report on research based in Kenya indicating that carbon financing has facilitated growth in the ICS sector through attracting new actors and technologies to the market. Given that the carbon financing paradigm remains a relatively recent phenomenon, improved cookstove markets have the potential to become increasingly important avenues through which carbon offsetting is facilitated.

However, carbon financing for such purposes fails to address all barriers associated with the slow adoption of improved cooking technologies, while, in some instances, creating additional problems (Simon et al. 2012; McCann, 2009). Though the carbon financing methodology has demonstrated some ability to reduce the price of ICS and cost remains an important factor for end-users, it is not the only variable affecting ICS adoption levels. Lack of motivation to change cooking habits (McCann, 2009; Ray et al. 2014) continue to present significant barriers. This issue is not unique to carbon financed projects, although it illustrates the inability of carbon financing to address socio-cultural barriers to adoption. Others, such as Grieshop et al. (2011), have highlighted the fact that some organisations may qualify to access carbon financing while only reducing some of the harmful emissions associated with non-efficient cookstoves.

Furthermore, the large-scale development of a particular type of cookstove can produce unintended economic consequences, such as the distortion of local metal prices in one carbon financing project

which stipulated the use of metallic stove types (Simon et al. 2012). This feeds into the broader issue of market interference, a point explored by Simon et al. (2012:282) who argue that carbon finance has the potential to encourage "the suppression of other similar or competing enterprises as a result of external financial injections". The destabilisation of (relatively) free-markets through a mass flooding of the sector by carbon financed programmes may damage existing legitimate businesses, making local enterprises non-competitive and damaging livelihoods and economies. This could create longer term damage to the ICS sector in these communities, particularly if key stakeholders within the international development arena begin to reject carbon financing models. ICS businesses heavily engaged with carbon finance are also at risk of changes to the price of carbon credits which can affect their viability (Shrimali et al. 2011; Simon et al. 2014).

2.3 End-user Finance

Lastly, as Rippey (2012) outlines, one way in which the financial sector and improved cookstove industry have interacted has been through the provision of credit for end-users. Through this process, financial institutions provide credit directly to an individual for the purchase of an improved cookstove, or alternatively products are purchased on-credit through stove manufacturers or retailers (Shrimali, 2011). Morris et al. (2007) argue that end-user finance can be a successful mechanism for purchasing energy services, including cookstoves, if repayments align with the previous energy costs of clients. In Mexico, Bailis et al. (2009) explore the challenges of financing on the part of end-users, particularly in an era which has seen reductions in the level of support from donors.

> "One of the biggest barriers to operating without donor support is customers' inability to pay the full costs of the stove. Credit-based sales can remove this barrier, particularly among households that purchase wood, who are accustomed to periodic expenditures to meet the family's energy needs" (Bailis et al. 2009:1701).

Similarly, Levine et al. (2012) conducted research examining the relatively low rates of uptake in Uganda, exploring different methods by which cookstoves could be delivered to low-income customers. Through fieldwork conducted in both the urban centre of Kampala and rural Mbarara, Levine et al. (2012) discovered that ICS offered with regular payments (in this instance, four equal weekly payments delivered interest-free) significantly raised the level of adoption by customers in

comparison with the upfront 'payment in full' option. This research challenged the assumption that low uptake of ICS was predominantly driven by lack of interest on the part of local populations, highlighting the high demand for such products when the terms of sale were altered. In conclusion, Levine et al. (2012) specifically identified liquidity constraints as an important barrier restricting the uptake of ICS by potential customers in Uganda. This outcome demonstrates the potential of financial providers to tap into this hidden demand by offering credit services which enable individuals to manage the cost of purchasing more efficient cooking technologies by spreading the payments.

In addition, the need to develop better financing options for ICS end-users in Bangladesh is discussed by Rosenbaum et al. (2015). With users reluctant to purchase ICS technology outright at market rates, the key role that financing has in encouraging users to adopt cleaner cookstoves is outlined, along with the importance of affordable repayments over an extended period (Rosenbaum et al. 2015). Particularly in situations whereby reduction in fuel cost is less than expected, end-user financing has the potential to smooth the transition between traditional and improved cooking technologies.

