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What's Cooking?
**Participatory and Market Approaches to Stove
Development in Nigeria and Kenya**

Temilade Adeyinka Sesan, BSc, M.Arch

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for the degree of Doctor of Philosophy

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Abstract

Improved stoves have been promoted in the global South by international organisations from the North since the 1970s for a variety of reasons including mitigation of health and environmental hazards related to the widespread use of solid biomass for cooking. However, uptake of these stoves by poor households in the South remains low, bearing negatively on efforts to alleviate energy poverty and achieve the Millennium Development Goals (MDGs). This thesis examines the framing and impact of participatory and market-based approaches to stove development and dissemination which have been widely promoted since the mid-1980s to address the failures of the predominantly expert-led, subsidy-based models favoured in the early years. Specifically, I investigate and compare two Northern-led stove projects, one established by Project Gaia in Nigeria, where stove development efforts targeted at addressing energy poverty have been limited, and the second by Practical Action in Kenya, where such efforts are more visible.

Drawing on empirical data gathered from field observations, interviews and key documents, I argue that despite the rhetorical shift from expert-led to context-responsive approaches, engagement with local priorities is still limited, and the interests and priorities of Northern organisations continue to shape the stove development agenda. The research establishes that Project Gaia's CleanCook project in Nigeria remains an expert-led intervention that fails to connect with the bottom of the socio-economic pyramid while seeking to create local market conditions for transferring stove technology. In Kenya, Practical Action has been more responsive to local realities in its efforts to engage marginalised women's groups in

participatory stove development; however, success is limited by the constraints of project funding and assumptions about homogeneity of the poor. Cultural preferences and socio-economic differences within Southern target populations challenge the Northern vision of improving stove dissemination through a combination of participatory methods and neoliberal market solutions.

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Chapter 1: Introduction

'Many of the world's poorest will never be reached, in their life time, through centralized national energy systems alone if "business as usual" approach to energy planning continues. But tried and tested off-grid decentralized energy solutions are already on the ground that can expand options to reach poor people. So too are working business models that are delivering affordable, cleaner and more efficient fuels to the poor.' (UNDP 2010, p. 3)

In a 2006 report by the International Energy Agency, it was estimated that 2.4 billion people worldwide depended on solid biomass fuels (fuelwood, charcoal, animal dung, grass, shrubs, straw, agricultural residue) to meet their basic energy needs for cooking and heating (OECD/IEA 2006). By 2010, this estimate had risen to 2.7 billion people, mostly living in countries in the global South classified as low-income and lower-middle-income in which large proportions of the population (2.7 billion out of 5.3 billion people in 2005) live on incomes of less than US\$ 2 a day (OECD/IEA 2010, World Bank 2005). For these populations, a move towards cleaner energy technologies is considered necessary, as the practices in which they burn biomass in traditional stoves and open fires have been identified by health, energy and environment experts as being socially and environmentally unsustainable. Improved stoves, designed to burn biomass fuels more cleanly and efficiently than traditional stoves, are the most prominent of the 'decentralized energy solutions' (UNDP 2010, cited above) that have been promoted, mostly by Northern-affiliated international organisations, towards the end of improving cooking energy access for poor biomass-reliant households in the South (Larson and Rosen 2002). Notwithstanding the proliferation of development initiatives to promote improved stove technologies especially from the 1970s onwards however, they have not been widely taken up by target populations in the Southern contexts where they have been introduced (Vargas 1995). This thesis sets out to investigate

the reasons for the disparity between stove development activity and stove uptake.

Beginning in the 1980s, stove development organisations have sought to facilitate local acceptance and use of improved stoves by moving towards more context-responsive forms of engagement with target populations. It is against this background that the thesis undertakes comparative evaluation of the approaches taken to implementation of two improved stove programmes by two different international organisations - Project Gaia and Practical Action - in Nigeria and Kenya respectively. The aim of the evaluation is twofold: to identify how a context-responsive implementation approach has engendered specific outcomes in both cases, and to uncover the assumptions underlying performances of context-responsiveness in each case.

Stove development is set in this study within the broader context of North-South relations in international development, specifically as they have been constructed since the mid-twentieth century towards the end of modernising or 'developing' societies in the South considered to be materially poor and technologically backward in relation to those in the North. The research therefore draws on relevant concepts in the field of development studies, particularly those within the participatory development and appropriate technology literatures, to analyse the scenarios that have resulted from the interaction of both externally-initiated stove programmes with the specificities of local contexts.

The chapter proceeds to expand on the broader context into which stove development fits and to critically review the participatory development

literature in an attempt to explicate the theoretical underpinnings of the empirical investigation and analysis undertaken in this research. It then describes the rationale for conducting this particular study on stove programmes in Nigeria and Kenya, outlines the specific questions that the study set out to answer, and lays out the structure for the remainder of the thesis.

1.1. The Context: Energy Poverty, the Development Project and the Rise of Participatory Approaches

The discussion in the preceding section drew attention to the prevalent use of solid biomass fuels for cooking by poor populations in the global South. The majority of these biomass-reliant populations lives on a subsistence basis in rural areas (Kanagawa and Nakata 2007), only partially engaged in the market economy and mostly operating a 'survival economy' (Friedmann 1992) in which low incomes are supplemented by mutual benefits that derive from the concurrent operation in such areas of what has been labelled the 'moral economy' (Scott 1976) or the 'economy of affection' (Hyden 1980).

The term 'energy poverty' has been used to describe the lack of access of biomass-reliant populations to modern cooking fuels such as kerosene, electricity and liquefied petroleum gas (LPG). The relationship between the income category of populations and their energy use patterns is captured by the concept of the 'energy ladder' (q.v. Leach 1992, Masera et al. 2000, Pachauri and Spreng 2003, Reddy and Reddy 1994), which depicts low- and middle-income populations as being reliant to varying degrees on solid biomass fuels, and shows the tendency for populations to move up to more

modern and efficient fuels with 'increasing prosperity and development' (WHO 2006a, p.8).

Energy poverty has been identified as being most prevalent in the sub-Saharan Africa and South Asia regions, where up to 90 percent of all households depend on solid biomass fuels to meet their energy needs (OECD/IEA 2006, Warwick and Doig 2004). Household energy use, primarily for cooking, typically accounts for the largest share of total energy consumption amongst these populations. According to Best (1992), this reflects the small amounts of energy used for commercial activities and also the inefficiency of end-use appliances. The most pertinent of such 'inefficient' end use appliances in the context of this research are the open fires and traditional cooking devices in which solid biomass fuels are burnt. The practices whereby these fuels are gathered and carried, sometimes over long distances, have been identified as being detrimental to the welfare of women and children. Women in particular are recognised as being the most burdened, as they have to also attend to many other chores that traditionally fall within their remit in the household. According to the results of a United Nations study cited by Day et al. (1990), women in Africa cultivate 70 percent of the food, gather 80 percent of the fuel, fetch 90 percent of the water, process all of the food, and bear all of the responsibility for child care and house cleaning.

Further, practices of gathering and burning biomass fuels in traditional cooking devices have been identified as posing specific threats to the environment - most notably deforestation and global warming over the last three decades - and hence are regarded as being environmentally unsustainable. Constant exposure to smoke from biomass fires is also seen

as putting local populations at risk of contracting acute respiratory infections (Barnes et al. 1993, Khushk et al. 2005), a threat which is regarded as one of the most serious health problems facing poor countries (World Bank 1992). Again, women and children are identified as being the hardest hit, as women are reported to spend three to seven hours daily tending cooking fires, often with their children at close range (Warwick and Doig 2004).

The phenomenon of solid biomass use in poor communities has thus been identified as a development issue, touching as it does on multiple areas of local people's existence. The significance accorded the issue in development policy circles was made evident by the inclusion of the 'percentage of households using solid fuels' as an indicator towards the achievement of Millennium Development Goal¹ (MDG) 7 prior to 2006 (Mehta et al. 2006). The indicator was originally devised by the United Nations to measure environmental sustainability, but not surprisingly, it was found to have at least as much significance for several other MDGs relating to health, mortality and women's empowerment (Rehfuess et al. 2006). Although all mention of this significant issue has been conspicuously absent from the MDGs post-2006, it remains a matter of agreement amongst development actors that improved energy access for biomass-reliant populations is central to the achievement of all eight goals by the 2015 deadline (UNCSD 2007, UNDP 2010).

Indeed, several interventions have been made by national and international organisations in response to the energy poverty situation prevalent in the

¹ The Millennium Development Goals are a set of eight measurable goals agreed upon in the year 2000 by 189 member states of the United Nations, to be achieved by the year 2015. There are eight goals in all, but the import of the lot is summarised in MDG 1: 'To eradicate extreme poverty and hunger'. The MDGs emphasise the right of those living in abject poverty and deprivation to development.

South. These interventions include improvements to household ventilation, initiation of behavioural changes regarding fuel use and cooking practices, and making alterations to childcare practices so that children are kept outside the kitchen during cooking (Larson and Rosen 2002). However, by far the most sustained and widely implemented intervention to date is the improved stove which is designed to burn biomass more efficiently than traditional cooking devices (Karekezi and Murimi 1995, Larson and Rosen 2002, Mahiri and Howorth 2001). Various prototypes of the improved stove have been promoted on the basis of the seemingly attractive benefits they offer to individual households and to the wider community: mitigation of smoke-related health problems; reduction of human and financial capital spent obtaining biomass fuels; reduced pressure on forest resources; and reduced greenhouse gas emissions (Barnes et al. 1993). Improved stove programmes therefore constitute one aspect of international development efforts to improve the welfare of the world's poorest and most vulnerable populations, along with programmes to improve various other aspects of their livelihoods.

The origins of modern development doctrine can be traced back to the 19th century, when the Industrial Revolution brought about aggressive social and economic transformations in Europe (Brown 1996). The international discourse on development is however commonly recognised to have kicked off around the late 1940s, gaining ground in the wake of the United States' publicly stated commitment in 1949 to institute a 'bold new program' for the improvement, growth and development of non-industrialised countries (Escobar 1995). From its origins in the global North, the idea of development has increasingly gathered momentum southward, so that it came to be regarded as the central organising concept of the 20th century

(Cowen and Shenton 1996) and is seen to have achieved the status of a global faith in the 21st century (Rist 2002). The common appeal of development for both North and South is closely connected to the promise it holds to direct the 'conjunctive forces of market and technology' (Berthoud 2010, p.84) 'proven' in the North towards improving the condition of the poor majority in less industrialised countries of the South. The development project is thus based on the assumption that 'rational'² technological and economic tools – themselves cultural products of the Northern civilisations in which they were developed - can be employed by any group of people to improve their existence, regardless of culture or locality. Indeed, this Northern-originated view of development based on the logic of profit (Bourdieu 2003) and a perception of technology-as-liberator (Barbour 1993) has become so established globally that, according to Berthoud (2010), it is becoming the only way to conceive of freedom in all contexts.

The net effect of this global development endeavour, particularly on vulnerable populations in the South, has however been the subject of much critical appraisal, particularly by authors belonging to the post-development tradition³. Alvarez (2010) for instance sees the development project as being implicitly based on the assumption that cultures of the North are 'more equal' than those of the South - so that, rather than serve to advance the cause of global equality, the project actually creates and perpetuates a

² The word 'rational' is used here in the sense articulated by Weber (1965) in describing what he believed to be the distinctive element responsible for the economic and technological advancement of the global North and its most important export to other cultures of the world: the ability to systematically apply logical principles towards capital accumulation in any enterprise.

³ The post-development school is radically distinctive in its rejection of the discourse of development as it has been constructed from the 1940s onwards. Proponents advocate, not alternative forms of development, but alternatives *to* development which resist the homogenising agenda of the Northern-led development project and encourage indigenous expressions of thought and being by local citizens in the South (q.v. Pieterse 1998, Sachs 2010).

global divide which sets 'dominating' societies apart from 'dominated' ones. On a similar note, Forbes (1993) observes that the global system is organised according to a 'hierarchy of domination' (p.223) in which the intervention of the North in other cultures is aimed primarily at reproducing itself and reinforcing its dominant position within the hierarchy. According to Friedmann (1992), the inequitable effects of development are hardly confounding, as they are consistent with 'the very nature of technical and economic progress' (p.9). This is the case as the tools employed in the pursuit of progress do not merely function as technical and economic instruments, but are more importantly instruments of social and political power that, according to Bourdieu (2003), serve to further the interests of dominant cultures of the North.

Corbridge (2000) however notes that the scope of development has progressively expanded in the decades following its institution to reflect the multifaceted realities of people's existence, so that cultural accounts of development increasingly vie for space alongside the economic interpretations of the concept favoured in the early years. Consequently, alternative development models have been proposed which in theory do not derive from any exogenous ideologies but which rather draw inspiration from the long-term goals of particular societies and see development as desirable only with reference to the meaning of life in those societies (Goulet 2006). Goulet's qualification corresponds to Cowen and Shenton's (1996) distinction between 'intentional' and 'immanent' development - the latter being more desirable because, unlike the former, it is not deliberately engineered but is allowed to grow naturally out of a society's history.

It is in attempting to decipher the specific meanings attached to various aspects of life by citizens in different Southern contexts that participatory models have become increasingly relevant in development discourse and practice from the 1970s onwards. As discussed in detail in the following section, proponents of participatory development recognise – at least in principle - that development organisations which are external to local communities are invariably limited in their understanding of the specificities of such contexts, and on this basis stress the need for local populations to be involved in identifying the forms of development of relevance to them. Occurring in tandem with the participatory wave of the 1970s was the intermediate technology movement (q.v. Schumacher 1993) which challenged the expert-led technology transfer model invariably adopted by the earliest development interventions (Clark 2006) and advocated in its place a context-responsive approach to developing appropriate technologies tailored to the social, cultural and economic specifications of poor populations in the South. According to Clifford (2005), an appropriate technology approach would engage local communities and outsider experts in participatory processes to develop technological solutions that are grounded in an accurate understanding of local limitations and capabilities, rather than simply imposing pre-identified 'Western' solutions on those communities.

The growing emphasis on participatory approaches is also a feature of research looking at technologies and technical expertise in their wider societal context. In this field of Science and Technology Studies (STS), the need for citizen participation in technoscientific decision making has begun to be emphasised even in Northern contexts (Leach et al. 2005). This is because, as Kleinman (2005) points out, all knowledge reflects a

perspective, and 'expert' technical knowledge on any issue is partial and not comprehensive. Crucially, 'technical' problems usually have wider social importance, and the quality of decisions made on such matters can be improved by broadening the array of knowledge producers beyond traditional experts to include lay members of the public. Indeed, as Raman and Mohr (2010) suggest, the boundaries usually drawn between expert and lay knowledge may be less clearly defined than commonly assumed. The lay-expert relationship in development contexts is described by Chambers (1983) as being an insider-outsider relationship. That relationship is depicted in this thesis as being between 'local citizens' and 'outsider organisations'.

Claims for local participation or lay involvement have been made by outsider organisations in the field of stove development from the 1980s onwards. A participatory or 'bottom-up' approach to stove development presupposes the involvement of local citizens in the development and dissemination of improved cooking technologies that are appropriate to their contexts, in contrast to 'top-down' approaches which are more prescriptive in nature and which privilege traditional expert knowledge in implementation processes. In employing two cases of stove programme implementation in Nigeria and Kenya, this study investigates the extent to which the general claims for participation have been borne out in the development of stove technologies and markets for energy-poor populations. The next section critically engages with pertinent debates in the participatory development literature in an attempt to explicate the theoretical foundations upon which this inquiry is premised.

1.2. Participatory Development in Theory

According to Guijt and Shah (1998), disillusionment with the outcomes of the development project three decades into its institutionalisation in the late 1940s led outsider organisations to consider alternatives to the top-down implementation approaches they had hitherto been employing. The focus of this drive was on understanding and respecting citizen/local knowledge, to rectify the dominance of outsider/Northern technoscientific knowledge in project implementation. The move towards participatory modes of project implementation countered the prevailing assumption in the field of development at the time that the application of rational technical knowledge alone was sufficient to provide the tools required by any group of people to improve their existence, regardless of culture or locality. Thus, participatory development is conventionally represented as emerging out of the recognition of the shortcomings of top-down development approaches, and is credited with having the potential to give rise to more socially and technologically appropriate solutions with greater probability of widespread adoption and improved likelihood of long-term sustainability. Irwin and Michael (2003) however assert that participatory approaches, like the top-down methods they were devised to replace, embody working principles and assumptions about societies and individuals, even if these are rarely expressed or even acknowledged.

On a parallel note, public participation in science and technology decision-making has been a preoccupation of Science and Technology Studies (STS) since the 1970s (Leach et al. 2005). STS challenges the dominant assumption within Northern scientific and policy circles that non-scientific or lay members of the public do not have sufficient appreciation of technoscientific issues to have a say in such issues, and that better

understanding of science and technology will guarantee favourable attitudes toward scientific and technological innovation (Bucchi and Neresini 2008). STS calls for increased public participation in decision-making processes in an attempt to redress the imbalance engendered by a mainstream tendency to make policy decisions on the basis of scientific 'facts', without due consideration for the role that human values should play in the decision-making process or allowing for other ways of understanding complex issues in the context of ordinary everyday life applications. As such, the theme of participation is common to both development studies and STS: whether in Southern development contexts or Northern industrial settings, both fields challenge the dominant hegemonic assumptions of 'expert' institutions (Leach et al. 2005). This research is however mainly concerned with discourses of participation that relate to the field of development as it has been instituted in the South.

Chambers (2005) notes how, through the development decades, participation has had many different streams, 'with flows separating and merging, and new springs coming in' (p.99) – so that by the 1990s, participation had almost become a standard feature in the field of development, advocated by donors, governments and civil society actors, and had assumed global proportions. Indeed, by the early 1990s, 'participatory' had not only come to be used interchangeably with 'good' or 'sustainable' development, but had come to be associated with the radical message of empowerment and change for people in local communities (Cornwall 1998). Parfitt (2004) asserts that participation has in recent times become one of the central influences in mainstream development thinking and is, at least in principle, a desirable element of development projects in the South. However, as discussed in later sections, the nature, scope and

impact of participation as it is implemented in practice remains a subject of debate in the literature.

Oakley (1991) avers that the use of the term 'participation' is so widespread and its scope so broad that it is impossible to encapsulate its meaning within one definition or to privilege any one of the several definitions that have been given to it in the literature. Whatever the definition employed, it is clear that several authors agree that the central idea underlying participation is *influence* (Bucchi and Neresini 2008, Oakley 1991, Paul 1987). In theory, participatory development projects give local 'beneficiaries' space to influence the key project areas of planning, design, implementation, remuneration and evaluation. With regard to the degree of influence that local people may be able to wield in these areas, diverse levels of involvement or 'ladders' of participation have been identified (Arnstein 1969, Chambers 2005). Ladders of participation are basically gradations or calibrations of the depth of user involvement in development projects, on a scale ranging from utter compliance with top-down initiatives (zero participation) to local users taking the initiative for their own development (total autonomy). The metaphor of the ladder resonates with Drijver's (1991) concept of 'functional reach' which stipulates that it is not sufficient that many different sections of local communities - individuals, cooperatives, community organisations, whole departments within local governments - are involved in a development project. What is more important is the level of importance of the tasks these different groups are involved in. The claim is that the deeper the degree of influence, the more beneficial participation becomes for the community.

Participation has been identified by several authors in the literature as having particular relevance for development projects that incorporate a technological component. Agarwal (1986) makes a distinction between studies of technology-led development projects in which the involvement of local people in the design and dissemination of the technology is seen as a necessary condition for success and those studies which see the issue in terms of persuading people to use an externally conceived and developed technical package. Gamser (1988), citing the results of an analysis of technical change in poor countries, highlights the importance of bringing the skills and ideas of technology users into the process of generating new technologies. Barbour (1993) rejects the deterministic stance that views technology as being able to evolve independently of society, and advocates down-scaling, decentralisation and user participation to optimise the benefits of technology. Finally, Leach and Scoones (2006) highlight the need to actively engage poor people in the 'slow race' to developing technological solutions that are appropriate to local contexts, rather than insisting on models that privilege the administration of quick technological fixes in the global race to spur economic growth and alleviate poverty in developing countries. Drawing on the appropriate technology and participatory technology development movements which gained popularity in the 1970s as well as ongoing debates in the field of STS regarding the role of the public in science and technology decision-making, Leach and Scoones advocate a central role for local people in technology-led development processes which allows them to be involved in shaping the design, delivery and regulation of technologies intended for their benefit.

Proponents' claims regarding the merits of participatory development have however been brought into question by several critics in the development

studies literature. Parfitt (2004) observes that participation has been criticised on two fronts, both in relation to its theoretical coherence and its practice. In Parfitt's (2004) view, these critiques of participation stem from an inherent contradiction in the concept which the next sub-section goes on to discuss.

1.2.1 The Means/End Divide of Participation

Oakley (1991) distinguishes between participation as a means or an end, with radically different implications for implementation aims and outcomes. When participation is employed as a means, it is seen as a short-term instrument applied towards the achievement of predetermined objectives stated by a project, and it usually expires with completion of the project. The emphasis of participation is more on completing the project at hand and meeting the targets set by outsider organisations, and less on developing the capabilities of the 'beneficiaries' of development who may be directly involved in the 'task' at hand, but more or less in a passive way. According to Oakley, an outsider organisation that views participation as a means would consider meeting the preset goals of the project in an efficient manner more important than the empowering potential of engaging local people in the process. An organisation that values participation as an end on the other hand recognises the importance of empowerment, both in the form of increased local technological capacity and greater relevance of users in decision-making processes, whether or not tangible outcomes are recorded. The participatory process takes place over a longer term and is more dynamic, because rather than the organisation placing a premium on the achievement of measurable targets, local people are allowed to actively define their own goals and objectives and in the process strengthen their

capabilities to take more responsibility for their own development in the future.

Parfitt (2004) picks up on Oakley's (1991) distinction and elaborates on the implications of adopting either approach for the analysis of power relations both 'horizontally' and 'vertically', i.e. among groups within a community as well as between the community and outsider organisations. Participation as a means is a 'politically neutral' process that leaves these power relations intact, as is the case when a top-down approach is employed. Where participation is viewed as an end however, the process takes on a radical political element and challenges the structures of power which exist at all levels of the development scenario. Aware of the 'pitfalls of participatory development' (Eversole 2003, p.781), participation as an end takes a critical, nuanced approach to engaging the community in the dynamic process of development described by Oakley (1991) and aims to liberate local citizens from 'clientelist' (Parfitt 2004) relations with outsiders.

Parfitt (2004) asserts that mainstream development organisations such as the World Bank, though they generally pay rhetorical attention to the empowerment objective, are more prone to subscribe to the view of participation as a means. On the other hand, Parfitt avers, non-governmental organisations that are in close proximity to vulnerable groups in local communities exhibit a greater degree of commitment to achieving the goal of empowerment among their target groups. Interestingly, this view is supported by a 2002 Working Paper prepared by the Social Development Department of the World Bank, which reports that donors and governments tend to see participation more as 'a means, an instrument, to facilitate implementation of projects or conduct poverty assessments'

(World Bank 2002, p.8), while non-governmental organisations view participation as 'an end itself, and thus calling for long, deep, and broad processes' (ibid.). Kapoor (2002) however argues that even amongst those organisations that are grassroots-oriented, there is a tendency to ignore the deeper questions of power, justice and legitimacy that must be addressed for the end goal of empowerment to be a reality.

Parfitt (2004) concludes that in practice, development projects necessarily have to straddle both ends of the means/end divide. Parfitt argues that, regardless of how end-oriented a participatory project is, an outsider organisation will still want to achieve some form of measurable outcome. Neither can a project record any degree of success without involving the community to some degree along the Information Sharing - Consultation - Collaboration - Empowerment continuum of participation identified by the World Bank (World Bank 2002). Parfitt asserts that for all practical purposes, development organisations have to strike a balance between achieving project efficiency and people empowerment, and suggests that the constitution of this means-end balance will vary for different organisations depending on their objectives, traditions and institutional culture.

Parfitt (2004) attributes a lot of the contradictions observed in participatory development - and the critiques arising from those - to the phenomenon he has termed the 'means/end ambiguity' of participation. According to him, the contradictions arising from the inherently ambiguous nature of participation 'partially undermine the coherence of the participatory approach' (Parfitt 2004, p.538) and inform the subject of the depoliticisation critique, which is examined in detail in the next sub-section.

1.2.2 *The Depoliticisation Critique of Participation*

Earlier in this chapter, attention was drawn to a convergence between the theme of participation in the fields of STS and development studies. Notwithstanding the conceptual similarity however, Leach and Scoones (2005) highlight an important point of difference in the implementation of participation in Northern and Southern contexts: whilst there has been an emphasis on engaging the public in democratic technoscientific decision-making processes in Northern STS contexts, the practice of participation in Southern development contexts has only recently begun to pay attention to the significance of political engagement.

Indeed, Southern participatory development models have been severally criticised as adopting an overly technical approach to the exclusion of underlying patterns of injustice, effectively depoliticising what should be an explicitly political process (Hickey and Mohan 2004, Kothari 2001, Mohan and Stoke 2000). The tendency in practice to constantly revise participatory methods and approaches while ignoring the more fundamental political ramifications of the participatory process has been described by critics as amounting to 'methodological revisionism' (Cooke and Kothari 2001) that obscures the issues of power and inequality which pervade local participatory spaces (Kapoor 2002, Williams et al. 2003), while simultaneously allowing for the outsider to dominate and manipulate the voices of the poor and marginalised (Hickey and Mohan 2004). As such participation is seen by critics as simply another platform for driving expert-led development agendas while appearing to demonstrate commitment to the empowerment of excluded and marginalised populations (Parfitt 2004).

This is what Cooke and Kothari (2001) have referred to as the 'tyranny of participation'.

The consensus amongst critics is thus that participatory practices in general tend to proffer technical solutions to what are essentially political problems. The contention is that the practice can only achieve the stated goal of empowerment if it expands beyond the current focus on methodological improvements to encompass opportunities for broader political impact at the level of expert-led development organisations and even beyond. Cooke and Kothari (2001) go so far as to suggest that the concept of participatory development has been so fundamentally depoliticised that a thorough objective analysis might mean the practice will eventually have to be done away with. Hickey and Mohan in a 2004 volume titled *Participation: from Tyranny to Transformation?* however offer a conceptual response particularly directed at the uncompromising critique put forward by Cooke and Kothari (2001). The next sub-section brings together some of the arguments presented by Hickey and Mohan and those of several other authors compiled in the same volume.

1.2.3 Responding to the Depoliticisation Critique

Hickey and Mohan (2004) propose that rather than jettison altogether the praxis of participation in development as suggested by Cooke and Kothari (2001), attempts should be made to relocate it within a more political frame. The notion of citizenship, Mohan and Hickey (2004) argue, provides one such frame - presenting a toolbox of concepts which, appropriated accordingly, are capable of repoliticising participation and restoring it to its radical roots.

Whether in relation to Northern industrial or Southern development contexts, emphasis has been placed in the literature on the links between participation and citizenship. Faulks (2000), for instance, notes that one of the vital defining features of citizenship is an ethic of participation. According to Lister (2003), citizenship as participation allows for the expression of individuals' agency in political spaces. The idea of agency is typically used to characterise individuals as independent and innovative actors who are capable of making their own choices (ibid.). Perhaps more in the established democracies of the North than in the South, claims to participation rights premised on citizenship status are increasingly gaining wider ground in policy practice. Barnes et al. (2007) for instance observe that in Britain, there has been an 'explosion' in recent years of participative forums such as citizens' juries, area committees, neighbourhood forums, tenant groups, and user groups. As a result of this explosion, new opportunities have begun to emerge for citizens to negotiate access to political spaces and gain substantive representation in decision-making processes (ibid.). Such participatory platforms are built around theories of 'deliberative democracy' (Barnes et al. 2007) and 'inclusive citizenship' (Kabeer 2005) - concepts which, in developing democracies of the South, are only beginning to gain relevance and recognition through dedicated citizen struggles (Cornwall et al. 2008).

It is clear therefore that the notion of citizenship presupposes, at least to some degree, a democratically run society. Consequently, its adaptation to less democratic Southern development contexts will likely entail a type of citizenship expression different from conventional democratic state-centred manifestations. Far from diminishing the scope for expression within developing societies, the element of difference encourages multiple forms of

expression - because as Kabeer (2005) points out, rather than being limited to a particular conception or definition, citizenship can be understood and experienced in different ways (q.v. Edwards and Gaventa 2001, Henry 2004, Leach and Scoones 2005). Rural communities in developing countries in particular may operate 'ethnic' forms of citizenship, in which participation is constructed around and conducted within a community-level project frame, resting on the assumption that citizen participation emerges through being a community member (Henry 2004).

Hickey and Mohan (2004) assert that the participatory development interventions that have shown promise of transformation in the South have been those which emphasise a citizenship focus rather than a technical orientation. Hickey and Mohan's conception of citizenship is founded on social movement theory which, according to Barnes et al. (2007), offers ways of recognising the importance of public spaces in which social actors can bring their experience to voice and can have such voices heard. Here, participation is defined within a broader framework by a struggle for rights that people have as members of particular political communities, as they seek to progressively restore the balance of justice and equity in the system (Hickey and Mohan 2004). Citizenship in this context is seen as a right to actively fight for and claim (citizenship as a practice), rather than a status that is automatically conferred 'from above' (citizenship as a status) (Oldfield 1990).

Brazil's practices of participatory governance offer a good example of the expression of citizenship described above. If governance involves the sharing of resources and maintenance of order (Faulks 2000), then participatory governance facilitates the distribution and management of

resources in a just manner, by equitably dividing the rewards and responsibilities of social life (ibid.). Since the beginning of Brazil's democratic transition (from military dictatorship) over two decades ago, social movements have struggled against inequalities of power, wellbeing and income amongst citizens (Cornwall et al. 2008). Brazil's long history of popular struggle and engagement reinforces a key point: that any prescriptions for political participation in any given society must be historically and contextually situated.

The inherent pitfall in almost exclusively associating citizenship with movement socialism (Mohan and Hickey 2004) however, is that in aiming to transform 'particularist claims of identity' into 'more universalist democratic gains' (p.69), there is the danger that the voices of the 'marginalised within the marginalised' may be drowned out. In Southern development project contexts, this group is most commonly constituted by people sidelined by gender and ethnic prejudices. While movement socialism may be potentially revolutionary for class and group struggles, it ignores the issue of oppressive power relations within local communities. By privileging the collectivist elements of citizenship over its individualistic elements (q.v. Faulks 2000), Mohan and Hickey's approach misses out on the chance to understand people's experiences of 'lived citizenship' (Hall and Williamson 1999) or 'intimate citizenship' (Oleksy 2009), i.e., the meanings that citizenship actually has in people's individual lives and peculiar circumstances.

A second point of contention where movement socialism is concerned is that, situated as it is in the context of political struggles, participation tends to be used as a tool for claiming rights within the framework of a formal

social contract, usually between a state and its citizens (Cornwall et al. 2008). If however, as Faulks (2000) asserts, the primary question of citizenship for the individual is that of social membership, then it should be possible to construct various notions of citizenship based on the 'multiple social, cultural and political identities' (Honwana 2007, p.6) and relationships that people engage in. A conceptualisation of citizenship in terms of membership emphasises the necessity of going beyond formal codes governing the relationship between individuals and the state to recognising the diverse relationships that exist between individuals and the wider society (Lister 2003). It becomes necessary to transcend Marshall's (1992) theory of citizenship as status to inquiring into what makes people 'valid' members of the community in the first place. This will entail projecting beyond theories of citizenship predicated on performance (e.g. Cornwall et al. 2008) and looking to a conception of citizenship on the basis of social identity. My research aims to give some insight into how citizen participation might look in more informal societies (such as typified by rural communities of developing countries) where, as Henry (2004) observes, popular participation in development may already form an obligation rather than a right of citizenship. Taking into cognisance the distinction that Weber (1947) makes between 'rational' and 'traditional' forms of legitimate authority in different societies, the research explores some of the meanings that norms and practices pertaining to performances of membership-based citizenship hold for members of traditional societies.

Mohan and Hickey (2004) further ground their concept of citizen participation in a 'critical modernism' framework. This approach involves 'rethinking' development in a manner that does not reject modernism altogether but retains a belief in what the authors identify to be the central

tenets of modernism: 'rational' values such as progress, democracy and emancipation. In defining rationality and modernity, Mohan and Hickey stress that they do not favour any all-encompassing meaning of the terms such as those associated with the European Enlightenment. Instead, they propose that development is approached in a way that takes into account the 'contending rationalities of multiple modernities' (p.63), on the premise that every civilisation embodies its own versions of rationality and modernity which it can bring to the table in a dialogic process. Mohan and Hickey advocate that this sort of negotiation between rationalities is more likely to facilitate reasoning which is pragmatic rather than idealistic, thus increasing the possibility of making the most appropriate decisions in any given situation.

Mohan and Hickey's (2004) theory appears to be consistent, but as is later discussed, it is based on certain assumptions that are taken for granted in Western notions of citizenship and democracy. One such assumption is that the social structure of traditional communities in developing countries is equitable and allows for equal participation by all members of society (Cleaver 2004). Cleaver stresses that this is not always the case in reality, and cautions against the tendency to construct notions of citizenship that ignore peculiar constraints within particular societies. It is, after all, pointless to abstractly impose notions of agency – which denote freedom of choice – on impervious traditional structures which may prove much more difficult to transform than public spaces and state institutions. Importantly, Cleaver argues that agency tends to take the form of the structure in which it is expressed. Likewise, the content and possibilities of citizenship cannot transcend the sum total of everyday social life and relationships that take place in a community. With this analysis, Cleaver essentially pulls back the

reins on Mohan and Hickey's (2004) optimistic ideas around the possibility of reconciling different rationalities.

Cleaver (2004) goes on to make an interesting observation - one which proponents of Western citizenship will probably find confounding - that indigenous citizens may actually be quite content with the seemingly limited choices afforded them by the structures in which they live. This is because, as Mohan and Hickey (2004) also recognise, definitions of what is rational vary, and 'rationality' sometimes has to be negotiated on a trade-off basis - with people making compromises in favour of what they perceive to be most beneficial to them in their lived realities. Cleaver gives the example of traditional systems in parts of Africa and India where a woman is free by customary law to acquire land by her status as a legal (and equal) citizen but also through subject positions as, for example, a wife or a daughter. Asserting her rights as an equal citizen may not necessarily be the 'rational' option for a woman if she perceives that it will come at a cost to her family relationships. This example lucidly illustrates Cleaver's main point of contention with Mohan and Hickey (2004): that in pursuing participation as citizenship, different 'rationalities' will never really be reconcilable. Extremes like inequality and fairness, or constraint and agency, will always coexist in traditional societies, and the enduring challenge of development is to work out how change can be effected in spite of ever-present contradictions in value systems.

The sense that Cleaver (2004) conveys is that in prescribing citizen participation as a route to people's empowerment, proper account needs to be taken of the context in which our theories of citizenship are to be operationalised. In a striking illustration of the context-sensitive nature of

citizenship, Scott (2007) presents the results of research into the meanings of citizenship in classical and contemporary Islamic states. In spite of claims made by many Islamists today for the compatibility of contemporary Islam with Western notions of citizenship and democracy, Scott points out that there are still limitations that would preclude a perfect correlation. This is because there are points of divergence between assumptions of citizenship inherent to both contexts. One of such points is the separation (or otherwise) between religion and state. Despite protestations by contemporary Islamists about full equality of all citizens, the qur'anic law makes hierarchical distinctions between Muslims and non-Muslims, ascribing authority to the former.

Henry (2004) provides another example of how indigenous practices of citizenship may defy prescriptions of Western citizenship. Contrary to most citizenship approaches to development in which the moral rights of the citizen are stressed, Henry identifies an indigenous society in Ethiopia where rights are not granted automatically by virtue of being a member of the community. Rather, rights are activated on an individual basis upon a person's demonstration of commitment to the community, usually by way of membership of particular groups and fulfilment of attendant obligations. Henry describes how indigenous institutions and social practices are proficiently 'harnessed' for development via a system in which local people are excluded from decision-making processes and deference is given to the increased knowledge and resources of the 'elite'. Under these conditions, participation in development by local citizens is more instrumental than empowering. However, as in Cleaver's (2004) example cited earlier, not only have these practices become accepted by the people, they are also

regarded as legitimate and have become central to notions of citizenship in that particular community.

In light of the evidence presented by the authors cited above, questions begin to arise as to what should ultimately constitute visions of empowerment in Southern development contexts. The term is often described in the literature in terms of processes that help marginalised or oppressed people to recognise and exercise their agency (Cornwall 2004) and to consequently take the initiative of participating in change-making processes (Freire 1996). Rogers et al. (2008) assert that it may also denote the devolution of political authority to citizens or to local organisations. Regardless of nuances in definition, it is instructive to note that 'empowerment' has been normatively proposed as an end of development as if there was a unanimous specification of what it would entail in any given society.

Sen (1999) employs another term – freedom – in describing the phenomenon he identifies as being the end of development as well as the means for achieving it. Contrary to Mohan and Hickey's (2004) expectation of enhanced 'material well-being' (p.63) resulting from citizen empowerment, Sen proposes that the experience and expression of freedom by marginalised people ought to be valued for its own sake, without needing to be justified by any tangible outcomes. The real measure of any development intervention, Sen argues, is the degree to which it enhances the range of freedoms that people have reason to value. In making this assertion, Sen is suggesting that what constitutes 'freedom' is subjective – and subject to individual interpretation. Going against Mohan and Hickey's (2004) predilection towards movement socialism, Sen ascribes agency to

the individual, describing an agent as 'someone who acts and brings about change, and whose achievements can be judged in terms of her own values and objectives, whether or not we assess them in terms of some external criteria as well' (1999, p.19).