This approach of utilising finance availability at the individual level, often with a focus on credit provided through microfinance institutions, is visible in the wider agenda to promote more sustainable energy use in the developing world (Rao et al. 2009; Kabir, 2010; Taishi, 2006). This mechanism has been praised for its ability to allow clients to upgrade energy systems without financially destabilising the household while enabling an instant reduction in fuel consumption and associated negative environmental impacts. However, a number of limitations have been identified to this approach, which serve to undermine some of the perceived advantages to end-user financing as a mechanism for increased cookstove uptake.

Firstly, while microfinance institutions have been identified as a primary means of credit provision in this context, their ability to serve individual customers sustainably has been questioned. Though the majority of MFIs purport to support activities which promote poverty reduction, this is largely achieved through the framework of supporting economic growth. For example, "traditional microfinance institutions usually lend for income-earning assets rather than consumer goods", even if non-income based purchases, such as ICS, are likely to result in savings on the part of the borrower (Bailis et al.

2009:1701). This focus on financing income-generating activities may serve to limit the flow of credit to end-users trying to access funds to purchase improved cooking technologies. Furthermore, financial institutions, including commercial bank and MFIs, may not be prepared to extend credit for the purchase of ICS at the individual level due to the low rate of return (Singh and Pathy, 2012). Financial institutions may not see the value in providing credit for the purchase of cheaper, lower quality stoves, for which there are a wide variety available on the market, if they are unable to generate sufficient profit.

More broadly, the issue of loan affordability for individuals who, in many instances, represent the poorest demographic, remains a problem. As Bailis et al. (2009) report, attempts in Mexico to develop credit-based solutions to improving access to clean cookstoves have, in some cases, resulted in default by customers. This can be linked to wider criticisms of the microfinance sector in particular which, as a product of increased commercialisation, has extracted increased levels of capital from customers (Bateman, 2010; Augsburg and Fouillet, 2010). Critics such as Roy (2010) question the underlying principles of the microfinancial movement; a process which fundamentally indebts some of the world's poorest people whilst generating sizable profits for private sector actors. Consequently, end-user financing for the purchase of ICS technologies remains a contested issue both from a practical and theoretical perspective.

2.4 Financial Sectors in Kenya and Uganda

These three approaches each rely upon the provision of a stable and prosperous financial sector to deliver the necessary services to facilitate growth, which have developed over time in both research countries. However, until the 1980s, the banking sector in Kenya was subject to stringent financial controls which served to restrict the growth of the industry (Kamau, 2009). Financial reforms, supported through World Bank investment, sought to liberalise this sector through an increased focus on the role of market forces which led to a relaxation of controls on interest rates and greater competition and efficiency amongst existing financial institutions (Mwega, 2011). This movement towards universal banking resulted in the improvement in the Kenyan banking sector in terms of the availability of new, quality products and services, increased profitability and financial stability with a higher percentage of the Kenyan population, particularly those in urban areas, able to access suitable financial services (Kamau, 2009; Mwega, 2011).

This period coincided with a rapid expansion in Kenyan microfinance sectors (Johnson and Nino-Zarazua, 2011) as market-led approaches to poverty reduction increasingly came to dominate the international development agenda. This process saw the extension of credit, debit and money transfer services to previously excluded low-income individuals and groups beyond the scope of commercial banking institutions. In terms of numbers, the Association of Microfinance Institutions in Kenya (AMFI Kenya) represents dozens of microfinance institutions and SACCOs (Saving and Community Cooperatives) across the country (AMFI Kenya Annual Report, 2014), while the Microfinance Information Exchange (MIX Microfinance, 2012) reported over 500 MFI and 4,000 SACCO branches in the country. In order to manage this substantial growth in the financial sector, the contemporary industry in Kenya is subject to considerable legislative orders. The Kenyan banking industry is regulated through a number of Acts designed to ensure stability in the sector and is administered by the Bank of Kenya, while the Micro Finance Act (2006) allowed financial institutions to apply for licenses as either deposit-taking, non-deposit-taking or informal organisations and register as either national or community institutions.