In bringing together the arguments summarised above, a dilemma becomes apparent. Sen (1999) on the one hand asserts that the achievement of substantive development is 'thoroughly dependent on the free agency of people' (p.4). On the other hand, Cleaver (2004) draws attention to the observed reality that indigenous social structures often exist which may serve to constrain the 'free agency' of people. Implicit in Cleaver's analysis is the idea that not all forms of 'freedom' are necessarily desirable in all contexts. Freire (1996) introduced the notion of 'fear of freedom' to describe reluctance on the part of marginalised people to break with the established order of traditional authority and legitimacy, lest any individual exercise of agency instigate anarchy. Amidst these conflicting perspectives then, how is it possible for notions of freedom or empowerment to be appropriately articulated amongst local citizens in Southern participatory development contexts?

As discussed, Mohan and Hickey's (2004) proposal to employ a citizenship framework in aligning participation with the ideal of political empowerment is one that is fraught with a number of assumptions, based as it is on Western conceptions of 'ideal' citizenship (Marshall 1992). Mohan and Hickey's approach partly takes for granted what constitutes 'ideal' and whose standards these ideals are to be judged by (q.v. Lister 2003). Any attempt to successfully ground participation within a citizenship framework in local communities needs to build on the institutions and structures within

which local people already live out practices of indigenous citizenship. What do such traditional structures and practices entail, and where might they conflict with established notions of citizenship? In what ways can the conflicting priorities (or, borrowing Mohan and Hickey's (2004) phrase, 'contending rationalities') of local citizens and outsider organisations be effectively handled? Can these multiple rationalities really be juxtaposed and negotiated to converge towards a common goal of empowerment, or will it be necessary, as Cleaver (2004) suggests, to constantly oscillate between competing interpretations in different situations? These are some of the theoretical questions that have informed my research into stove development practice in Nigeria and Kenya. The next section expands on the set of practical observations which led on to identification of the research questions.

1.3. Rationale for the Research

This research was prompted in the first instance by a desire to unearth evidence that might be relevant to understanding the 'paradox of plenty' (Karl 1997) apparent in Nigeria's energy sector: although the country is 'the most important producer of oil and gas' (Watts 2008, p.27) in Africa, earning substantial revenues from the export of crude oil and natural gas from the late 1950s onwards (ECN 2003), the majority of its citizens are energy poor (Adeyemi et al. 2008). A review of energy use patterns in the country reveals a picture consistent with the global energy poverty scenario described in the preceding section. The household sector accounts for about 80 percent of energy use in the country, compared to 11 percent in the industrial sector, 7 percent in the transport sector, and 2 percent in all other sectors (IEA 2008). Several studies conducted locally (for example Adegbulugbe and Akinbami 1995, Adeoti et al. 2001, Oladosu and

Adegbulugbe 1994) have shown cooking to be the most significant end use of household energy in the country. For an estimated 67 percent of the population, this substantial demand for cooking energy is met by traditional biomass fuels (WHO 2006b).

The Nigerian Renewable Energy Master Plan published by the Energy Commission of Nigeria in collaboration with the United Nations Development Programme acknowledges that biomass is 'the energy of choice for the vast majority of rural dwellers and the urban poor' (UNDP/ECN 2005, p.67) in the country. In light of the huge financial implications of establishing large-scale infrastructure networks to serve this majority, the Master Plan underscores the potential of low-cost decentralised cooking technologies such as improved stoves and biogas digesters to mitigate the energy poverty situation amongst those populations. The Master Plan however asserts that, despite efforts directed towards promoting their uptake, 'improved wood stoves have not gained any significant foothold in any part of the country' (ibid., p.7), and 'only a handful of biodigesters presently exist in Nigeria' (ibid., p.8).

I therefore began this study by asking questions regarding the factors that have contributed to limiting the widespread uptake of available decentralised energy technologies in Nigeria. Though the intention at the outset was to focus my attention solely on Nigeria, it soon became apparent that there was considerable insight to be gained by broadening the scope of the study to include countries where large percentages of the population face similar energy challenges as Nigeria. A number of countries – in particular, China, India and Kenya – appeared to have taken significantly greater strides than Nigeria in addressing the incidence of energy poverty

amongst citizens. However, of the three, Kenya seemed to be the country of greatest relevance for a study setting out to explore issues around energy use and development in Nigeria. This is because, apart from having close political and social connections⁴, both countries have comparable energy use patterns: solid biomass fuels are also the most common sources of household energy in Kenya, used by 78 percent of the population for cooking (WHO 2006b). As with Nigeria, the dominant energy user is the household sector (approximately 78 percent, most of which is attributable to cooking energy), compared to 15 percent in the transport sector, 6 percent in the industrial sector, and 2 percent in other sectors (IEA 2007 cited in Karekezi et al. 2008)⁵. Biomass sources supply 75 percent of total energy used across all sectors (ibid.).

Reviewing the energy use statistics for Nigeria and Kenya cited above, it is easy to recognise the importance of household energy, and in particular cooking energy, to citizens in both countries. Paradoxically, despite the prominent role played by biomass sources in meeting the significant demand for cooking energy, the issues of energy poverty associated with their use have not been a priority of national policies and programmes in either country. In Kenya, no notable government interventions aimed specifically at alleviating energy poverty amongst biomass users have been recorded since the 1980s when the Ministry of Energy teamed up with local and international non-governmental organisations to develop and disseminate fuel-efficient charcoal and wood stoves in urban and rural areas

⁴ Nigeria and Kenya are both sub-Saharan African countries; however, with Nigeria situated in the west and Kenya in the east of the continent, there exist wide variations in social structure and cultural expression between both countries. This interplay of similarities and differences between the countries seemed to offer a range of interesting possibilities for analysis, and presented a practical opportunity to learn lessons from one country that could be applied to another within the 'developing economy' context.

⁵ The figures quoted here have been rounded up to the nearest decimal point for ease of comprehension.

respectively (Hyman 1987, Kammen 1995, Karekezi et al. 2004). In Nigeria, government initiatives targeted at providing improved cooking technologies to biomass energy users have existed mainly at the level of research and development and have not progressed to the dissemination stages (UNDP/ECN 2005).

International development organisations, perceiving an unmet need for improved energy access amongst biomass-reliant populations in these countries, have responded by initiating stove programmes especially targeted at rural and peri-urban populations which operate within the survival economy and experience the most extreme dimensions of energy poverty. As previously alluded to, such initiatives appear to have gained greater traction in Kenya than in Nigeria. However, regardless of level of stove development activity, the uptake of improved cooking technologies among target populations remains low in both countries, as is the case in most regions where such technologies have been promoted (Karekezi 1994, Karekezi et al. 2004). This observation subsequently generated the set of research questions presented in the next section.

1.4. Research Questions and Choice of Case Studies

In the preceding section, attention was drawn to the limited role played by national governments in Nigeria and Kenya in stove development and the subsequent attention given by international development organisations to alleviating energy poverty amongst biomass-reliant citizens in both countries. Following the intervention of these outsider organisations however, improved stove technologies have not achieved widespread dissemination amongst this most vulnerable group of energy users in either country. This prompted the overarching query which informed this study:

Given that high levels of energy poverty have been identified in both countries and that numerous interventions have been launched by outsider organisations to address the issue, why has relatively little progress been made in disseminating those interventions towards the end of alleviating energy poverty amongst target populations?

It came to light in the course of the research that local development organisations in both countries have also responded to the perceived need for improved energy access amongst these populations, but their intervention has been far less sustained than has been the case with their international counterparts. Consequently, the stove development field in both countries is characterised by significant local-global interactions that inevitably impact upon the content and delivery of stove programmes. This observation generated interest in the kind of impact that global-level processes have on the uptake of stoves and other improved cooking technologies by local populations, and in how externally-conceived stove programmes are perceived by 'beneficiaries' in local communities. Hence the first question addressed by this research:

How have the objectives of specific externally-initiated stove programmes translated into the realities of local contexts, and what aspects of these contexts have influenced stove uptake by local citizens?

A review of the general development literature conducted in the early stages of the research led me to identify the prominent role envisaged for local participation in facilitating the local-global exchanges which define interactions between local citizens and outsider 'experts' in development scenarios. On this basis, I formulated a hypothesis with specific reference

to stove development, namely that stove dissemination rates are likely to be higher with participatory approaches in which improved stove programmes are designed to respond to the priorities of citizens in local contexts. This led to the articulation of a further question, as follows:

Has a context-responsive approach to implementation of specific stove programmes had a discernible impact on stove development processes and outcomes?

Further, a review of the stove development literature revealed a distinction in the field between context-responsive approaches employed to facilitate identification of appropriate technologies for alleviating energy poverty and those aimed at facilitating dissemination of those technologies amongst target populations. With respect to the latter, low rates of stove dissemination have been linked to the privileging of a subsidy approach by implementers of the earliest interventions seeking to facilitate stove uptake among the poorest households, and outsider organisations have subsequently advocated the application of market principles to stove dissemination with a view to tackling the incidence of energy poverty on a widespread scale. Consequently, a third question was generated:

How does the shift towards market-based stove dissemination relate to the ideal of context-responsiveness expressed by outsider organisations, and what is the impact of this shift on the objective of energy poverty alleviation stated by particular organisations?

To answer the above questions, two different stove programmes were selected that seemed to incorporate pertinent aspects of the phenomena under investigation: Project Gaia's CleanCook project in Nigeria and

Practical Action's biomass smoke alleviation programme in Kenya. Both programmes, in employing technology and market platforms towards resolving the energy challenges identified amongst poor households in project communities, appeared at the outset to favour a context-responsive approach to implementation. In introducing the CleanCook technology to Nigeria in 2003, Project Gaia, a US-based international organisation, attempted to adapt the technology, already proven to work well in specific Northern contexts, to be appropriate for everyday use in poor Southern contexts – thus appearing to deviate from conventional technology transfer models. Practical Action, a UK-based international organisation which has worked on the biomass smoke alleviation programme in Kenya since 1998, appeared to demonstrate an even greater degree of commitment to appropriate technology principles, with its emphasis on engaging citizens in participatory processes to identify those solutions that best respond to the realities of their local contexts. Taken together, these two cases offered a platform for exploring the nuances in outsider organisations' performances of context-responsiveness in market-based stove development in the South.

The next section summarises the contribution made by each chapter in the thesis to answering the research questions presented here.

1.5. Structure of the Thesis

So far in this chapter, this study has been located in the context of international development, particularly as it relates to the application of technology, markets and participatory principles by Northern-affiliated outsider organisations in addressing the widespread occurrence of poverty amongst local citizens in the global South. Importantly, insight has been provided into the expediency of conducting an investigation into stove

development in Nigeria and Kenya in light of the disparity between the drive by outsider organisations to address the perceived need of local citizens for improved cooking technologies and the response of the latter to these externally-initiated interventions. This section proceeds to give an overview of the structure adopted in discussing the research subject in the chapters that follow.

Chapter 2 traces the trajectory of stove development in both North and South, highlighting the acceleration in technological development ushered in by the Industrial Revolution of the 18th and 19th centuries which precipitated the spontaneous development of modern cooking technologies in the North and their relatively forced development in the South. The chapter goes on to review the recent history of stove development in Southern contexts in three distinct, albeit overlapping, phases – expert-led, context-responsive, and market-based – corresponding to the central analytical and conceptual themes explored in this thesis; namely the enrolment of technology, local participation, and markets in institutionalised development from the late 1940s to date. The shifts in emphasis of outsider organisations on the normative role of technical expertise, citizen knowledge and neoliberal ideology in achieving widespread stove dissemination are observed through these phases. The discussion essentially provides historical and theoretical context for later analysis of the two stove programmes considered in this study.

Chapter 3 addresses issues pertaining to the strategy, design and methodology employed in the research. The chapter elaborates on the theoretical premise of the particular epistemological stance adopted, as well as on the practical considerations involved in selecting the cases for

empirical study in Nigeria and Kenya. The methods employed in gathering data in both cases are discussed in detail, in particular highlighting and clarifying those decisions considered to be of strategic importance to data collection and analysis. The impact of the researcher on various research settings is reflexively considered, as are the ethical implications of engaging subjects in those settings.

Chapter 4 features a detailed discussion of the implementation approach adopted by Project Gaia in introducing the CleanCook stove-and-fuel technology into Nigeria. The chapter evaluates, in the light of appropriate technology principles, Project Gaia's seemingly context-responsive attempt to modify a technological solution originally developed for use in specific Northern contexts to suit the requirements of Southern populations. Using empirical data gathered from interview and observation sessions as well as data from key project documents, the chapter examines the strategies and expectations of the implementers in the already completed pilot phase and in the proposed market-based 'scaling-up' phase of the project.

In Chapter 5, the approach taken by Practical Action in introducing a range of improved cooking technologies to energy-poor households in Kenya is discussed. Similar to Project Gaia, Practical Action assumes both a context-responsive and a market-based approach in developing and disseminating its technological interventions. The organisation explicitly articulates a philosophy built around appropriate technology principles which do not give primacy to technology and market platforms but instead predicate change on the ability to engage local citizens in participatory processes to develop solutions that are suited to their specific contexts. Relying primarily on interview and observation data, the chapter evaluates these claims to

context-responsiveness made by Practical Action by examining the objectives of the organisation and assessing them in light of the priorities of local citizens so as to determine their relationship to each other.

Chapter 6 brings together the two stove programmes examined in Chapters 4 and 5 to comparatively analyse outsider organisations' performances of participatory development on both programmes and evaluate the impact that a market focus has had on energy poverty specifically and poverty more generally amongst target populations in Nigeria and Kenya. Critical appraisal of the CleanCook project in Nigeria reveals the potential for key aspects of the proposed scaling-up phase to be enhanced by adopting a more context-responsive approach in their implementation. Further, analysis of the participatory market development model employed by Practical Action in Kenya reveals some of the limitations of the model with respect to the stated objective of citizen empowerment.

Chapter 7 summarises the findings discussed in the preceding chapters and presents the conclusions of the thesis. The research questions, and the hypothesis from which they were generated, are directly addressed on the basis of evidence gathered in the course of the study. The insights offered by the study for research and practice in the field of stove development as well as in the wider field of development are discussed. The limitations of the present study are highlighted, along with the possibilities that exist for further research into externally-initiated stove programmes targeted at energy poverty alleviation in the South.

Chapter 2: Stove Technologies in Development

'But there is a third, alternative race, which also demands our attention. This emphasises pathways to poverty reduction which may involve science and technology, but are specific to local contexts. It recognises that technological fixes are not enough, and that social, cultural and institutional dimensions are also key. And it sees science and technology as part of a bottom-up, participatory process of development, where citizens themselves take centre stage.' (Leach and Scoones 2006, p.14)

In Chapter 1, it was established that nearly half of the world's population, mostly people in regions characterised by 'low agricultural productivity and poor standards of living' (Best 1992, p.3), depend on solid biomass fuels to meet their cooking and heating energy needs. Amongst these populations, the mundane practice of burning biomass fuels in traditional cooking devices has been variously framed as constituting environmental, health and climate-related challenges to development. This chapter reviews the efforts that have been made by development actors to promote improved stove technologies as a solution to those problems at various points in recent history.

The discussion in Chapter 1 also provided a glimpse into the historically complex relationship between technology and development. Since colonial times, technology has been applied towards the end of stimulating a 'forward' movement in technologically 'backward' countries (Smith 2009). While it is the case that technology plays a central role in development, its relationship to development is by no means deterministic. On the contrary, the successful application of technology for human development is contingent on specificities peculiar to the local contexts in which it is deployed. A review of the history of technology-led 'development' in the global South reveals that this element of contingency has not always been acknowledged by the North, with largely disappointing outcomes. A growing

emphasis on engaging local populations in North-South development processes – concisely articulated by Leach and Scoones (2006) cited above - is aimed at facilitating the identification of contextually relevant solutions for complex local settings. The present study essentially provides a platform on which to analyse the progression of a particular technology through various stages reflecting the changing ideals that have governed development processes since post-colonial times.

This chapter is divided into four main sections. The first section traces the development of the stove, depicting the evolution of the technology from its ancient roots to its various contemporary forms. This is to provide a context for the discussions that follow as well as to enable appreciation of the status of stove technologies today relative to their history. The section discusses how post-industrial stove development relates to the wider context of technological development in the North on the one hand and that of technological assistance in the South on the other.

The second, third and fourth sections systematically detail the efforts of development organisations - mostly outsider organisations not indigenous to Southern countries in Asia, Africa and Latin America, with few exceptions - to develop and promote improved stove technologies in those regions over three phases. Each section highlights the overarching themes, targets and objectives pursued by those organisations in each phase and the prevailing circumstances that have informed their transition between phases. Importantly, the assumptions underlying the methods and principles adopted in each phase are uncovered, leading to the identification of certain shortcomings which appear to have persisted in stove development practice through the phases and which have not been adequately addressed in the

literature to date. The review closes with a discussion of how this study aims to address some of the identified gaps in the literature.

2.1. Stove Development: A Historical Background

According to Germann (1995), stoves and the space they inhabit – the kitchen – are an integral part of every culture and vary from one culture to another, so that there are as many variations in their design and functionality as there are different peoples and places. Westhoff's (1995) narration of the development of the stove gives details of a process that has occurred concurrently with human development since prehistoric times. Far from being products of modern-day innovation, contemporary cooking devices are more accurately identified as products of the progressive refinement of a technology that is 'as old as the discovery of fire and human civilisation itself' (Westhoff 1995, p.18). Westhoff traces the evolution of the simple fire through several stages corresponding to progressive changes in the dietary needs, farming systems, and technological capabilities of early man – so that by the time landmark innovations such as pottery and architecture made the construction of mud dwellings possible, the 'archetypal stove' had fully evolved. According to Westhoff, the archetypal stove – essentially a triangular arrangement of three stones at ground level with openings on each side of the triangle to receive fuelwood – has been in existence for around 12,000 years now, and is more commonly known today as the 'traditional stove', the 'open fire', or the 'three-stone' fire.

Westhoff's (1995) account therefore depicts the 'discovery' of the archetypal stove as a relatively new but significant milestone in human development and civilisation. Indeed, it was the most structured form of cooking technology that had been developed up till the time of its discovery, and it

came to be regarded as the focal point of family dwellings, regardless of whether it was installed inside or outside the main structure. Westhoff points out that the history of the development of the archetypal stove - though reflecting the cultural and chronological variations mentioned by Germann (1995) - followed a similar pattern in various regions of the world, remaining predominant in Europe up to the 18th century and in the rural areas of many African, Asian and Latin American countries in the global South to date. Thus Westhoff (1995) makes clear that the use of traditional stoves - though most evident in countries of the South today - is in no way peculiar to those countries given the historical context of stove development. Indeed, it was as a consequence of improvements in technology and incomes engendered by the Industrial Revolution of the 18th and 19th centuries that the relatively recent development of 'modern' cooking technologies in the North began. Westhoff stresses that the development and adoption of modern stoves or 'cookers' in countries of the North from that period onwards has been a natural, unforced corollary of the broader industrial and economic developments that have taken place within them.

On the contrary, Westhoff (1995) notes, the trajectory of stove development for many countries in the South has not taken the historically progressive path followed by the North. The emergence on the global scene of the terms 'development' and 'progress' in the immediate post-World War II period brought about a division of the world into 'developed and underdeveloped, industrialized and non-industrialized, urban and rural' (Westhoff 1995, p.18). This division highlighted the technological advancement and material wealth of 'developed' or industrialised countries in relation to the 'underdevelopment' of others. Escobar (1995) argues that it was the

'invention' of this concept of development in the late 1940s that led to a 'discovery' by the North of mass poverty in the South. Westhoff (1995) avers that in those 'poor' countries that have been variously categorised as 'less-developed', 'under-developed' and 'developing', a process of modern stove development has also occurred, but it is one that has been initiated or forced by the North through processes such as colonisation, globalisation, and 'development'. The result is an uneven patchwork of post-industrial stove development in the South that is not consistent with its history: while modern cooking technologies fuelled by gas, oil and electricity are used by the minority mostly in urban areas of Southern countries, it is estimated that 75 percent of the population in those countries still cook over the traditional three-stone fire (Westhoff 1995).

This review is concerned with stove development in the South from the commencement of the era of international development which, Dossa (2007) notes, coincided with the end of the colonial era. According to Westhoff (1995), development policy in general in the immediate post-colonial era was characterised by an economic and political hegemony that 'developed' countries of the North exercised over the 'under-developed' countries of the South. This general state of development affairs is exemplified in the particular case of stove development: since the 1970s, the design and implementation of stove projects have continuously shifted to reflect the political standpoints of Northern countries on foreign aid (Westhoff 1995). Stove development efforts have been mainly directed at promoting the use of improved cooking technologies by the majority of the population in the South that has not made the transition to modern cooking stoves and fuels and that still cooks predominantly with fuelwood and other forms of biomass over three-stone fires. According to Smith (1989), the

launch of these efforts marked the beginning of 'self-conscious stove improvement movements' (p.1) and established a distinction between traditional and improved biomass stoves, one captured by Westhoff and Germann (1995, p.10) as follows:

"Traditional", in the broadest sense, refers to technologies that developed spontaneously without any outside influences. "Improved" is used to describe technologies that were improved or introduced in connection with development projects or technology transfer.'

Barnes et al. (1994), attempting to justify the need in developing countries for outside assistance or intervention in developing and disseminating improved stoves amongst those populations categorised as the 'new poor' (Escobar 1995) by the development divide, state that much lower income levels in developing countries (compared to incomes in developed countries when the spontaneous transition from biomass to modern fuels occurred) limit the capacity of the poor in those countries to independently and spontaneously develop and adopt improved cooking technologies. Outsiders thus see the need to rise to the aid of citizens in poor countries by developing and promoting the use of improved stoves which burn biomass more efficiently than the three-stone fire and other traditional variations of the archetypal stove.

Several authors have however commented on the existing tensions between outsider organisations' conceptions of 'efficiency' and local citizens' interpretations of the same term. While outsiders tend to view stove efficiency in strictly technical terms, citizens' experiences allow for a broader range of meanings to the notion. According to Barnes et al. (1994), outsiders compare the efficiency levels of traditional and improved stoves on the basis of such measurable indices as fuel use, energy conversion ratios,

and the cost or length of time spent obtaining fuel. Ramakrishna (1995) however draws attention to the multiple 'non-cooking' functions that traditional stoves perform – ranging from practical functions such as space heating and thatch roof preservation to various cultural and spiritual functions - which are unlikely to be compatible with the notions of efficiency associated with improved or modern stoves. Indeed, according to Gill (1987), the various 'drawbacks' (Troncoso et al. 2007) that outsiders have identified with the use of 'inefficient' traditional stoves may be seen by citizens as adding value in diverse aspects of local life. Gill cites the example of a community in Ghana where the smoke produced by traditional stoves – seen by outsiders as the product of inefficient fuel combustion – was not always considered a problem by citizens because it fulfilled the important function of food preservation. Ramakrishna (1995) expands on the non-conformity of traditional stoves to the outsider imperative of efficiency by pointing out that the sheer functional versatility of traditional stoves negates the technological rationale for improved efficiency as the latter concept fundamentally implies an increasing specialisation of functions.

According to Gill (1987), the versatility of traditional stoves applies not only to the variety of end functions that they perform, but also to the flexibility they allow with regard to the variety of biomass fuels that can be used in them. Given the socio-economic constraints that poor people are faced with, this feature of fuel versatility is valued above the higher efficiency rates offered by improved stoves, as it allows them to switch to 'secondary' forms of biomass such as crop residue and animal dung when 'primary' fuels such as fuelwood and charcoal become too costly. Another interesting perspective on conflicting interpretations of efficiency is provided by Mannan (1996): an improved stove technology introduced to a community in Bangladesh by an

outsider organisation in the 1990s was considered inefficient by local women because, unlike the traditional stoves they used, the improved stove required constant attention and prevented them from attending to other household tasks while they cooked – thus resulting in net inefficient use of the women's time.

Notwithstanding these apparent tensions between citizen and outsider priorities, improved stove programmes continue to be initiated and assisted by outsider organisations as part of attempts to stimulate social and economic progress in poor countries (Smith 1989). Different phases of stove development can be identified in the literature which correspond to the different 'problems' that have been associated with the use of traditional stoves since the 1950s and the different approaches that have been taken to alleviate those problems. The first phase, labelled the 'classic phase' by Smith (1989), was led mainly by grassroots organisations in India and Indonesia (Smith 1989, Westhoff 1995) and focused on reducing the exposure of biomass users to smoke. However, 'significant financial and technical assistance' (Klingshirn 1995, p.24) was not given to improved stove projects until the 1980s, when the issues associated with use of traditional stoves gained recognition on the international development scene and the second, 'energy phase' (Smith 1989) of stove development was underway. The next three sections review improved stove development beginning from this 'energy phase' when, Klingshirn (1995) observes, increased financial and technical support from outsider organisations also meant that the 'development' goals addressed by those organisations did not necessarily align with the needs of people at the grassroots.

2.2. 1970s - 1980s: Stove Development as Expert-led Intervention

Westhoff (1995) identifies the period between the 1970s and the 1980s as marking the 'first wave' of improved stove development, a categorisation which is adopted by several other authors in the literature (q.v. Bailis et al. 2009, Crewe 1997, Troncoso et al. 2007). This popular approach to classification apparently leaves out the 'classic' phase of the 1950s identified by Smith (1989) which received little support from the international development community. As this research is focused on analysing approaches to the intervention of Northern development actors in the South, we will abide by Westhoff (1995) and others' system of categorisation throughout this discussion.

Crewe (1997) pegs the entrance of Northern-affiliated international organisations onto the stove development scene at a time when the dominant international discourse cast development as a process of social evolution. According to Crewe, it was a specialised variant of modernisation theory - an 'energy modernisation theory' (1997, p.72) - that prompted the involvement of international organisations in improved stove development. Solid biomass users in poor countries were seen as needing to move up the energy ladder to modern cooking fuels as their societies developed. As such, biomass fuel use was one key criterion used by international development 'experts' to categorise countries in the global South as 'developing', and their intervention in improved stove development was guided by the overarching principle that the introduction of more modern cooking technologies into those countries would accelerate their development. Crewe (1997) avers that improved stoves were considered to be an especially important area of 'appropriate' technology development in the 1970s because they brought together several fashionable subjects in the

field of development such as women's empowerment, enhancement of livelihoods and natural resource conservation. It is thus not surprising that stoves attracted a great deal of aid and attention in this phase, with many organisations - international, government and non-governmental - becoming involved in their development and promotion (ibid.).

Contrary to the smoke-reduction objective of the uncelebrated 'classic phase' of stove development, the focus of stove designers in this first wave was primarily on achieving fuel savings through increased combustion efficiencies, with smoke reduction largely being a secondary or absent consideration (Smith 1989). Expert technicians set out to design stoves that would surpass the efficiency ratios of traditional stoves by up to six times (Barnes et al. 1994). It was assumed to be a straightforward technical challenge, and outsider organisations believed that the increased efficiency of the new stoves was enough incentive for local populations to adopt them quickly, and in no time establish self-sustaining enterprises that would see the stoves being disseminated without external assistance (ibid.). Indeed, as Barnes et al. (1994) assert, the phrase 'stove dissemination' often used to describe early improved stove development efforts seemed to imply that distribution was the only precondition for the uptake of improved stoves; that as long as channels could be created for distributing the stoves, local populations would embrace the new technology on the basis of its superior technical performance. Thus the predominantly technological approach taken by outsiders in this phase was based on the assumption that an improved efficiency stove would be a *better* stove by the standards of local citizens.

The emphasis on improved stove efficiency and rapid stove dissemination in this phase can be better understood when viewed in the context of the nature of the 'problem' that stove development efforts were responding to. A report published by Eckholm (1975) alerted international attention to 'the other energy crisis' supposedly occurring concurrently with the global oil price shocks of the 1970s. Eckholm, then a researcher with the Washington-based Worldwatch Institute, claimed that a much subtler, yet equally devastating, crisis was being created by the unsustainable use of wood for cooking and heating in rural areas of developing countries. Indeed, all the calculations and projections of the 1970s and early 1980s showed that fuelwood demand greatly exceeded supply - sometimes by as much as 200 percent in desert regions - a conclusion which came to be dubbed the 'gap theory' (Crewe 1997). During this time, all of the United Nations Development Programme/World Bank energy-sector assessments for poor countries were based on gap-theory projections (Leach and Mearns 1988). It was predicted in 1984, for instance, that Tanzania would be completely stripped of its forests within six years, a prediction which proved in time to be wrong (ibid.). The priority of the experts at the time was therefore to present a once-for-all solution to the fuelwood crisis that was believed to be imminent, by introducing fuel-efficient stoves in those areas that relied heavily on fuelwood for cooking, thus reducing fuelwood consumption and ultimately leading to a reduced pressure on forests (Gill 1987).

This framing of the issues in purely technical terms in the first instance clearly informed the technical response given by the 'experts', who assumed what Gieryn (1995) refers to as 'cognitive authority' over the situation without making room for alternative ways of understanding and framing the issues. Outsider organisations, accustomed to scientific understandings of

risk and assured of their technical ability to predict and control the outcomes, presented the improved stove solution as a quick fix to the impending fuelwood crisis that had been identified as posing a threat to sustainable livelihoods in local communities. In reality however, as Leach et al. (2005) point out, such issues often have more multi-dimensional and varied meanings for local populations than just the narrow technical ones given by expert institutions.

Thus the general approach to stove development in the first phase was distinctively top-down. Crewe (1997) asserts that the most important planning decisions in stove projects were made by expatriate planners who did not deign to consult the subjects of their development efforts, but preferred to make their decisions on the basis of abbreviated oral or written reports passed on to them by special hired 'advisers'. These experts had after all been contracted to impart technical wisdom to non technology-savvy beneficiaries in local communities, and role definitions required that they spoke while the non-expert locals (including local planners and engineers) listened.

Crucially, the 'indigenous techno-cultural knowledge' (Mannan 1996, p.114) of local women doing the cooking, honed through years of constant practice, was deemed irrelevant by the experts partly on the basis of certain features inherent to the activity: cooking is considered a female, tradition-bound household chore, and does not contribute to the formal market economy (Crewe 1997). According to Crewe, local women were not involved in stove development (other than being invited to test a model's 'acceptability' after a round of technical design had been completed) because their internalised *perceptions* of the everyday activity of cooking were deemed to be inferior

to the 'objective' technical *findings* that stove engineers brought to bear on the design process. Crewe notes that underlying this stance was the assumption that Northern science was the only path to objective truth. Thus early stove development took place within the context of unequal power relationships in which indigenous knowledge possessed by predominantly female stove users tended to be overridden by outsider technical knowledge. Local women in project communities, often with limited access to resources and opportunities, were made even more aware of their marginal status and the relatively little negotiating power they possessed. Crewe makes use of this point to signal a wider issue related to stove development, that of gender: because the vast majority of stove users in the world's households are women, cooking (and stove development processes) needs to be understood within the context of gendered social relations. This point regarding the significance of gender relations in stove development will be more fully developed in the data chapters of this thesis, particularly in Chapter 5 discussing Practical Action's improved stove intervention in Kenyan communities.

The lay-expert working relationship described above characterised the field of stove development for about a decade until the 1980s, when the entire basis for rolling out improved stove programmes was challenged and it gradually came to the fore that outsiders had rushed to the rescue of local communities based on a misguided analysis of the relationship between domestic fuelwood use and deforestation. Barnes et al. (1994) assert that many of the hastily executed programmes in this first phase failed because outsider organisations were 'oblivious to the influence of custom, setting and circumstance' (p.13) on programme design and implementation. Gill (1987) avers that improved stoves in this phase 'failed to displace

traditional designs to any extent' (p.137) because they neglected to take into account the existence of differences in the priorities of local citizens and outsider 'experts'.

Crewe (1997) ultimately attributes the shortcomings of this first phase of international stove development to the top-down methods employed in programme implementation. In the first instance, failure to consult with local fuelwood users and national energy analysts led to a misdiagnosis of the major causes of deforestation. Outsiders erroneously thought that people in rural areas of developing countries cut trees to obtain fuel for domestic use, and with the use of abstract projections that were not informed by actual fuelwood gathering patterns, it was inferred that the best way to slow the rate of deforestation in those areas was to find a means to decrease domestic fuelwood consumption. Crewe asserts, after Gill (1987), that the improved stoves presented by technical experts as the solution to this dilemma were frequently rejected by local users because the priorities of the latter had not been taken into account in the design of the so-called fuel-efficient devices. The experts had given primacy to the technology, in the belief that the more efficient the stoves were, the better they would be at combating the resource depletion problems they assumed were engendered by domestic fuelwood use. Many of those experts, apparently unable to conceive that their rationally crafted solutions constituted part of the problem, were quick to explain the non-adoption or abandonment of the stoves as being a result of users' lack of education and their demonstrated preference to stick with tradition. According to Crewe, it was not until the second phase in the early 1990s that some technicians began to accept that stove users had acted quite rationally in rejecting early

designs, since they were crafted to meet outsider experts' specifications, and not necessarily those of local users.

The top-down implementation of the first wave of stove development reflected the principles governing the wider field of development at the time, as portrayed by Chambers' (1983) description of the general working relationship that characterised the period: outsider organisations assumed they knew best and implemented interventions on the premise that local citizens did not know what was most beneficial for them, and increased awareness would result in them articulating different priorities which in reality were likely to be little more than projections of outsiders' priorities. As Bucchi and Neresini (2008) point out however, while it is the case that citizen or lay knowledge is qualitatively different from outsider or expert knowledge, the former is not inferior to the latter. In the next section, we observe how the boundaries of the lay-expert divide in improved stove development began to shift in the second phase of stove development as participatory methodologies and principles were introduced.

2.3. 1980s – 1990s: Stove Development as Context-responsive Intervention

As indicated in the preceding section, the early and mid-1980s saw the development experts of the period suggesting, on the basis of newly emerging evidence, that the entire stove development project was based on a flawed premise; that the link between rural fuelwood use and deforestation was far more tenuous than originally assumed. Indeed, reappraisals of field data which took into account more realistic resource use patterns revealed an overall potential surplus rather than deficit of fuelwood in certain areas (Arnold et al. 2003). The gap theory which dictated stove

development policy for much of the 1970s began to be questioned (Deweese 1989, Foley 1987, Leach and Mearns 1988). Results of research in individual countries began to reveal that clearing land for agriculture created by far the greatest pressure on wood resources, and that timber logging, charcoal making and industrial fuel use all accounted for substantially greater depletion of the forests than domestic consumption (Crewe 1997, Mannan 1996, Troncoso et al. 2007). Foley et al. (1984) concluded that since people cut trees primarily to clear land for cultivation or livestock grazing rather than for use as fuel in their stoves, deforestation was ultimately a land and not a fuel issue⁶.

Crewe (1997) makes an interesting observation: years before the 'experts' began delinking domestic fuelwood consumption and tree-felling, local researchers in the South had been pointing out that people did not cut green trees to use as cooking fuel. But in the expert hegemonic fashion typical of the first phase, the views of the locals were not taken into account by outsider organisations. It was not until outsider researchers began pointing out the same things that the locals had been saying all along that international development policy regarding fuel-efficient stoves was revised. In the wake of the 'new' discovery, many donor agencies withdrew support from improved stove programmes, so that by the end of the 1980s, only a

⁶ Many of the studies that disproved, or at least questioned, the link between domestic fuelwood use and deforestation in the 1980s were limited to specific localities. The assumptions that informed the fuelwood gap theory were not subjected to widespread scrutiny in mainstream development policy until the 1990s, when 'plenty of evidence' became available to show that fuelwood use was not a major cause of deforestation (FAO 1997). On the other hand, research has identified that fuelwood availability and use patterns vary widely across localities (Masera et al. 2005), and trends of fuelwood use in certain localities may contribute to the depletion of forest resources in those places (FAO 1997). Indeed, as will be apparent from the ensuing discussion, a perceived need to curb deforestation processes in local communities still forms the basis of a number of stove programmes initiated in the second and ongoing third phases.

handful of agencies were still running some form of stove intervention in a few countries (Crewe 1997).

In the early 1990s, the Commission of the European Communities (CEC) provided funding for a stove research project which culminated in the publication of a collection of reports edited by Westhoff and Germann (1995). The publication presented the results of a 'systematic and typological survey' of those improved stove interventions that had survived in Africa, Asia and Latin America up until the second phase. The approach taken by the researchers on the CEC-funded project was radically different to the expert approach that characterised outsider interventions in the first phase: according to the project team, a deliberate attempt was made to minimise outsider bias in the process and instead encourage active local participation and open communication. The overall tone of the project report, which was one of the most comprehensive of its kind that had been published at the time, suggested that a few lessons had been learned from the failures of the first phase. The authors acknowledged the complexities involved in introducing new technologies into diverse local contexts, 'where things have their own language and meanings' (Westhoff and Germann 1995, p.9). Further, they articulated a realisation that the only way to gain insight into the workings of 'traditional' contexts was to work *with* local people, particularly women, rather than on their behalf. Critically, the authors asserted that though stove projects found it necessary to make a distinction between 'improved' and 'traditional' stoves, improved did not necessarily mean *better* than traditional.

Further, stove development was recognised as being linked to and influenced by several aspects of local life, rather than having a simple linear

cause-and-effect relationship with any one area such as energy or health or the environment (Germann 1995). Germann retrospectively tied the failure of previous stove projects to a tendency by outsiders to neglect one or more of the many interconnected areas that bear upon fuelwood use one way or another. Germann reached the conclusion that the most important pre-condition for successful implementation of a stove programme was not the technical performance of the stove, but its adaptability to the socio-cultural, economic, and environmental specifications of local contexts. According to Germann, fulfilling this pre-condition requires not so much exceptional technological prowess, but an 'ability and willingness to observe, listen, and to ask questions' (1995, p.17). Germann points to women as 'experts in the field' (ibid.) who, on account of their familiarity with the tool, should be considered indispensable to any stove project. Germann's report summarily draws attention to the highly complex nature of stove development projects and predicates the success of any such project on the active participation of 'local partners' at all stages.