Similarly, the financial sector in Uganda experienced substantial growth in recent decades, especially the expansion of microfinance providers (Carlton et al. 2001; Okumu, 2007). Mirroring Kenya's transformation, financial sector reforms in Uganda in the latter decades of the 20th century, including the "liberalisation of interest rates [and] the privatisation of state owned banks" (Nathan et al. 2004:2), served to create an economic environment conducive to the rapid expansion of financial institutions in the county. The dramatic rise in the popularity of microfinance as a mechanism for poverty reduction and economic growth, at both international and domestic political levels, resulted in rapid growth in the MFI sector, while community-based organisations have remained prominent financial actors, especially in rural areas. While the financial sector in Uganda has a plethora of actors across the scale, from multinational to community-centred, the financial institutions interviewed can largely be separated into five categories. These include commercial banks (CBs), microfinance institutions (MFIs), microfinance deposit-taking institutions (MDIs), SACCOs and Village Savings and Loan Associations (VSLAs). These institutions serve a wide variety of customers across different demographics, income groups and geographical regions.

In Uganda, the Bank of Uganda is mandated with supervising and regulating some financial institutions in the country, specifically commercial banks and MDIs, of which there are currently three: Pride Microfinance, FINCA and Ugafode. Such institutions are subject to registration, financial audits and must adhere to the instructions of the Bank should they be considered at high risk. Other financial institutions, such as MFIs and community-based organisations operate independently, unsupervised by any financial regulator, though many belong to umbrella organisation such as the Association of Microfinance Institutions in Uganda (AMFIU), which, while lacking any legislative powers, offers guidance on industry best practise as well as lobbying on behalf of its members. In summary, a wide variety of financial providers operate within the country, with a broad range of financial products and services across multiple regions and scales.

Kenya and Uganda are both GACC focus countries which have been identified for priority intervention and are included in Phase I of the organisations' "three-phase Alliance strategic business plan", which commenced in 2010[3] (see GACC, 2017a). As part of phase II, which was initiated in 2015, both countries are promoting the adoption of clean cookstoves in five and three million households respectively (GACC, 2017b; 2017c). In countries targeted as part of the GACC programme, financial institutions have been engaged as one approach to help further develop technologies and increase production of ICS technology (GACC, 2017a).

For example, ARC Finance operate in both countries, acting to draw together actors in both the microfinance and clean energy sectors. Under the Renewable Energy Microfinance and Microenterprise Programme (REMMP), in partnership with USAID, ARC Microfinance seeks to:

> "Increase the availability of financing for clean energy services and products to enable low-income populations to gain access to technologies that can improve livelihoods and quality of life while mitigating climate change" (ARC Finance, 2017).

[3] Six other countries were identified as GACC focus countries; Bangladesh, China, Ghana, Guatemala, India and Nigeria.

In this instance, small-scale credit is employed to help overcome a lack of end-user finance and foster increased growth in the ICS sector in both Kenya and Uganda (along with Nepal, India and Haiti). Similarly, microfinance institutions have increasingly become engaged with the ICS sector through partnerships with organisations such as REEEP (the Renewable Energy and Energy Efficiency Partnership) which have worked with credit providers to develop products and services specific to the clean energy sector in both countries. Additionally, Levine and Cotterman (2012) report on the use of time payments to help customers in Uganda to overcome liquidity constraints to purchase efficient cookstoves. As financial institutions in Uganda and Kenya have become increasingly liberalised, developments in the ICS sector have advanced steadily, in part due to the availability of credit and its ability broaden access amongst poorer populations.

3. Methodology

The empirical data used in this paper forms part of a larger research project conducted between 2013 and 2017 which investigated barriers to the introduction and uptake of ICS in East and Southern Africa. Households were the main point of investigation of this project but ICS enterprises and financial institutions (as well as policy makers) were included in the wider study to better understand financial barriers to ICS uptake. Data on these were collected in 2015[4] and are drawn upon in this paper. ICS business interviewed as part of this research consisted of cookstoves manufacturers, distributors and retailers of improved cookstoves, prominent actors within the ICS value-chain. Representatives from commercial banks, MFIs, SACCOs and VLSAs were interviewed from the financial sector.

A qualitative approach was undertaken to elicit insights into key financial barriers to ICS adoption and services provided to ICS value chain actors. Reflecting the qualitative nature of the study, emphasis was placed on gaining depth of understanding on how financial barriers were perceived from within the two sectors rather than producing generalizable results. Furthermore, rather than a comparison

[4] Interviews in Kenya were conducted in August 2015 and interviews in Uganda were conducted in November 2015.

between the two countries, the aim of this research is to learn lessons from the experiences of ICS enterprises and financial providers in the East African context.

Due to data being collected in a variety of geographical settings by a range of interviewers, a structured interview guide was designed to ensure consistency and increase reliability and credibility across all research settings (Arino, LeBaren and Milliken 2016).

Questions asked to ICS enterprises covered a broad range of topics including organisational structure and marketing strategies, for example. Interviewees were also asked about any barriers to expanding their business and how these could be overcome. ICS enterprises were also asked about their experiences with financial providers, their experiences in accessing credit through such institutions and any challenges to utilising loan availability to growth their business.

Financial institutions were asked a range of questions around the current services provided to customers, including the range of credit available and rates of interest charged as well as the types of borrowers served. Specifically on the subject of ICS enterprises, financial institutions were asked about their experiences, perceptions and challenges with engaging with ICS businesses and the ways in which such relationships can be improved to a mutually beneficial end.

In total, 29 interviews were conducted with ICS enterprises in Kenya and Uganda (nine in Kenya and 20 in Uganda) and 27 interviews took place with financial institutions (seven in Kenya and 20 in Uganda – see Table 1). The larger sample size in Uganda is reflective of a recent surge in ICS enterprise activity in the country, partly enabled by the presence of a relatively vibrant and accessible carbon finance market (Sesan et al forthcoming). The increased number of interviews in Uganda reflected a desire to explore issues related to this more recent growth, which has attracted less research when compared with the more well-established Kenyan market. Both value chain interviewee and financial providers' interviews were transcribed and coded qualitatively using NVivo software and coded using thematic analysis to help identify dominant narratives within the texts.

4. Results and Discussion

Following analysis of the data, a number of key themes emerged as important discussion points. These particularly centred on the level of connectivity between the finance and ICS sectors, both in terms of current interaction and future collaboration.

4.1 Evidence of Existing Relationships

Interviews with value-chain actors and representatives from financial institutions in both countries suggest that there is evidence of a direct, if at times limited, relationship between the two types of organisations. It is clear that financial organisations have provided financing to clean cooking technology businesses in both nations. In Kenya, there was evidence of different types of financial institutions already engaged with ICS businesses, including commercial banks, microfinance institutions and savings and credit cooperatives (SACCOs). While more localised financial institutions classified the size of loans they provided to ICS importers, distributors and retailers as “small”, others, particularly those in the banking sector (Interview 4 and 6, for example), reported upper lending ranges of $10,000 to $30,000 USD. This level of engagement was also evident in Uganda which showed existing credit relationships between ICS value-chain actors and financial institutions across the scale from multinational banks to local, community groups.

The nature of this relationship varied considerably depending upon the individual financial providers. Particular institutions were enthusiastic about their past experiences, as “loan repayments are made promptly” (Interview 1) with “no hurdles encountered so far” (Interview 2) and the overall experience being “so far so good” (Interview 15). One Kenyan SACCO (Interview 7) described their experience with lending to ICS businesses as “very positive” with terms respected, loans repaid promptly and enterprises built around the delivery of quality products. One bank described the ICS industry in Kenya as a “lucrative sector [with]…enormous potential and opportunities for banks” (Interview 3).