Klingshirn (1995) also highlights the complex, multidisciplinary nature of stove development programmes given their relevance to several livelihood areas including skills development and income generation. Klingshirn consequently stresses the need for outsider organisations to adopt a participatory approach to the development of integrated stove programmes which recognise the need to go beyond technical aims to directly address as many aspects of local livelihoods as are contextually relevant. Klingshirn expresses belief in the potential that such context-specific, participative, and integrated stove projects hold, not just to bring about improvements in household energy use, but also – and more significantly – to usher in wider development benefits to local communities.

The cognitive authority assumed by outsiders was thus challenged in the second phase of stove development, seemingly resulting in a movement towards participatory modes of project implementation. Westhoff (1995) avers that the stove programmes introduced in this 'second wave', although possibly not as prolific as those in the first wave, were more qualitative in that they paid greater attention to the specific requirements of local contexts. According to Westhoff, 'open participation' by stove users and local organisations in planning processes resulted in the design of more appropriate stove technologies as well as the identification of locally viable production and dissemination channels. Barnes et al. (1994) surmise that in this phase, outsider organisations seemed to finally realise that technical improvements alone were not sufficient to guarantee stove uptake, and that local populations needed to be engaged for processes of stove development and dissemination to be effective.

As was the case in the first phase, the move towards more context-responsive approaches in this second phase of stove development was reflective of wider trends in international development: according to Chambers (1992), dissatisfaction with the outcomes of the expert-led forms of development research and planning employed in the 1970s prompted a search for alternative approaches to development. Outsider organisations, particularly those non-governmental organisations that were in close proximity to the grassroots, began to implement projects in which local citizens were encouraged to participate in knowledge production processes. More than emphasising the relevance of local knowledge, the participatory ideals advocated in this period would entail acknowledging local citizens as having ways of *being* that, together with their epistemological inclinations,

constitute the range of values that should be brought to bear in developing and implementing appropriate solutions (Leach et al. 2005).

Another defining characteristic of the second phase was the considerably greater attention given by outsider organisations to the establishment of autonomous, self-sustaining mechanisms of stove dissemination than in the first phase (Karekezi and Ranja 1997, Westhoff 1995). However, neither a subscription to participatory principles nor a renewed focus on dissemination systems in this phase seemed to make a difference to stove uptake by local populations: according to Barnes et al. (1994), stove programmes implemented between the 1980s and the early 1990s, like the expert-led ones of the 1970s, achieved low dissemination rates in local communities.

In the early 1990s, an attempt was made to find an explanation for the prevailing disparity between stove programme input and outcomes. With funding from the United Nations Development Programme and technical assistance from the World Bank Energy Sector Management Assistance Programme, a team of outsider researchers set out to identify what factors had contributed to the successes and failures recorded by stove programmes up until then. The results of the study, published by Barnes et al. (1994), showed that the relevance of fuel-efficient stoves to the livelihoods of local citizens appeared to be growing in light of the increasing monetary and non-monetary costs of obtaining biomass fuels; however, the prices of those stoves posed a significant challenge to their uptake by 'poorer people'. The report by Barnes et al. (1994) cited the results of other studies in which middle-income households in Africa were found to have adopted improved stoves at much quicker rates than poor households. According to Klingshirn (1995), the limited margin for experiment amongst

the latter group makes technological change especially difficult to achieve where they are concerned. For people in this group who already struggle to provide basic necessities and for whom the purchase of an improved stove would represent an uphill investment, Ramakrishna (1995) has suggested that subsidies be provided by development organisations to facilitate their access to the stoves.

Barnes et al. (1994) however caution against implementing a subsidy-based stove dissemination strategy aimed at poor households, describing such a model as 'risky'. They argue that technical assistance to build local capacity, rather than financial assistance, is the most important form of aid required by developing countries to build self-sustaining stove programmes. Barnes et al. concede that the provision of subsidies can help overcome the inability of the poorest households to acquire improved stoves, but maintain that subsidies tend to 'sour' stove projects in the long term. They report that early projects in which stoves were offered at no cost to poor households showed unsatisfactory use and maintenance records, so that by the early 1990s, the proportion of stove programmes offering full subsidies had dwindled to less than 10 percent.

Barnes et al. (1994) assert that the experiences of stove programme implementers in the first and second phases of stove development suggest that commercial routes to stove dissemination should be pursued where possible; however, they stress a need to continually search for the most effective and self-sustaining routes to reaching the poorest in different local contexts. The authors hold up the stove programmes initiated by the governments of India and China in the 1980s as examples of contrasting routes taken in the search for a self-sustaining dissemination model, with

different outcomes. The stove programmes in India and China are widely acknowledged in the literature as having achieved the highest stove dissemination rates in the second phase in spite of generally low global dissemination records (Aggarwal and Chandel 2004, Crewe 1997, Hanbar and Karve 2002, Smith et al. 1993). These two programmes, identified by Barnes et al. (1994) as illustrating the 'dilemma' faced by outsider organisations over whether to apply subsidy-based or market-based principles in stove dissemination, are examined in some detail below.

2.3.1 The Indian National Programme on Improved Chulha (NPIC)

The NPIC was initiated by the Government of India, first as a demonstration programme from 1983 to 1984, then on a full-fledged scale in 1985 (Kishore and Ramana 1999), with the main objective of reducing the demand for fuelwood, which in turn was expected to curb deforestation and also save time and money for energy users (Hanbar and Karve 2002). As such, the NPIC concentrated primarily on increasing the fuel efficiency of wood-burning stoves at a time when international organisations had begun to lose interest in the objective.

The aspects of the NPIC that are of greatest interest to this study relate to the strategy employed in stove dissemination. Under the programme, the government provided one-off direct cash subsidies to the tune of 50-75 percent of total stove cost, depending on the region and social status of households (Kishore and Ramana 1999). This heavy subsidy approach was informed by the implicit aim of the programme to create amongst biomass-reliant populations a culture of efficient, clean and sustainable use of biomass energy (Hanbar and Karve 2002). It was expected that use of improved stoves would convince local women of the benefits of continuing

with them, so that when the time came for their subsidised stoves to be replaced, they would have been incentivised to purchase improved stoves at full cost on the open market rather than revert to using traditional stoves (ibid.).

The Government of India officially withdrew funding support from the NPIC in 2002, by which time the project had overseen installation of at least 28 million improved stoves since 1985 (Kishore and Ramana 1999). However, Hanbar and Karve (2002) assert that it is not clear to what extent the subsidy approach succeeded in engendering the kind of user conversion originally anticipated by the government, and the approach is generally thought to have hindered, rather than helped, the spread of the stoves. As such, despite the large number of stoves disseminated, the NPIC is generally deemed not to have been a successful programme (Bailis et al. 2009).

This assessment of the performance of the NPIC can be understood in light of the conclusion published by Ramakrishna (1991) (cited in Barnes et al. 1994) based on a global survey of 137 improved stove programmes implemented in the first and second phases, that the sustainability of improved stove projects ought to be defined more by the extent to which households buy their second improved stove and less by the scale of dissemination of the first round of stoves. According to Hanbar and Karve (2002), the subsidies given under the NPIC performed an important function by facilitating the move by poor households from traditional to improved stoves; however, a failure to look beyond the initial subsidised phase to maximise the performance of the technology and utilise market channels for the sustainability of subsequent phases undermined the overall

effectiveness of the subsidy strategy. In the following sub-section describing the implementation of the Chinese stove programme, we observe how such a transition, i.e. from an approach incorporating an element of subsidy to one that operated fully according to market principles, was made.

2.3.2 *The Chinese National Improved Stoves Programme (NISP)*

The NISP has been heralded as the 'world's largest publicly financed initiative to improve stoves' (Shell Foundation 2004, p.1). Between 1982 and 1992, the NISP introduced some 129 million improved biomass and coal stoves into rural areas, a figure which translated to 65 percent of all rural Chinese households at the time (Smith et al. 1993). Even taking into account China's large size, the rate of dissemination far outstrips those of similar programmes in other developing countries: about 90 percent of all improved stoves installed globally in the 1980s-1990s were in China (ibid.).

According to Smith et al. (1993), the NISP benefited greatly from sound policies that were designed to be sensitive to specific local circumstances. Different policies obtained for different counties, depending on the particular energy needs and resources available to households in each county. Smith et al. assert that the part played by state financing in the NISP is often exaggerated in references to the programme. In reality, government contribution was limited to about 15 percent of total project cost, and that was restricted mainly to training, administration, and promotion. Even this modicum of support was systematically withdrawn so that, by the late 1990s, state support was limited to the provision of technical advice, quality control and product certification (Bailis et al. 2009). Most stove users under the NISP actually paid the full cost of stove materials and construction labour. Bailis et al. (2009) contrast this market-based approach with the

subsidy approach employed by the NPIC in India, noting that the former produced more encouraging results than the latter.

There is however an important qualification that should be taken into consideration when commenting on the 'success' of the NISP's market-based model. Smith et al. (1993) point out that, even though India and China were both classified as low-income countries in the 1980s, adjusting both countries' per capita income for purchasing power reveals that China was actually three times richer than India and fit into the range of middle-income countries. This indicates that households in China did have a significantly higher capacity to pay for improved stoves than their counterparts in India. Further, Bailis et al. (2009) state that the NISP was actually not targeted at poor people. According to Smith et al. (1993), the NISP mostly operated in relatively accessible middle-income areas in the period from 1982 to 1992, and it is uncertain that the same record-breaking results would be obtained if the programme went on to promote the stoves in poorer and more remote areas of China.

Notwithstanding the specificities of the conditions that favoured the market-based dissemination strategy employed in China, there is evidence that the approach is gaining recognition among stove project implementers in developing countries as being more self-sustaining, and therefore more desirable, than a subsidy-based approach. As an example, the Indian government in a December 2009 press statement publicised its intention to launch a successor to the NPIC – the National Biomass Cookstove Initiative – which has been designed 'not as a handout to poorer households, but rather as an economically sustainable business solution' (MNRE 2009). The next section goes on to discuss how debates around the donor dilemma

articulated by Barnes et al. (1994) regarding whether to privilege subsidy or market-based strategies have not only continued into the third phase of stove development, but appear to be polarising in favour of market-based approaches.

2.4. 1990s – Date: Stove Development as Market-based Intervention

In previous sections, we noted how achieving a reduction in smoke levels emitted by traditional biomass stoves was an important concern of Smith's (1989) 'classic phase' of stove development, but received little attention from outsider organisations in subsequent phases that ran from the 1970s to the 1990s. More recently, however, an adverse relationship has been 'discovered' between fuelwood use and smoke-related health hazards (Smith et al. 2004). The World Health Organisation (WHO) estimates that indoor air pollution caused by smoke from traditional cooking fires is responsible for nearly 3 percent of the total global burden of disease and causes 1.6 million deaths each year, over half of which are children below the age of five (WHO 2002). This burden of disease is similar in scale to those of known 'killer' diseases like malaria and tuberculosis, but it is perhaps noteworthy that the figures are still lower than for plain undernutrition, which is responsible for about 7 percent of the global burden of disease (ibid).

Development actors have found that improved stoves, once again, offer a solution to the indoor air pollution problem resulting from biomass use in poor households (Ezzati et al. 2004). As a result, international organisations and donors in the mid-1990s made a reappearance on the stove development scene following the lull in the 1980s and early 1990s (Bailis et

al. 2009). Besides promoting a variety of improved stove technologies targeted at mitigating the health hazards associated with biomass smoke, organisations involved in this phase have campaigned vigorously to raise the profile of the problem of indoor air pollution on the international development scene and thus garner sufficient financial and policy support to tackle the problem (Warwick and Doig 2004). This campaign, initiated in the 1990s by international non-government organisations working at grassroots level, appears to have gained significant ground: at the 2002 World Summit on Sustainable Development in Johannesburg, an international commitment to mitigate the health risk to biomass users in poor countries was consolidated with the launching of the USEPA-led Partnership for Clean Indoor Air (ibid.).

From that point onwards, organisations working in the areas of health and the environment in developing countries, notably the World Health Organisation (WHO) and the United States Environmental Protection Agency (USEPA), assumed the role of providing funding and policy direction for the global programme tackling indoor air pollution resulting from solid biomass use. The WHO for instance partners with non-governmental organisations working in the field of household energy through its 'Programme on Indoor Air Pollution' to deliver improved stove programmes aimed at reducing the exposure of women and children in developing countries to biomass smoke (Warwick and Doig 2004). In this third phase therefore, stove programmes have been reinvented as health interventions, but as with the first and second phases, the majority of these have been unable to scale up significantly (Bailis et al. 2009).

Further, scientific evidence has recently emerged to suggest that soot – or black carbon - emitted in copious amounts by traditional biomass stoves is a significant factor in the occurrence of climate change: according to Rosenthal (2009), climate experts attribute 18 percent of the earth's warming to black carbon, making it the second largest contributor after carbon dioxide. Stove development efforts are therefore increasingly being directed towards resolving this latest in the line of problems associated with solid biomass use in poor countries.

Bailis et al. (2009) observe that the shift in focus of stove programmes has occurred alongside increasing pressure from the international donor community for development organisations to adopt a commercial orientation to stove dissemination, with a view to increasing efficiency and accountability on projects. Bailis et al. assert that this shift, with its political underpinnings, is reflective of a sector-wide movement in development practice towards neoliberal principles which advocate 'free' markets as the most efficient means of distributing resources⁷. According to Klingshirn (1995), the dependency of most stove organisations on donor funding makes their operations subject to 'overriding political or strategic considerations' (p.28) of respective donor organisations. It therefore follows that stove organisations operating in this third phase will be obliged to operate within the terms of the increasing commitment of major donors to 'act more like investors and less like charities' (Hoffman et al. 2005, p.25).

⁷ Advocates of neoliberalism embrace a globalising agenda premised upon an unquestioning belief in the ability of a self-regulating market to fairly allocate goods and services among individuals and societies. Based as it is on a strictly economic conception of development (Reed and Reed 2009), neoliberal ideology resists state intervention in the economy, except where such regulation serves to promote unfettered market activity. Neoliberal policies rose to prominence in the UK and US in the 1980s (McCarthy and Prudham 2004) and shaped the terms of Northern development assistance to cash-strapped Southern states in the same period, with largely disastrous outcomes for the latter (ibid.).

A review of the literature on stove development reveals that considerable scope exists for analysing social, cultural, political and economic elements of the changing landscape of improved stove development as it has been constituted from the 1950s onwards. However, as Bailis et al. (2009) observe, the literature to date has largely focused on analysing technical aspects of improved stoves particularly relating to fuel efficiency and exposure to indoor air pollution. Bailis et al. provide one of the few existing critical reviews of the growing preference for market-based dissemination strategies in this third phase of stove development. In their analysis, they acknowledge that the application of certain business principles and practices does reduce the risk of project failure when donor funding inevitably runs out, but they call for a 'balanced' approach to commercialisation that takes into account the relative difficulty of establishing viable commercial enterprises in most developing countries where improved stoves have been introduced.

Citing the 'successful' example of the NISP in China, Bailis et al. (2009) argue that a combination of long-term state and/or donor support and market-based strategies is required to establish enduring stove enterprises in developing country contexts. They assert that this is especially pertinent if stove development organisations hope to reach lower income households with their interventions. The authors back up their position with examples of dissemination of other technologies such as solar home systems in Kenya and insecticide-treated bed nets in Nigeria: the solar home systems were inaccessible by the rural poor and were mostly purchased at full market price by middle-income rural dwellers, while the bed nets achieved higher dissemination rates when handed out free than when they were offered to the poor via subsidised cash sales. Bailis et al. therefore warn that an

unyielding commitment to market-based dissemination strategies might exclude the poor altogether from such interventions.

The analysis provided by Bailis et al. (2009) is instructive on a number of fronts; however, it leaves out a few pertinent points. Most critically, the focus of the analysis is tilted towards the 'supply side': a lot of attention is given to the ways that supply channels – made up of stove developers, promoters and marketers – can be effectively strengthened by outsider organisations to facilitate self-sustainability of local stove enterprises. The authors' recommendations to outsider organisations to invest in research and development, social marketing, monitoring, evaluation and quality control, while pertinent, are reminiscent of some of the top-down concerns of previous phases and neglect to analyse the issue of stove uptake from, as Irwin (1995) describes it, 'the citizen's side'. In other words, there is an overriding concern with how best stove organisations can build a self-sustaining mechanism to get the message and the product across to potential users, but much less attention is given to how this message translates to local citizens within their lived realities. Bailis et al. (2009), like key reviewers of stove programmes implemented in earlier phases (for example Gill 1987, Barnes et al. 1994) acknowledge that the poorest households may have difficulty paying the full costs of improved stoves under a market-based approach, and may therefore require subsidies to be able to acquire the stoves. However, none of these analyses sets out to understand how stove dissemination mechanisms, either subsidy-based or market-based, relate to the wider social, cultural and economic contexts in which poor people conduct their lifestyles and construct their livelihoods. Indeed, the debates in the stove development literature continue to shift to reflect the changing priorities and policies of outsider organisations, but

much less attention has been devoted to investigating and articulating the realities and priorities of local citizens, or to engaging them in those pertinent debates.

Ramakrishna (1995) observes that the varied mundane experiences of local women who cook with traditional stoves, though legitimate, are on their own unlikely to be prioritised by outsider organisations unless a connection is identified between interests on both sides. Troncoso et al. (2007) in a relatively recent study concluded that 'actual people's perceptions' are overridden by those of 'external stakeholders' in designing components of improved stove programmes. These claims in the literature appear to suggest that, despite the espousal of participatory development principles from the second phase of stove development onwards, outsider interests continue to dominate the field of stove development into the current third phase. My research sets out to investigate this apparent divergence between the enrolment of participatory principles in stove development – principles which, according to Mohan and Stokke (2000), advocate citizen engagement in a manner that is 'free from the normative biases of non-locals' (p.252) – and the experiences of citizens in local contexts. It is towards this end that the research undertakes a study of the seemingly context-responsive approaches taken by outsider organisations in two different contexts and evaluates their impact on poor target populations.

Conclusion

This chapter has given a chronological overview of stove development dating back to prehistoric times. It has been shown that, barring cultural and chronological variations, stove development followed a largely similar progression globally up until the Industrial Revolution period. The history of

stove development diverged post-Industrial Revolution for North and South, essentially setting in motion spontaneous development and uptake of modern cooking technologies in the North. A number of processes initiated by the North, particularly those that come under the label of 'development', have produced uneven transitions from 'traditional' to 'modern' cooking technologies in the South. Improved stove programmes have been implemented by Northern organisations particularly from the 1970s onwards to alleviate energy poverty amongst local populations in Southern countries classified as poor relative to their Northern counterparts, regardless of enduring tensions between the priorities of local citizens and outsiders. Stove development programmes, initially driven by assumptions within 'expert' development circles that the introduction of more efficient technologies was in itself sufficient to prod poor countries along on the path of 'development', gradually began to articulate the need for more reflexive, bottom-up approaches to development that engaged local populations in shaping and delivering solutions appropriate to their contexts.