Conversely, other financial institutions, such as one large commercial bank in Uganda, argued that in their experience ICS importers usually incurred sizable losses making them unattractive to creditors and an MFI argued that it was expensive for them to serve small, local ICS enterprises. Across all scales of financial institution, minimal or no interaction with any ICS enterprises emerged as a dominant narrative.

For the ICS enterprises themselves, responses around their relationship with finance providers largely fell into one of two categories. Firstly, there was simply no engagement with credit providers. This outcome was predominately driven by an inability to access loans rather than apathy on the part of ICS enterprises. These barriers were mainly due, in the opinion of ICS actors, to the design and requirements of the financial products available and these issues represented a fundamental barrier to accessing credit. This notion, discussed in more detail subsequently, of exclusion of services and financial isolation, emerged as a dominant theme.

Secondly, those that had managed to engage with financial institutions and acquire loans were largely positive about their experiences. Against the general consensus, one Kenyan energy business believed access to its creditors, in their case a commercial bank, to be easy, particularly as the enterprise was linked to the financial institution by energy-focused NGO Energy4Impact. Another ICS value-chain actor believed that while first loans may have been challenging to access, subsequent credit was more easily accessible as financial institutions become more confident in them as borrowers. Similar to the perspectives of financial providers, experiences appear individual to specific ICS enterprises, though these interactions were generally framed by their opinions of the application process. As stated, a key theme emerging from the interviews was the lack of engagement on the part of ICS businesses with financial institutions of all sizes.[5]

4.2 Appetite and Opportunity

[5] Additionally, a couple of ICS businesses (Interview C, Interview X) assumed the role of creditor in order to allow end-users to more easily access their goods. This was either in the form of the business providing a small loan to customers enabling them to directly purchase products or through offering improved cooking technologies to clients on credit. Interview data highlighted that such forms of credit were extended not only to individual end-users, but also to institutions, with one Ugandan retailer (Interview X) providing ICS to a school on credit, the debt of which was then settled once school fees had been collected. However, such ICS supply-chain actors that provided either loans or credit schemes were in the minority (only two businesses offered this service), with vast majority of businesses not offering any form of financial assistance services.

Despite limited connectivity between ICS enterprises and formal credit streams supplied through financial institutions, data analysis demonstrated the desire for increased cooperation and engagement between these two differing sectors. Financial institutions appear interested in becoming more engaged with the ICS sector as the ICS industry has great potential for financial returns for their institutions. A discourse of opportunity, growth and potential was evident in many of the interview answers given by representatives from financial institutions. For example, as well as viewing the ICS sector as "an innovative way of conserving the environment through business", one financial provider (Interview 13) viewed ICS businesses as providing a platform to expand their "scope of coverage i.e. more clients, customers" while others were keen to "expand our client base" (Interview 15) through greater engagement with ICS enterprises. Credit providers were keen to explore avenues for expanding the provision of services to business involved in the production and distribution of improved cooking technologies. Despite the relatively limited integration between the finance and ICS sectors in both countries, creditors across the scale from commercial banks (Interview 2) to localised SACCOs (Interview 7) viewed increased lending to value-chain actors as a broadly positive move.

Additionally, there was a consensus amongst financial providers that the current ICS sector was nascent and relatively under-developed, demonstrating another indication of reasons behind the interest of commercial banks, MFIs and SACCOs to provide increased levels of credit to ICS enterprises.

Furthermore, a strong narrative emerged around the desire of ICS stakeholders within the value chain to access more financial services in order to strengthen and grow their businesses. In both countries, aside from issues associated with the transportation of goods which repeatedly emerged as an ongoing challenge for such businesses, limited access to suitable financial services was frequently highlighted by value-chain actors as a significant barrier to the development. Lack of access to finance was directly linked to limitations on producing cookstoves and the incapability of ICS businesses to sufficiently promote stoves in the marketplace, as highlighted by a selection of response given by ICS value chain actors. These included "limited materials of production owing to limited financing opportunities" (Interview Z), "limited finances which limit our production capacity" (Interview A) and "limited financing to carry out adequate marketing of stoves" (Interview B). The implication amongst these respondents was that increased engagement with credit services may serve to reduce some of these barriers to increased production and distribution.

Increased lending from financial institutions to ICS enterprises located throughout the value chain appears to have the potential to create win-win outcomes for both parties. ICS value-chain actors are keen to benefit from the ability to access funds to accelerate growth in their business through, for example, increasing production capacity or strengthening marketing strategies, while banks, MFIs and SACCOs stand well-placed to financially benefit from involvement in such relationships. Therefore, questions are raised as to why there is not a well-established partnership between stakeholders in the two sectors despite indications that better connectivity could prove mutually beneficial. These issues are discussed explicitly in the following subsections in relation to both financial providers and ICS value-chain actors.

4.3 Challenges to Greater Interaction – Financial Providers

A number of important issues related to the ICS sector were reported by representatives from financial institutions which continue to constitute substantial barriers to increasing the flow of credit to ICS businesses. One dominant narrative emerging from interviews with financial providers in both Kenya and Uganda was their belief that ICS businesses operated in a disorderly manner. On multiple occasions, different financial institutions cited their perception of informality and disorganisation within the ICS sector in both countries, which caused creditors to engage cautiously with these enterprises. The need to formalise the activities of ICS value-chain actors, in regards to achieving universally accepted standards and regulating ICS businesses were seen as key to building sustainable, long-term partnerships.

Closely linked were concerns by financial providers regarding the legality and legitimacy of the businesses operating in the sector. The absence, at least in the eyes of financial institutions, of a uniformly accepted registration process for ICS enterprises caused some credit providers concern as they were unable to authenticate their practises. While the businesses themselves were predominantly considered viable enterprises, the lack of appropriate organisational and financial structures made financial institutions less likely to extend credit. In practical terms, many ICS value-chain actors lacked sufficient accounting or bookkeeping credentials to satisfy creditors' requirements. Such experiences were common in both countries, with little difference in the types of responses from Kenyan and Ugandan financial providers when asked what ICS companies need to do in order to make it an attractive business for their institutions to lend to.

These responses, citing issues around informality, legitimacy and accountancy, feed directly into the fundamental issue consistent to all credit providers: ensuring the borrowers are creditworthy. All these indicators act to reassure financial service providers that customers are in a position to fully repay the loan and are unlikely to default. Practises such as registration and accurate bookkeeping provide lenders with evidence that an ICS enterprise is a secure environment to invest capital. Though this issue constitutes the fundamental principle of lenders across all sectors, it is evident that within the ICS industry, these obligations are currently not being achieved by enterprises in need of credit. Therefore, demonstrating creditworthiness to lenders represents a key barrier to accessing finance.

Lastly, amongst financial institutions of all sizes, there remained concerns as to the general lack of awareness around the ICS sector. The perception existed amongst a number of creditors that the sector was relatively new and generally not known amongst the wider population, and even amongst some commercial lenders. This can impact upon decisions around creditworthiness, with financial providers less like to offer credit should they remain sceptical as to the scale of any potential markets. Raising the profile of ICS products and services was therefore seen as key to addressing this issue.

4.4 Challenges to Greater Interaction – ICS Value-Chain Actors

One important issue to explore when analysing the relationship between financial providers and ICS businesses is understanding the level of knowledge a certain population has of the financial services available on the market. Whilst previous research has highlighted the lack of awareness amongst potential borrowers that may benefit from access to (micro)financial services in some low-income countries (see Aggarwal et al. 2012), ICS manufacturers, distributors and retailers in both Kenya and Uganda appear both informed and mindful of the opportunities available through such institutions. However, in many instances, while this awareness existed, many ICS enterprises simply could not access them. This exclusion described by a significant proportion of individuals within the ICS sector in both countries was due to many factors, but particularly associated with affordability and product design.