A review of the trajectory of stove development over three successive but overlapping phases however reveals that in spite of the inclination towards more context-responsive implementation approaches, the priorities and policies of outsider organisations appear to take centre stage in the current market-based phase of stove development just as much as they did in the first expert-led phase of the 1970s. The problems addressed by stove development organisations and the mechanisms for dissemination of solutions to those problems have shifted over the phases to align with changing risks to local populations identified by outsiders. Similarly, analyses of stove programmes in the literature shift to reflect the concerns of outsider organisations regarding the technical efficiency and financial

sustainability of stove programmes in local contexts, but little has been done to understand how these externally-conducted debates translate into the everyday realities of ordinary citizens in poor countries. My research attempts to address this gap in the literature by identifying the priorities of local citizens in particular contexts and ascertaining their relationship to the priorities of outsider organisations in this third phase of stove development. Drawing on the theories, critiques and counter-critiques of participatory development expounded in Chapter 1, the research undertakes empirical investigation of two stove programmes in Nigeria and Kenya to explore different approaches taken to stove development in practice and determine their implications for the development of local citizens.

Chapter 3: Research Design and Methods

'The decision about whether to commission and use qualitative or quantitative methods, or a combination of both, is a pragmatic one. The overriding question should be, what methods will provide answers to the question at hand in the most effective and efficient manner?' (Murphy and Dingwall 2003, pp.49-50)

In the introduction to this thesis, the questions that this research into improved stove development and dissemination in Nigeria and Kenya set out to answer were outlined. Following the discussion in Chapter 2 of how those questions relate to the existing body of research and practice in the field of stove development, this chapter describes the path navigated in designing and executing a study employing methods that were determined to be appropriate for investigating the stated questions. Importantly, the chapter seeks to explain the rationale for choosing the methods and strategy adopted, highlighting their merits and limitations and reflecting on their implications for the 'trustworthiness' (Bryman 2008, p.34) of the data gathered in the process.

The chapter is divided into six main sections. The first section briefly discusses the development of the research focus. The second section describes the development of the research design. The epistemological grounds for adopting the chosen research strategy are discussed, and the rationale underlying key decisions made in selecting the cases included in the study is explained. A discussion of preliminary fieldwork conducted in Nigeria and Kenya is provided, followed by an exposition of the processes involved in finalising the schedule for the main round of fieldwork. The third and fourth sections describe the process of fieldwork in Nigeria and Kenya respectively. In particular, both sections clarify the process of obtaining access to particular settings and individuals in the field and provide rationale

for issues of strategic importance that arose in my use of the interview, participant observation and non-participant observation methods in the field. Further, both sections critically reflect on some of the ways in which the multiple identities that I embodied as a researcher in the field, or my positionality, may have shaped my engagement with research subjects as well as the outcomes of those interactions. In the fifth section, the approach taken to interpreting and analysing the data gathered in the process of fieldwork is described. The final section reflects on the ethical implications of my conduct of the research with subjects in the field.

3.1. Origins of the Research

As indicated in Chapter 1, I began this research in February 2008 by asking open-ended questions concerning the factors that have limited the uptake of a range of decentralised renewable energy technologies amongst energy-poor populations in Nigeria. Given the rather broad scope of the problem I had defined for myself, I started out by conducting a 'scoping review' of the status of renewable energy technology and policy in Nigeria. The review led to the identification of certain limitations inherent in the technocrat-led approach to development and dissemination of renewable energy technologies prescribed by the Nigerian national energy policy. Subsequently, I proposed that the energy policy would benefit from moving from this technology-focused approach towards a 'people-based, socio-cultural approach'. The scoping review had been launched with a view to undertaking policy research in some form; however, upon careful consideration of the context of the proposed research, I concluded that it would be 'more useful to conduct research that [would] help shape policy, rather than conduct direct policy analysis'.

The scoping review exercise further led to the identification of Kenya as a potentially interesting case to study alongside Nigeria. This is because, as pointed out in Chapter 1, although Kenya appears to have recorded significantly higher levels of activity in the development and dissemination of renewable energy technologies, the phenomenon of energy poverty still exists in the country on a scale comparable to that experienced by local citizens in Nigeria. The decision was subsequently made to adopt Kenya as a second country of study, and to replace my erstwhile general interest in 'renewable energy technologies' with focus on a single technology – the improved stove – as it is deployed towards sustainable development and poverty alleviation in developing countries. The sequence of events described above ultimately culminated in the resolution to structure the research as a comparative analysis of approaches to implementing improved stove programmes aimed at alleviating household energy poverty in Nigeria and Kenya. The rest of this chapter is devoted to describing how the research was conducted and what was done with the data generated in the process.

3.2. Developing the Research Design

The preceding section briefly outlined the process by which the objective of the present study evolved from an interest in general energy policy to a focus on household energy poverty in developing country contexts. The concern of the research with the internal and external relationships that define the implementation of energy poverty alleviation programmes in those contexts suggested the use of a qualitative research approach which, according to Bryman (2004), is concerned with seeing social phenomena 'through the eyes of the people being studied' (p.279). Taking this approach entails adopting an interpretivist epistemological stance which does not seek

to provide general explanations for social behaviour and experience but rather attempts to understand the meanings that individuals attach to social reality (Bryman 2008, Henwood and Pidgeon 1993). Such context-specific qualitative studies typically rely on ethnographic research involving a range of techniques including observation, semi-structured 'intensive' interviewing and focus group discussion (Devine 2002) – methods which, according to Ragin (1987), facilitate a more holistic treatment of complex social scenarios than quantitative approaches do. It is in the interpretivist context of understanding the relationships between complex social variables that this comparative study of improved stove programmes in Nigeria and Kenya was designed. This section goes on to explicate the processes involved in research design, beginning with a description of the process by which particular stove programmes in each country were identified as being appropriate for the purposes of the study.

3.2.1 Case Selection

A key resource that aided case selection in Nigeria was the Household Energy Network (HEDON), a global virtual network of practitioners working in various capacities on energy poverty and development issues in the South. The HEDON website (www.hedon.info) provided access to information about stove development organisations, their past and present projects and contact details of key staff members. Through this medium, a total of three stove projects located in Nigeria were identified, all of which involved a local non-governmental organisation, the Centre for Household Energy and the Environment (CEHEEN). However, two of the three projects had been initiated by two different international non-governmental organisations, and only one had been initiated and implemented independently by CEHEEN. The three projects were: the Improved Egaga

project, the CleanCook project and the Mayon Turbo stove project. However, the information available on each of the projects was not sufficient to determine which one of them would best fit into this study. Several email enquiries soliciting further information were subsequently sent to the contact address I obtained for CEHEEN via the HEDON website. When no response to those emails was forthcoming, it became evident that I would need to embark on a preliminary round of data collection at the earliest opportunity.

The case selection process in Kenya proceeded quite differently. One of my research supervisors with links to Practical Action, an international non-governmental organisation that has worked in the field of stove development in Kenya from 1986 to date, initiated contact with the organisation on my behalf. Though I subsequently established a line of communication with members of staff, it soon became apparent that the research under design required a greater degree of detail than the existing level of correspondence afforded. I therefore began to plan a preliminary visit to the organisation as well as to CEHEEN in Nigeria. These preliminary field visits were vital to obtaining clarifying information on the stove projects identified through desk research, and to establishing access to CEHEEN in Nigeria on the one hand and consolidating access to Practical Action in Kenya on the other.

The preliminary fieldwork in Nigeria was scheduled for two weeks in October 2008 to coincide with the International Renewable Energy Conference convened annually by a local business actor in Abuja, the country's capital city. This strategy was informed by the expectation that the conference would provide a platform for networking, possibly with CEHEEN

representatives and also with other potentially valuable contacts in the field of energy development. One key contact I established during the conference was with a senior official of the Energy Commission of Nigeria (ECN), the government organisation in charge of overseeing matters relating to national energy policy. This was significant as I had envisaged previously that insight into the high-level policy issues around energy use and economics in the country would provide a useful backdrop for later analysis of the data obtained on decentralised stove projects.

Although direct contact was not established with CEHEEN at the conference, useful information was obtained from representatives of other organisations that enabled me to subsequently locate and establish telephone contact with the organisation. Though no member of CEHEEN staff was available to meet at short notice for the duration of the field visit, the initial contact made with the organisation in the field laid the foundation for a series of telephone interviews with a senior member of staff over a seven-month period between October 2008 and May 2009. The serial nature of the interviews provided the opportunity to process the information gathered on each occasion and feed my interpretations back into successive conversations.

Due to constraints on the time and financial resources available for the research, preliminary fieldwork period in Kenya was limited to one week in December 2008. During that time, two scheduled visits were paid to the Practical Action East Africa regional headquarters in Nairobi. On the first visit, I held a semi-structured interview with a member of staff who had worked extensively on the organisation's improved stove programme. I also obtained a referral to a senior official of the Kenyan Ministry of Energy (the government organisation in charge of energy policy matters in the country)

with whom another semi-structured interview was conducted. Both interview sessions were digitally recorded, providing a resource from which relevant information was retrieved in the process of planning the main round of fieldwork. I also kept a fieldwork journal in which my immediate impressions of the interview sessions were recorded. I found that the journal was especially valuable for recording information that the interviewees apparently did not feel comfortable enough to divulge on tape:

[PA-EA Staff 2] initially seemed a bit reluctant to release too much information. Eventually, however, he seemed to warm up to the interview. About 85-90% of the interview was captured on tape, and when I thought it was winding down I stopped the recording device and made to leave. Incidentally, that was when [PA-EA Staff 2] began to reveal some crucial bits of information. I'm not entirely sure he'd have been so forthcoming on tape! (TS Fieldwork Journal, December 11 2008)

As was the intention, I did not visit any of the stove project communities under consideration at the time of preliminary fieldwork in Nigeria and Kenya, choosing instead to defer those visits till the main fieldwork period when full attention could be paid to the project communities eventually selected for study. The limited scope of ethnographic work conducted at this stage may be seen to be restrictive; however, considering its primary aim to establish and consolidate access to the key implementing organisations, the progress made in this phase was sufficient to facilitate the planning and design of the second, more comprehensive round of fieldwork.

With Practical Action in Kenya, though I obtained extensive information on the various stove projects implemented by the organisation since 1986, access could not be immediately finalised to any of those projects. I however expressed a preference for working on the biomass smoke alleviation programme, which comprises a series of stove projects

implemented from 1998 to date. This preference was based on the expectation that the currently running programme would offer more easily accessible and verifiable data than would previously completed projects.

With CEHEEN in Nigeria, I decided to investigate the Improved Egaga project rather than the Mayon Turbo project or the CleanCook project, both of which had earlier been identified as possible choices. The final selection was made via a process of elimination. Unlike the other two projects, the Mayon Turbo project was still in its planning stages and had not yet been implemented. The CleanCook project had undergone two pilot phases and was planning a commercial launch, but I decided not to pursue it further on the basis of a distinguishing technical feature: the technology employed was a *biofuel* burning stove rather than a *biomass* burning stove. On this point, the project appeared to be ill suited for comparison with Practical Action's biomass smoke alleviation programme within the framework of the 'most similar systems' design recommended by Hague et al. (1998) for 'small N' qualitative comparative research. The Improved Egaga project on the other hand seemed to share sufficiently similar technical characteristics with the biomass smoke alleviation programme to facilitate 'most similar' comparison. Further, both stove programmes appeared to share certain characteristics which I identified to be consistent with a participatory implementation approach – an important detail given that the research questions I set earlier had been informed by a participatory development framework.

However, as discussed fully in section 3.3.1 below, inability to gain access to the Improved Egaga project during the main round of fieldwork prompted a redirection of the investigation towards the CleanCook project. Although

initially prompted by practical restrictions with regard to access, this switch ultimately provided the basis for a richer analytical outcome as the significant technical and non-technical differences between the CleanCook project in Nigeria and the biomass smoke alleviation programme in Kenya provided a pair of 'meaningfully contrasting cases' (Bryman 2008, p.58), analysis of which was likely to facilitate better understanding of the kind of social phenomena under investigation (ibid.).

The following sections discuss the final plan prepared in advance of the main round of fieldwork and show how actual events in the field deviated considerably from the original plan in certain respects, but ultimately yielded rich and varied data which facilitated a more robust analysis than originally anticipated.

3.2.2 Finalising the Research Design

The main round of fieldwork in Nigeria and Kenya was originally scheduled to last for twelve weeks between September and December 2009. In preparing the schedule for the ethnographic work planned for this period, it was decided that semi-structured in-depth interviews would feature prominently in my investigation of the context-specific research questions outlined in Chapter 1. This is because the flexible and interactive nature of such interviews makes it possible for the qualitative researcher to obtain 'insider accounts' (Hammersley and Atkinson 2007, p.97) of social phenomena from the perspective of individuals within a social system. Indeed, according to Devine (2002), sociologists tend to rely to a greater extent on such in-depth interviews than on other ethnographic techniques. However, as Silverman (1998) points out, there is the danger in fieldwork for the researcher to treat the responses of subjects in the interview

situation as adequate representations of their multifaceted realities. In order to minimise this danger, I intended to pay 'evenly hovering attention' (Kvale 1996, p.149) to the field situation and to actively look for clues that would shed light on the investigation and serve to refine the course of the enquiry. This, I was aware, would require the use of observation techniques in the field, whether or not the 'main' interview method was being used at any point in time.

In selecting interviewees, I found it impractical to adopt a random sampling method of the kind that Devine (2002) associates with quantitative research. Rather, as Murphy et al. (1998) recommend, an attempt was made to integrate the pragmatic considerations of time, cost and ease of access to informants into sampling decisions in a systematic way. Schatzman and Strauss (1973) use the term 'selective sampling' to define this kind of pragmatic sampling that is 'shaped by the time the researcher has available to him, by his framework, by his starting and developing interests, and by any restrictions placed upon his observations by his hosts' (pp.38-39). Selective sampling entails the purposeful selection of informants according to the aims of the research, filtered through relevant categories such as age, gender, status, role or function in organisation (ibid.). This description ties in with Coyne's (1997) argument for qualitative research that is responsive to conditions in the field and that meets the information requirements of the study.

The selection of informants was planned according to certain categories which I had determined to be central to my inquiry, notably those of gender and organisational role. A total of 39 individual interviews and 2 focus group interviews were proposed in both countries, split amongst five actor groups:

policy makers, project community authorities, project organisation staff, local citizens and stove producer groups.

For each of the actor groups, a set of questions was prepared in advance to serve as a guide in conducting interviews. According to Bryman (2008), such a guide is ideally a flexible checklist of topics to be covered with each informant. However, the guide I prepared in the pre-fieldwork design phase was shown to be quite restrictive upon commencement of fieldwork, and it consequently underwent several modifications in response to the general requirements of each interview situation and the specifications of each informant.

I discovered further while in the field that the selective sampling method advocated by Schatzman and Strauss (1973) tended to be more effective with local citizens than with 'elite' interviewees (Smith 2006), especially members of project organisation staff and policy makers. For this elite group, 'snowball sampling' (Sadler et al. 2010), which involves progressive generation of the sample based on the recommendations of successive interviewees, was more appropriate. Ultimately, the size of the final sample turned out to be significantly larger than anticipated prior to fieldwork, as shown in Table 3.1 below.

'Partner organisation staff', an additional category developed in the field to accommodate emerging lines of enquiry, comprises members of staff of government and non-governmental organisations in Kenya working in various areas of development including energy, agriculture, agro-forestry and women's empowerment which were introduced to me by members of Practical Action staff as 'partners' of the organisation. The significantly

greater size of the final sample is due in part to the addition of this new category, but also, and more significantly, to the exceptionally large number of interviewees in the 'local citizens' category in Kenya.

Table 3.1: Distribution of field interviews by country and actor group

	Nigeria	Kenya	Total
	<i>No. of interviews</i>	<i>No. of interviews</i>	
Policy makers	2	3	5
Project organisation staff	7	4	11
Partner organisation staff	0	6	6
Project community authorities	1	2	3
Local citizens	5	31	36
Stove producer groups	0	1	1
Total	15	47	62

'Local citizens' was a varied group within which individual interviewees were chosen with as much sensitivity to gender and energy use as the practicalities of field access allowed. Possible selections identified pre-fieldwork included: a woman who has adopted an improved stove; the husband of that woman; a woman who has not adopted an improved stove; her own husband; a woman who used an improved stove for a while but subsequently abandoned it; a woman who would adopt an improved stove but has not been able to acquire one. As fieldwork progressed, I was open to emerging categories of citizens with the potential to offer additional insight into local populations' experiences of improved stove interventions. The large selection of local citizens in Kenya was made possible by the unusually high level of field access experienced in the location: with near-unrestricted access to two different communities, I was able to practise

selective sampling using several different combinations of features (see Appendix 2 for a comprehensive list) until I perceived that a measure of 'theoretical saturation' (Glaser and Strauss 1967) had been attained within the category.

This chapter goes on to describe the nature and conduct of the interviews and other aspects of the ethnographic work conducted within all the above-listed categories in Nigeria and Kenya, noting limitations engendered by the contingencies of the field and the implications these may have for the quality of the fieldwork process and the data gathered.

3.3. Ethnographic Work in Nigeria

So far this chapter has discussed the origins of the research focus and outlined the stages of development of the proposal to investigate two improved stove programmes in Nigeria and Kenya. The following sub-sections describe the conduct of the main fieldwork in Nigeria which was planned for six weeks between September and October 2009. The methods employed in the fieldwork – semi-structured interviewing and non-participant observation – are discussed in some detail, with a view to explicating the rationale underlying some of the strategic decisions made in the process. First, however, it is necessary to take a look at some of the pertinent issues that arose in the process of negotiating access to particular settings and individual interviewees in the field – a process which, as the following sub-section reveals, was far from straightforward.

3.3.1 Access and Recruitment

In the period following the preliminary phase of fieldwork in Nigeria, I was able to establish contact with two other policy makers within the Energy

Commission of Nigeria (ECN) through the key contact made earlier at the 2008 International Renewable Energy Conference. For practical reasons, the interviews with all three policy makers in the capital city of Abuja were scheduled to coincide once again with the 2009 edition of the conference which is normally held at a venue within easy reach of the ECN offices. Having learnt from experience that senior ECN officials usually made a point of appearing, however briefly, at the annual conference, I employed this strategy to increase the likelihood that all the officials that had been contacted would be available for interview around the same time. The reasoning was that this would save time and the cost of making repeated trips between the capital city in the north of the country and the project community in the south. Despite having taken this precaution however, only one of the original three policy makers in the sample – the key contact – was available when I arrived in the field. Seeking to obtain at least one more perspective from an ECN standpoint, I spent a few more days than originally planned in Abuja negotiating access to another official in charge of a different energy sub-sector than my key contact in the organisation.

As indicated earlier in section 3.2.1, I was unable to follow through with the original plan I had prepared to study the Improved Egaga project based on the series of telephone interviews conducted with CEHEEN staff in the preliminary data collection phase. Though I had established in the course of the telephone interviews that the CleanCook project had more or less displaced the Improved Egaga project on CEHEEN's agenda, the organisation had given the assurance that it would facilitate access to the communities that had participated in the latter project.