The barriers around affordability and accessibility can be broken down into individual challenges. Firstly, the level of collateral required by financial institutions was considered to be both excessive and unrealistic in the opinion of ICS business. Lack of securities, such as land titles, were routinely cited by ICS businesses as the primary reason they were unable to access credit services.

Furthermore, there were instances whereby ICS enterprises had the perception that collateral requirements were excessive without having ever interacted directly with a financial institution. Exclusion from credit due to collateral obligations therefore provided both a real and imagined barrier for improved cooking technology enterprises in these countries. Additionally, the cost of borrowing emerged as a supplementary factor which restricted ICS value-chain actors from accessing finance. This may occur primarily in the form of prohibitive interest rates, but also through fees and insurance often associated with the administration of loans by financial institutions. However, in terms of the design of financial products, it was the collateral requirements which provided the most substantive barrier.

In addition, the way in which loans were administered provided an extra obstacle to securing credit through formal financial providers. A regular complaint amongst ICS businesses was the bureaucratic nature of the application process, with the administrative process proving arduous and, in their view, unnecessarily complex. This issue, coupled with the slow pace of the procedure, discouraged potential borrowers in the ICS sector from applying for a loan, even in situations in which access to credit was the primary challenge to selling or producing ICS. Though there were a small number of examples of ICS businesses which described the application phases as uncomplicated, such complaints were evident in relation to financial providers in both Uganda and Kenya. These challenges are not exclusive to the improved cooking technologies sector, but it was clear that the slow and bureaucratic nature of the application process constituted an additional, substantive barrier to ICS value-chain actors seeking access to credit.

4.5 Achieving Greater Connectivity

With both sectors interested in greater integration and cooperation, it is important to understand the existing challenges and devise strategies and approaches to overcome these barriers. This involves some adaptation and willingness on behalf of actors in both sectors to change their behaviours to foster greater collaboration. For financial institutions, these actions fall into two main categories. Firstly, if creditors provide more flexibility around collateral requirements, then it is more likely that ICS value chain actors will be in a much better position to access finance. This could include reducing the level of securities needed, broadening the type of collateral accepted as leverage against a particular loan or redesigning the types of products available to ICS value-chain actors. A wider section of

improved cooking technology businesses are likely to be able to access credit to grow their operations should collateral requirements be either reduced or restructured. However, particularly following the mass commercialisation of the microfinance sector in both Uganda and Kenya, financial institutions may be resistant to these types of changes through fear of default on the part of ICS borrowers. Therefore, building greater trust between the two sectors is key to this process, and this issue is discussed latterly.

Secondly, it is in the interest of financial institutions to dispel some of the negative perceptions outlined by individuals within ICS businesses. The notion of high interest rates and long and laborious application processes existed even amongst interviewees that had neither applied for or accessed a formal loan from a financial institution. Rather than interacting with ICS enterprises only when approached, financial institutions could do more to raise awareness around their products, services, costs and processes by actively engaging with the ICS sectors in both countries. Such action would not only serve to address some of these views, providing factual information to potential customers, it would also demonstrate to ICS businesses that financial institutions are interested and available to serve their credit-based requirements.

Fundamentally, however, given the liberalised nature of the financial sectors, with a constant emphasis on generating profits even amongst institutions which were created to promote greater financial inclusion amongst low-income groups, substantive shifts in the service delivery by financial providers is unlikely to occur. While small changes can certainly be achieved, it is likely that enterprises within the ICS sector will need to alter their behaviours more substantively to foster greater access to credit services. For ICS suppliers, importers, distributors and manufacturers, the key to the successful acquisition of credit is understanding the needs of financial providers in this relationship. Many see the potential of the sector and are willing and able to act as creditors should certain conditions exist, and ICS value-chain actors may wish to revise their operations to fulfil these requirements. In turn, it would be beneficial for financial institutions to be explicit in the ways this could be achieved.

In order to address concerns around the legitimacy of business and to allay some of the perceptions of informality within the sector, financial providers recommended that ICS enterprises seek some form of official registration with a respected industry organisation. Though such schemes may exist in this

field, financial providers across all scales indicated a lack of awareness around such a framework. This barrier could be overcome, for example through the creation of a new organisation formed through greater integration of existing ICS business or through registration and accreditation from an international partner, such as GACC. In both Kenya and Uganda, the official registration of ICS businesses to a uniformly respected body would serve to increase the likelihood of them accessing credit, through the addition of another layer of credibility and legitimacy to the business.

Furthermore, improving the accounting practices of individual businesses would be beneficial. Formal bookkeeping is not only advisable for the benefit of ICS value-chain actors in terms of understanding their own enterprise, but can also be used to provide evidence of the affordability of loans to financial providers. Unlike the development of an umbrella body to serve the ICS sector which can be seen as a medium term objective, improvement in business accounting process can be achieved quickly, improving the appeal of such business to lenders. Additionally, opening bank accounts with financial institutions as part of this process can not only reinforce positive account behaviours, but also begin to build connections with financial institutions that may lead to the development of credit relations at a later point.

The opening of bank accounts or other forms of deposit feeds into a broader narrative of building both connection and trust between parties in these two sectors. In interviews, the formulation of strategic partnerships were raised. Although these lacked specific detail, credit providers were clear that creating longer-term ties, either between individual businesses or as a collective body, would increase their ability to serve ICS businesses. As stated, all these actions are designed to provide accountability and legitimacy of ICS enterprises in the eyes of financial providers in achieving their two key objectives of ascertaining credibility of the organisation and affordability of any potential loan agreement.

5. Conclusions and Policy Implications

Though this research does not represent a direct comparison between the ICS sectors in Uganda and Kenya, it is clear that ICS enterprises in both countries are experiencing similar problems in relation to developing their businesses. Though other important issues exist, for many it is access to credit which constitutes the most significant challenge to expanding their operations. Importantly, while a number of ICS value-chain actors struggled to acquire credit, there was widespread awareness of the services

available on the market through a variety of financial institutions. However, these services were, or were perceived to be, unattainable due to a number of factors including affordability and product design. Conversely, financial providers remain concerned as to the legitimacy of businesses in the sector and the creditworthiness of many ICS distributors, manufactures and suppliers. The net result is that the ICS sectors in both Uganda and Kenya are currently unable to fulfil their potential, limiting the number of improved cooking technologies available to customers in these countries and slowing the adoption of such devices.

The relationship between the ICS and financial sectors is central to achieving increased flows of credit to these enterprises. Greater understanding between businesses on both sides would provide this foundation, whereby barriers such as collateral requirements are reduced as ICS value-chain actors are able to prove their legitimacy and reliability through accreditation or registration schemes which are uniformly accepted and respected. This mechanism represents the most pragmatic way in which trust can be built between creditors and borrowers and the essential notion of creditworthiness established. As evidenced within the interview data, once reliable relations are created between financial providers and individual ICS businesses, fruitful partnerships can develop leading to multiple loan acquisitions and repayments.

The emphasis is not only on ICS enterprises to facilitate the progression of these connections. As Rippey (2012) argues, financial providers must seek to understand the supplier, manufacturer, retailer and distributor chain in order to decide at which point in the process their capital may be best suited to maximise growth. This may involve looking “beyond traditional microfinance models…to create linkages with suppliers of clean energy devices” (Rippey, 2012:225). Rather than viewing such businesses in isolation, financial providers may benefit from developing a more holistic oversight of the ICS sector, particularly given its potential for future expansion and, by extension, profit.

Looking beyond the scope of this article, other forms of finance may also serve to increase the capacity of ICS business in these contexts. Zerriffi (2011) explores options for governments or donors offering partial subsides for ‘enterprise finance’ in the energy sector to promote business development in the supply chain. Another interesting approach is that of venture capital, with investors providing capital for a stake in improved cooking technology businesses which are emerging in developing

countries. Both of these avenues are worthy of further exploration and have the potential to provide the financing clearly required by ICS value-chain actors to increase their productivity.

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