Upon arrival in the field however, I realised that an insistence on studying the Improved Egaga project would in fact be counterproductive to my investigation, as it was apparent that the conditions in the field were not conducive to studying that particular project at the time. Firstly, the structure of the organisation had changed significantly following the completion of the Improved Egaga project: CEHEEN, a local non-governmental organisation, had merged with Project Gaia, an international non-governmental organisation to become Project Gaia Nigeria; and secondly, the organisation, with its new focus on the more recently completed CleanCook pilot project and the proposed commercial follow-up to the project, was unwilling to apportion any substantial amount of time or human resource to the obsolete endeavour they now considered the Improved Egaga project to be. The organisation was particularly reluctant to be involved in negotiating access to the Improved Egaga project communities on the basis that it would prove difficult to trace the particular households that had taken part in the project which ended in 2001. Given the preoccupation of the research with understanding the issues that local citizens considered to be pertinent to the development and dissemination of improved stove technologies, I regarded any arrangement that excluded access to project communities as being far from appropriate.

In response to this rather sudden turn of events, I decided to abandon my initial attempts to stick with the carefully prepared research design and instead build the investigation around the project that Project Gaia Nigeria was interested in at the moment. As such, my attention shifted in the field from the Improved Egaga project to the CleanCook pilot project and its commercial derivative, the Cassakero programme - so named by Cassava Agro-Industries Services Limited (CASL), the local company overseeing

implementation of the project's scaling-up phase. The decision to alter the research design to conform to actual field conditions follows Hammersley and Atkinson's assertion regarding the general response of researchers in such situations:

'...it is often found that some of the questions... are not open to investigation in the setting selected. The researcher is then faced with the choice of either dropping these questions from the investigation or re-starting the research in a setting where they *can* be investigated, if that is possible. While, on occasion, the importance of a problem may lead to the latter course, generally researchers stay where they are and select problems that can be investigated there... not only does moving to another setting involve further delay and renewed problems of access, but there is also no guarantee that the new setting will turn out to be an appropriate one in which to investigate the preferred problem.'

(Hammersley and Atkinson 2007, p.29)

The decision to adapt the study to the preference of the project organisation constituted a major change in the original research design; however, it was one that had valuable practical and theoretical implications for the research. Practically, negotiation of access to project staff and project communities proceeded at a much faster pace than it did prior to the change in direction. Perhaps more significantly, I came to recognise CEHEEN's abdication of the Improved Egaga project in favour of the CleanCook project as constituting data in itself, thus opening up an interesting new line of analysis which is discussed extensively in Chapter 6.

As with most stove projects, the unit of implementation of the CleanCook pilot project was the household. I discovered, not surprisingly, that access to this most private of settings – an example of what Buscatto (2008) refers to as 'closed spaces' - could only be obtained with the guidance of field staff who had deployed the technology in the various project communities. Of the two members of field staff at hand to offer assistance at the time of

fieldwork, one member of staff who had overseen implementation of the project in a rural location declined to be involved on the basis that it would be an uphill task to negotiate access to the community within the time frame earmarked for fieldwork in Nigeria. The other member of field staff who had overseen the pilot project in thirteen households situated in a large residential complex in Warri, an urban community in the delta region of Nigeria (shown in Figure 3.1 below), agreed on short notice to provide the required logistic support. Due to the small numbers, I initially intended to include all thirteen project households in the interview sample. However, it came to the fore that six of the thirteen households had moved out of the residential complex to other locations since the pilot project ended in 2007. Of the seven project households left, it was only possible to gain access to five. A project participant in one household declined access on the grounds of ill health, while another was in the process of moving with her household to another location and therefore proved difficult to track down for an interview.

3.3.2 Interviews

The format of the interviews with informants in Nigeria varied across the different categories identified in Table 3.1. As I had been able to establish either email or telephone contact with policy makers and project organisation staff prior to the fieldwork period, I only needed to provide a brief recap of the research aims previously communicated to those informants. However, with local citizens and community authorities to whom access had been negotiated on my behalf by project staff after my arrival in the field, the interviews began with a more detailed description of my research background and objectives.

Figure 3.1: Map of Nigeria showing area of study



Source: The Nations Online project (http://www.nationsonline.org/oneworld/map/nigeria_map2.htm). Accessed December 2010.

All informants consented to having the interviews recorded from the beginning, with the exception of a senior elected local government official in the project community who declined to go on record from the start to safeguard the interests of his political career. However, when the conversation moved from general introductory issues to focus more specifically on the CleanCook project, I was permitted to turn on the recording device.

The interviews with policy makers were held in their offices at the Energy Commission of Nigeria headquarters. The topics discussed with the two interviewees in this category varied according to the different responsibilities they assumed in the organisation. The shorter of the

interviews lasted 35 minutes, while the other interview with the key contact went on for two hours. The much longer duration of the latter interview was facilitated by the greater degree of openness demonstrated by the interviewee with whom I had been able to maintain an open line of communication in the period following the preliminary fieldwork phase.

A total of seven interviews with project organisation staff were held at different times with three individuals: one member of Project Gaia Nigeria management staff; one member of Project Gaia Nigeria field staff; and one member of CASL management staff⁸. The lengths of these interviews varied according to the time available to each interviewee and the degree of formality of the interview situation. Generally, the *less* like a formal interview the situation appeared, i.e., the more it resembled what Hammersley and Atkinson (2007) refer to as an 'informal conversation', the longer the interview tended to last and the more revealing it tended to be. A face-to-face interview held across a table with the Project Gaia Nigeria management staff member lasted 21 minutes, while one held during a guided tour of the project community with the member of field staff took an hour and 26 minutes. Indeed, the informal interviewing technique constituted a key component of fieldwork in Nigeria, as the flexible working structure of project staff meant that interview opportunities sprang up at unlikely times and in unlikely places, particularly with the member of field staff whose hands-on involvement in the pilot project had been quite substantial. This level of proximity to project staff enabled me to pick up on some of the tacit assumptions and motivations driving implementation,

⁸ I have intentionally classified CASL staff as 'project organisation staff' because, unlike 'partner organisation staff' in Kenya who mostly have no direct involvement in the stove projects implemented by Practical Action, the member of CASL staff included in this study works directly on the Cassakero programme, which is an extension of the CleanCook project piloted by Project Gaia Nigeria.

particularly of the proposed commercial scaling-up phase. Further, each informal encounter with project staff was useful for opening up new insights which were applied to the interview schedule as I went along, constantly modifying the topics to explore emerging avenues for understanding relevant aspects of the project with which I was only just becoming familiar.

This strategy of maintaining close contact with project staff in the field, notwithstanding its apparent advantages, seemingly engendered a different set of concerns. Within the project community, I was mistaken at times for a representative of Project Gaia Nigeria monitoring local citizens' level of acceptance of the project, despite having been introduced to them by project staff as 'the student from the UK'. Even this latter description may have been problematic in its own right because, as I noted in my fieldwork journal, it appeared to have had a distinguishing effect which I considered inauspicious in light of my objective to minimise any impact that my personal characteristics or credentials may have upon interview settings. I found however that this effect seemed to wear out gradually the more I interacted with citizens in the project community, thus progressively undermining the propensity to generate what Silverman (1985) refers to as 'idealised accounts' of interviewee's experiences.

It is possible that my characterisation as 'the student from the UK' had another set of implications for my interactions with the 'elite' group of interviewees, particularly officials of the Energy Commission of Nigeria and Project Gaia/CASL staff. My affiliation with a Northern university may have lent me a substantial degree of credibility in the context, as employers in the country generally rate Northern university degree-holders higher than their counterparts from local universities on the basis that standards of

education are more rigorous in the former than the latter. This was evident in the fact that a member of Project Gaia staff prevailed upon me throughout the fieldwork period to return to the CleanCook project as a consultant upon completion of my degree because he was persuaded that the project would greatly benefit from the services of 'someone like me'. It is not clear however if this close association with a Northern institution meant that I was perceived as being more of an outsider than an insider – in which case the interviewees might have been selective in their treatment of more sensitive topics, especially given the politically fragile climate of the Niger delta region under study. In any event, my identity as a Nigerian citizen born and raised in the country meant that I possessed substantive experiential knowledge of the context. This position as a native Nigerian who was 'researching back' (Smith 1999, p.7) into her country of origin and who possessed background knowledge of the context likely increased the propensity for interpreting and analysing field data more richly and accurately than would be the case with a non-native researcher (Mullings 1999).

The interviews with local citizens were with five female members of households that participated in the CleanCook pilot project in 2007. All the women were educated and their households had been classified by the project as belonging to the middle-income category. Four of the five interviews took place in individual households, with one woman's husband sitting through part of the interview. The last interviewee expressed a preference for holding the interview on the premises of a local church. The interview questions were designed to capture the experience of each citizen on the pilot project - in particular to determine their responses to the implementation model employed on the project. However, rather than put

forward a direct question that openly enquired about an interviewee's opinion of the degree of participation afforded by the project, a less obvious question would be tendered along the following lines: 'Is there any way you would have liked to be involved in the pilot project that you were not?' The intention in taking this indirect questioning approach was to avoid pre-framing the issues in any particular way and to facilitate open interpretation and communication by the interviewees.

The questions in the interview guide prepared prior to fieldwork were mainly targeted at women with low levels of education and income as I had expected to find in the predominantly rural Improved Egaga project communities. Given the different context of the CleanCook project, the guide had to be modified to adapt to the situation of the women I was now interviewing. For example, I played down the questions exploring the links between structure, agency and stove uptake because the status of the interviewees as educated, working (or retired) women meant that such links were more tenuous than was likely to be the case with their rural, uneducated counterparts.

With this group, I found that my multiple identities as a relatively young, educated, urban, middle-class woman overlapped to position me simultaneously as an insider and an outsider, and it was necessary to carefully negotiate this delicate balance in my interactions with the women. The similarities I shared with the interviewees along the lines of gender and socio-economic standing seemingly put me in good stead and paved the way for my acceptance as one of the group. However, my role as a *younger* woman questioning members of older age groups did not fit well into the norms of a society in which age hierarchies play an all-important role in

defining the forms of interaction that are deemed acceptable between people, be they male or female. Respecting those norms required me to assume an attitude of deference towards the women, all of whom were much older than me, without which it would have been difficult to obtain valid information from the interviews. Indeed, being of comparable socio-economic standing with the women could quite easily have worked to my disadvantage, as any show of assertiveness on my part could have been misconstrued to mean that I was deliberately shunning the time-honoured societal value of respect for older members because I was now 'modern'. However, the same societal norms place a high premium on marriage and family, and my status as a married person likely compensated for my youth and facilitated my acceptance - in one instance, an interviewee openly registered her approval at the sight of the wedding band on my finger. Given that discourses of cooking practices are closely linked to notions of home and family within the context, I might have encountered greater difficulty in establishing my credibility as someone worthy of discussing the subject had I been unmarried, and my positioning as an outsider relative to the group under study would likely have had significant implications for the quality of the interactions and the information obtained.

The questions posed to the women did not vary greatly from one interviewee to another as I found the group to be a relatively homogenous one with regard to energy use, socio-economic status and perception of the project. It may be argued that this homogenous sample is not representative of the range of households that participated in the project. However, in the analysis presented in later chapters, the interview data have been supplemented with project information supplied by Project Gaia Nigeria, particularly the official documentation of a 2006 quantitative

baseline survey carried out by the organisation across all nine project locations. Although it has been argued that official documents such as these are carefully produced to present organisations in a particular light and therefore should not be accepted uncritically by qualitative researchers as unequivocal representations of reality (Atkinson and Coffey 1997, Murphy and Dingwall 2003), they nevertheless provide useful information and can present interesting possibilities for analysis (Hammersley and Atkinson 2007). Furthermore, the homogeneity of the sample in the project community meant that it was possible to achieve a degree of saturation in that location with the small sample size available.

3.3.3 Non-participant Observation

Although there was an element of observation present at every stage of the fieldwork in Warri, there was a specific occasion on which I had to primarily employ the observation technique. Fortuitously, I received an invitation to attend a 4-hour meeting of stakeholders to discuss the proposed commercial scaling-up phase of the project – the Cassakero programme – scheduled to begin in November 2009, about a month from the time of the meeting. The meeting had been planned well in advance of my visit and none of the eight attendees except for one member of Project Gaia Nigeria staff knew beforehand that I would be present. The benefit of being in attendance at such a meeting was that it presented the opportunity to observe in a 'quasi-naturalistic setting' (Maynard 1998, p.133) the way that different interests were represented on the project, particularly those of Project Gaia Nigeria, CASL and other private-sector actors keen to invest in the commercial phase of the project. The unexpected but extremely productive opportunity to sit in on a meeting of such an interesting mix of stakeholders enabled me to observe deliberations and interactions amongst

them in a way that personal interviews would not have captured. Furthermore, the opportunity to gain valuable insight into several different aspects of the project within a relatively short period of time proved to be highly beneficial in light of the restrictions to my fieldwork timetable which had become even tighter as a result of the delays experienced with negotiating project access at the start.

The stakeholder meeting was convened by a member of Project Gaia Nigeria staff who had agreed to have my interview with him recorded earlier the same day but firmly declined my request to record the stakeholder session on the grounds that the business-oriented stakeholder meeting was distinct from the research-oriented interview he granted earlier. I was however welcome to scribble notes during the meeting, which I managed to do quite extensively in my fieldwork journal. It was interesting to observe this attempt to retain some degree of control over the more 'naturally occurring situation' (Silverman 1985, p.15) of the multi-stakeholder meeting which apparently offered less scope for 'impression management' (Broom et al. 2009) than the interview situation. As an outsider whose interests were not represented in this strictly-business meeting, I was not expected to make any contribution - indeed, the tone of the meeting suggested that the opposite was the case. The boundaries to my participation thus drawn however, I found that my role as a researcher was very clearly defined in the situation - a position which ultimately enhanced the quality of the observation.

3.4. Ethnographic Work in Kenya

The fieldwork in Kenya lasted for a period of six weeks between November and December 2009. As the next sub-section will describe, access to individuals and groups in the research setting was much more

straightforward than was the case in Nigeria. As indicated earlier, not only did this facilitate in-depth interviewing with a significantly greater number of individuals distributed across the informant categories identified prior to fieldwork, it also led to the identification of the additional category of 'partner organisation staff' and made it possible to deploy the observation technique at much closer range than was feasible in Nigeria.

3.4.1 Access and Recruitment

I was able to negotiate access to three energy policy makers in Kenya by applying snowball sampling principles. Though my key contact at the Kenyan Ministry of Energy was not available for interview at the time of fieldwork, he referred me to two other senior officials within the ministry, one of whom in turn facilitated access to a senior official of the Kenyan Energy Regulatory Commission, the government organisation responsible for economic and technical regulation of key energy sub-sectors in the country.

During the preliminary visit to Practical Action in December 2008, three members of staff were identified who were appropriately positioned within the organisation to provide information and guidance relevant to the research. The diversity in the responsibilities of those staff members afforded access to information on various levels ranging from the overall constitution of the organisation, to the administration of its energy programme, to the implementation of its stove projects in particular.

Having met and talked to each of the three staff members in person during the preliminary field visit, it was relatively straightforward to schedule interviews and discuss issues of access to project communities with them in

advance of the main round of fieldwork. Access to partner organisation staff was facilitated by two of these three key contacts at various points in the course of fieldwork.

With the guidance of these key contacts at the start of fieldwork, access was successfully negotiated to West Kochieng, one of eight communities involved in the particular biomass smoke alleviation project – the USEPA project - that was running at the time of fieldwork. Perhaps even more than was the case in Warri, the urban CleanCook project community where fieldwork was conducted in Nigeria, an insider status was vital to obtaining and maintaining access in West Kochieng, a peri-urban location in which communal ties remain very strong. Although the Practical Action staff members working on the USEPA project at the time of fieldwork were indigenous to Nyanza province (indicated in Figure 3.2 below) within which West Kochieng is located, they could not be said to possess full insider status as far as community membership went. Realising this, I decided to enhance the quality of the recruitment process within the project community by enlisting the assistance of a key insider informant who was indigenous to the community and who, by virtue of her taking a lead role in the USEPA project from inception, was very familiar with the details of Practical Action’s intervention in the region.

It soon became apparent, however, that the strategy of relying on an insider for effective access negotiation could present problems for the quality of the informant sample generated.

Figure 3.2: Map of Kenya showing area of study



Source: The Nations Online project (http://www.nationsonline.org/oneworld/map/kenya_map.htm). Accessed December 2010.

The first two households to which the key informant helped to secure access were those of her mother-in-law and fellow group member respectively, both of whom may have felt obligated by family and group ties to give particular constructed accounts of their experiences of the project. Though

my interaction with the informants in both instances provided valuable insight into certain dynamics underlying relationships between family members on the one hand and group members on the other hand, both situations pointed to the risk of bias that Devine (2002) associates with generating a sample from a single network of interconnected individuals. My status as an outsider meant that my credibility within the community could be at stake if I attempted to negotiate access to individual households and groups without the backing of an insider. In light of the above considerations, I made an effort to mitigate the risk of gathering non-representative data by subsequently specifying to the key informant in advance of each interview a specific combination of characteristics that had emerged in the course of my early interactions in the field as warranting exploration in subsequent interviews. A full list of the criteria specified for each interviewee is provided in Appendix 2, referenced previously.

Precisely to address the access-related issues I experienced as an outsider in West Kochieng and to facilitate more accurate observation of the project community, I had attempted at the outset, with the help of Practical Action field staff, to make accommodation arrangements within the community for the duration of the fieldwork. These attempts proved unsuccessful however, and I subsequently made alternative arrangements - again facilitated by Practical Action staff - to reside in Kasewe, a neighbouring community, for a period of time. The reasons for choosing Kasewe as an alternative observation site are discussed later in section 3.4.3. The point of interest here is that, upon taking up residence in Kasewe about two weeks into the fieldwork period, I realised that the assumption upon which my strategy of maximum proximity was based - namely that I would be viewed and treated less as an outsider if I lived amongst members of a community - did not

necessarily hold. The following excerpt from my fieldwork journal describing my experience with a group of citizens – precisely a stove producer group – in Kasewe highlights this realisation:

I remember Priscilla⁹ telling me yesterday how today's plans had been made on my behalf. I learnt from her that Joyce was to take me round to individual members' houses. For starters, I had no idea Joyce would be my guide for the day – I had in mind Mama Rose, who'd taken me to her neighbours yesterday. I was also thinking to visit Emma and Joanne, because we missed out on their homes yesterday due to a storm that was threatening. Much to my chagrin, Joyce came to me as I sat in the living room, and told me we'd be visiting Patience and someone else. I tried to tell her I'd been thinking otherwise, and though she insinuated that I could follow through with my initial plan if I wanted, I had the feeling the matter had been settled among the group members. A similar thing happened yesterday: I'd originally planned to go out to Priscilla's so she could take me to some of her neighbours who weren't using the Upesi. The plan blew up in my face when, in the space of 10 minutes, [my hosts] literally re-arranged my day with Mama Rose. It seems that the group is bent on projecting the image of having a visitor amongst them, and of making a fuss over the visitor 24-7. Almost like they want to take me on a tour of who and where they think I should go to, to get the kind of impression of the group they want me to get. An exaggerated version of West Kochieng. Way exaggerated. (TS Fieldwork Journal, November 19 2009)

By this account of my experience with the group in Kasewe, it would seem that the basis of the strategy I adopted to observe the community from within had been completely undermined. However, the experience did in fact yield a highly significant observation which later developed into a major theme discussed in the analysis of the data in Chapter 6, namely that citizens in local communities may have their own established ways of doing things which outsiders, often seeking to implement standards which conflict with local value systems, may find difficult to influence in any significant way.

⁹ Real names have not been used to preserve anonymity.

3.4.2 *Interviews*

The interviews with policy makers, project organisation staff and partner organisation staff in Kenya – thirteen in all, with one project organisation staff granting two interviews on separate occasions - took place in the interviewees' respective offices. The topics discussed with policy makers were designed to elicit information regarding the overall status of household energy use within the national context, while the interviews with partner organisation staff were aimed at obtaining a broader view of the development imperative as expressed by a selection of the many different outsider organisations working to alleviate poverty in the country. All interviews were recorded with the permission of the interviewees, with the exception of one with an official of the Ministry of Energy who was not completely satisfied with the assurances given him to handle the recorded data with the utmost confidentiality. I was however welcome to take notes, although these turned out to be quite sketchy as the nature of the interview required me to participate actively in the situation. Nevertheless, the impressions gathered from the meeting, together with the recorded interviews held with the other two policy makers in different offices, were sufficient to constitute the general picture of the national energy scene that this group of interviews was designed to capture.

As was the case during fieldwork in Nigeria, my status as a student of a British university appeared to supersede my identity as a Nigerian citizen and, by implication in this context, a non-Kenyan citizen. My academic affiliation with the university was clearly a more important factor in determining access to and shaping interactions with policy makers, project organisation staff and partner organisation staff than was my country of

origin. Practical Action in particular indicated that the organisation has a long-standing practice of hosting research students from the UK on a regular basis, which is perhaps not surprising given the organisation's foundations in the UK. This existing commitment had a positive impact on my interactions with members of Practical Action staff on and off the field, and it is possible that access to the organisation - and by extension partner organisations and policy makers to which I was subsequently introduced - may have been more limited had I attempted to negotiate entry under a non-UK affiliation.

The interviews with local citizens were conducted with thirty-one individuals in West Kochieng and Kasewe. The majority of the interviewees (twenty nine of them) were adult female members of different households, as they have historically been the main users of stove technologies. More so, Practical Action's explicit focus on making women the core beneficiaries of its stove projects ensured that the sample was heavily tilted in favour of female citizens. As West Kochieng and Kasewe are predominantly Dholuo-speaking communities¹⁰, the majority of interviews with citizens were conducted with the aid of an interpreter in each community, both of whom not only facilitated translation of the language, but also of several other significant aspects of Luo history and culture.

All the interviews with the women took place in their households. An interview typically lasted about an hour when it was not planned ahead to coincide with food preparation times. A total of six interviews, five in West Kochieng and one in Kasewe, were scheduled to take place around the time

¹⁰ Dholuo is the native language of the Luo tribe to which West Kochieng and Kasewe communities belong.

that each of the women planned to cook either breakfast or lunch on pre-arranged days. This strategy was employed to enable firsthand observation of the way that the women organised and performed their everyday cooking tasks using various stove technologies, both traditional and improved. When making appointments for these 'fireside interviews', I arranged to arrive at the households about an hour prior to the commencement of food preparation. The aim was to allow some time to build a level of rapport with each interviewee, so as to establish common ground for conversation and make the women more comfortable with opening up their private domain to an outsider. These informal opening conversations, all of which were recorded, would continue in the kitchen area throughout the duration of food preparation, which ranged from about 25 minutes to an hour. When 'hanging around' in this way, I usually offered to help the women with tasks I could manage in the hope of mitigating the observer effect on the situation. During these sessions, I asked to take photographs of the cooking and living areas in each of the households; a request which was granted in all cases.

Though the interviews with local citizens yielded useful data for analysing individual experiences in the context of the wider society, they did not offer sufficient insight into the dynamics of the predominantly female groups that are the unit of implementation of Practical Action's stove projects. To realise the latter aim, a focus group interview was held with nine members of a stove producer group located in Nyahera, another community located in the same province as West Kochieng and Kasewe. Although this group was not involved in the USEPA project that was ongoing at the time of fieldwork, it was selected for the focus group interview on the basis of its active involvement in previous stove projects implemented by Practical Action and

its reputation as one of the most successful stove producer groups in the country.

Watterson and Watterson (2003) describe focus groups as semi-structured group discussion sessions in which participants are invited, on the basis of certain shared experiences, to engage freely and equally in broad-ranging conversation in a way that does not exclude or intimidate even those participants who do not think they have anything of value to contribute. I chose to adopt the focus group technique over individual interviews with members of the stove producing group in Nyahera precisely to stimulate the kind of non-threatening, vibrant atmosphere depicted by Watterson and Watterson in which insights and experiences could be exchanged in a way that reflected wider relationship patterns amongst members. However, despite making several attempts throughout the session to facilitate a truly inclusive discussion, the general level of participation remained low, with only two of the nine women present making active contributions and the other seven women speaking only when I went round directing questions at them individually. Again, it may be argued that this outcome undermines the validity of the data gathered in the interview process. However, the experience with the group once again signalled a key point that fed into analysis of the data, namely that voices claiming to represent the group may not necessarily do so, but may rather represent the interests of a few prominent individuals within the group.

In the individual and group interview situations with rural women in Kenya, my status as educated, urban, and middle-class firmly located me as an outsider relative to the informants. In these situations, the existence of a power differential was evident between the researcher and the researched

(Wolf 1996) which posed a challenge to field interactions. Unlike in Nigeria where I was expected to defer to the seniority of female informants with a similar socio-economic background to mine, the interviewees in this group may have felt a need to impress with their responses as a way of compensating for the differences in socio-economic standing between them and myself. Despite being a woman working with predominantly female respondents, I found it difficult to successfully position myself as a member of the group, as the very conditions under which I was carrying out my research contravened the expectations of the majority of the women. Most significantly, I was repeatedly asked by the women, oftentimes with a genuine expression of disbelief, how it was that I was 'allowed' to travel outside of my home and country unaccompanied for such an extended period of time. Although these exchanges highlighted salient differences in our lived experiences, the women often took them as opportunities to voice their aspirations - as with interviewees in West Kochieng who spoke longingly of their desire to return to formal education, or those who told tales of other women in the community who had absconded with their newfound sense of empowerment upon completing secondary education, to the consternation of all the men in the community. It is possible that I would have been unable to uncover some of these aspirations, which are crucial to the theme of women's empowerment explored in this study, had I been male. It is likely that the women would have tacitly categorised a male researcher as belonging on the 'other' side with the men in the community - many of whom had decided to stop their wives from enrolling in school for fear that they might also abscond - and therefore been wary of discussing such aspirations with the researcher.

3.4.3 *Participant Observation*

'While participant observation has its limitations, this rather uneasy combination of involvement and detachment is still the best method we have for exploring the complexities of human cultures, so it will have to do.' (Fox 2004, p.4)

As I had set out in this study to understand some of the burning issues in stove development and dissemination from the perspective of local citizens, I considered it imperative to adopt an interpretive frame that was well informed by the realities of citizens' social and cultural contexts. Indeed, as Bryman (2004) asserts, it is not possible for the qualitative researcher to understand the behaviour of members of a social group other than in terms of the specific environment or context in which they operate. If this is taken to be the case, the question that follows is: what methods does the qualitative researcher employ towards understanding the complexities of social and cultural contexts of which they are not a part? It is evident from the discussions in preceding sections that data from individual and group interviews can yield useful insights into the realities of such contexts. The status of interview data has however been widely contested within the interpretive tradition (see for example Seale 1999, Silverman 1985, ten Have 2004), and according to Walford (2007), ethnographers commonly view interview data as constituting an insufficient basis for analysis of social behaviour. Participant observation, which entails the immersion of the researcher in the particular culture or context being studied for an extended period of time (Bryman 2001), has been identified as a potentially more reliable - albeit also limited - tool for ethnographic researchers seeking to understand the intricacies of complex cultures (Fox 2004, cited above). Some of the merits and limitations to this approach are evident in the following account of the participant observation research I undertook in Kasewe.

The decision to use Kasewe as the site for participant observation was mostly pragmatic: it was the closest community to West Kochieng, in terms of geographical distance and cultural character, that Practical Action field staff could negotiate access to on my behalf. Kasewe is located about seventy kilometres to the south of West Kochieng, and both communities are indigenous Luo settlements. The existence of a stove producer group in the community, though not a primary consideration in identifying the site, was a favourable development in light of the wider purposes of the research. Although the group in Kasewe is not a direct beneficiary of Practical Action's activities in the province, this detail was not fundamental to pursuit of the primary goal in conducting participant observation, which was to gain insight into the ways that citizens experience and interpret their socio-cultural realities from a vantage point within the community. The role I took up in the community was that of a guest within the household of one of the members of the stove producer group. The host household was selected because it shared its premises with the stove production workshop, and was thus a meeting point for members of the group. From this auspicious vantage point, it was possible to simultaneously make observations at the household, group and community level.

The host household - or homestead, as it is more commonly referred to in Kasewe - consisted of three generations of family members. Although I experienced a degree of difficulty interacting with those of the older generation as a result of language differences, I was able to communicate reasonably well with members of the middle generation whose age range was closer to mine and with whom I shared a common language. The informal conversations held by the kitchen fire with this latter category

during dinner preparation - which was always a group affair, as was eating the meal afterwards - provided remarkable insight into the significance of various social, cultural, and even spiritual practices cherished within Luo households and in the wider community. These sessions were recorded on a discretionary basis: I only asked to turn on the digital recorder which was in my possession at all times if its presence in the background was unlikely to significantly alter or strain the flow of conversation. I came to realise that this element of sensitivity to the immediate context was required throughout my tenure as a guest in the host household. For instance, I initially thought it best to withdraw from other members of the household in the early hours of the evening before dark to write up my observations for the day by natural light as there was no electricity in the community. However, after the first few days, this seemingly strange habit of mine began to appear somewhat rude and insensitive in the context, and so I took to spending the early evenings participating in whatever activity other members of the household were engaged in and writing up my observations by the light of a solar lamp or kerosene lantern after everyone else had gone to sleep.

Although, as earlier indicated, the stove producer group was initially considered to be secondary to my immediate observation goals in Kasewe, the opportunity to observe the operations of the group at such close quarters yielded insights that ultimately contributed to my understanding of the performance of the group stove enterprise model, a theme which is explored in detail in Chapter 6. Besides observing the group at work and sitting in on one of its meetings, interviews were held with some of the members in their households. Those home visits provided considerable insight into the ways in which the women constructed their livelihoods

outside of the stove producing arena - as potters, subsistence farmers, and petty traders.

The period of participant observation in Kasewe was limited to one week in November 2009, as the fieldwork schedule did not permit me to stay on for longer. Although this limited period yielded significant observations particularly with regard to household dynamics, it was apparently not long enough to significantly erode my status as an outsider in the community. Though I was not mistaken as representing any particular outsider organisation, I was generally regarded as someone who had arrived to assist the community in some way. It required a bit of tact to correct this impression and the rather awkward situation it created without causing disappointment or making false promises. In the final analysis, the limited period of observation can perhaps be said to have augured well for the objectivity of the process, as it was not sufficiently long to aggravate the tension between involvement and detachment that Fox (2004) highlights - a tension which, as I experienced firsthand, is very real for the ethnographic researcher:

At the outset, I'd had some trouble adjusting to the different food and lodging conditions, and I thought I couldn't wait to be out of here. But by Wednesday, I'd started to feel like part of the family. I even started to like Joshua's wife's *ugali* and *sukuma* and fish stew. I never believed that could happen in a million years! (TS Fieldwork Journal, November 21 2009)

3.5. Data Analysis

Throughout the period of fieldwork in Nigeria and Kenya, I maintained a journal in which my observations and impressions of the interactions and settings with which I engaged each day were recorded. A few extracts from

the journal have been employed in preceding sections of this chapter to illustrate or underscore the practical and theoretical implications of some of the methodological choices made in the course of fieldwork. Upon my return from the field, the fieldnotes recorded in the journal presented a valuable analytical resource: as their descriptive detail captured and preserved significant elements of the context in which interviews and observations were originally conducted, they facilitated recollection of essential components of the data that would otherwise have been lost with the passage of time. These fieldnotes were especially relevant to analysis as the fieldwork process had yielded a large data set that was diverse and rich and that presented interesting new lines of enquiry which had not featured in the research design prior to fieldwork. It became apparent immediately following the fieldwork phase that a coding system was required which would simultaneously provide an overview of the data that had been gathered and equip me to make decisions about the relative significance of different aspects of the data to the immediate analysis. My fieldnotes presented me with the material I needed to employ this sort of approach, and so I drew on them as the starting point of the analysis.

I began analysis by carefully reviewing the fieldnotes, highlighting points that shed light on established analytical themes (such as the implications of participatory approaches to stove development for citizen empowerment), identifying emerging themes (such as the implications of market-based approaches to stove dissemination for stove uptake), and commenting extensively on the relevance of these themes to my understanding of the research problem stated at the outset. At the end of this detailed review, I collated the pages of commentary separately for Nigeria and Kenya and proceeded to treat each data set individually. Starting with Nigeria, I worked

through the data, breaking them up into discrete units of information, grouping units together which conveyed similar or related meanings and allocating headings to each group until the entire body of data had been arranged around seven different headings or themes. I then worked through the same process with the data set from Kenya, supplementing the body of commentary with contextual detail from the photographs taken in the homes of local citizens after interview sessions. At the end of this process, a separate set of seven themes had been generated.

Guided by the themes generated in each case, I set out to identify the interviews that would be most relevant to analysis and reporting of the research. All recorded interviews had earlier been transferred from the digital recording device to my computer and were systematically labelled to reflect aspects/characteristics of the interview/interviewee that I had considered to be potentially relevant to analysis, for example: *'Interview 9_Woman not from Stove Group, Wanting an Education, not Installing and not Using Upesi_121109'*. Some of the interviews, such as those conducted with policy makers and partner organisation staff, had been undertaken to provide context rather than content for the study. Such interviews were treated as reference material for analysis, and so they did not require transcription. Applying the identified themes as a filter, the 'core' interviews with project organisation staff and local citizens were narrowed to a selection of twenty five most relevant interviews, all of which were personally transcribed fully or partially with the aid of transcription software. The resulting transcripts essentially provided content which were applied to progressively refine the initial set of identified themes until I emerged with the core set of analytical themes discussed in detail in Chapters 4, 5 and 6.

3.6. Reflections on Ethical Dimensions of the Fieldwork

As earlier noted, I began the process of negotiating access to elite informant groups - particularly policy makers and project organisation staff - in the first year of the research. This was done via email correspondence, telephone conversations and face-to-face meetings in which detailed explanations were given of the research subject and fieldwork goals. Though the process of gaining access to particular individuals and settings did not involve the signing of official documents or the observance of formal procedures, the verbal and written consent obtained from individuals and organisations at various times before and after my arrival in the field provided me with a sufficient degree of legitimacy to carry out research in those sites.

In the period leading up to preliminary fieldwork, I was required by the university to sign a declaration to the effect that I would abide by the ethical standards spelt out by university's Code of Research Conduct, which include obtaining informed consent from research subjects and treating all data gathered as confidential. Roulston (2010) however asserts that simply seeking to appropriate Western-originated standards of academic research in non-Western contexts may not satisfactorily address the often different standards by which ethically appropriate conduct is judged in such societies. Roulston argues that the quality of ethnographic research in such societies ought instead to be assessed in terms of the degree to which it is culturally sensitive and recognises culturally acceptable protocols of gaining and maintaining access. In conducting research in stove project communities in Nigeria and Kenya, I made every effort to adhere to standards of behaviour which I identified in the course of field interactions and observations to be the acceptable norm in those communities. As indicated earlier, my conduct

of interviews and observations in the privacy of individual households particularly required sensitivity to the kind of behaviour that was expected of a visitor in different circumstances. This not only enhanced my level of acceptance in project communities but also ensured that local citizens were able to participate in the research on their own terms. Nonetheless, this cultural sensitivity had to be balanced with the ethical stipulations of academic research: in instances where citizens' expectations threatened to compromise the research situation - such as in Kasewe location where I was viewed by citizens as a potential link to material and other benefits for the community - it was necessary to make firm choices which contravened those expectations.

Where particular individuals have been referred to or directly quoted in the reporting of the research, their anonymity has been preserved either by substituting pseudonyms for their real names or identifying them by the general category they belong to, for example: Project Gaia Nigeria Staff 1-2; West Kochieng Household 1-13. The photographs included in the thesis only serve to illustrate relevant aspects of the data and analysis; they do not reveal the identity of research subjects.

Conclusion

The primary aim in this chapter has been to account for the strategic decisions made in the pre-fieldwork, fieldwork and post-fieldwork phases of this comparative study of improved stove development in Nigeria and Kenya.

The chapter has described how the process of arriving at the final pre-fieldwork research design required me to make decisions on several

important levels, particularly with regard to the selection of particular stove programmes to employ in the study. An understanding of the social relationships that shape stove programme implementation was recognised to be vital to understanding the issues related to stove uptake in local contexts. A qualitative research design was shown to be more appropriate than a quantitative one for exploring the issues of process and context that the study is concerned with.

Importantly, the chapter showed how the research design prepared in advance of fieldwork underwent significant changes upon my arrival in the field. Many of these changes, though prompted by practical constraints of the field, were shown to have ultimately yielded rich theoretical and analytical benefits for the study. The chapter also dwelt extensively on the rationale for adopting various strategies and methods in the conduct of ethnographic research amongst subjects in various research settings, reflecting on the influence that I, as the 'research instrument par excellence' (Hammersley and Atkinson 2007, p.17), could have had on interactions with subjects in those settings. Further, the chapter discussed how the 'different layers of my identities' (Fournillier 2009, p.759) – as a young, educated, urban, middle-class, female Nigerian student carrying out research in a UK university – interacted to position me as either an insider or an outsider relative to different groups of actors in various research contexts. Participant and non-participant observation techniques, which were employed in addition to the main interview method to improve the reliability of the data gathered, were seen to also exhibit their own limitations. The situations engendered by those limitations were however shown in certain instances to constitute data, as they signalled erstwhile obscure aspects of

local citizens' realities that were subsequently identified to be relevant to the analysis.

In sum, this chapter has provided a description of how the investigation into improved stove development and dissemination in Nigeria and Kenya was carried out, but it has not featured any discussion of the data that was gathered in the process. The chapters that follow present the findings of the investigation and the conclusions that have been drawn from my analysis of the data.

Chapter 4: Stove Development as Context-responsive Intervention in Nigeria

'Traditional and three-stone stoves, using woodfuel, have been used for generations to cook food, and not without good reason; the stove is free (just three stones or made of mud), fuel is gathered for free, and an experienced cook can cook food quickly. So why not leave "well enough" alone? Because it's not.' (www.projectgaia.com)

The discussions in the preceding chapters have elaborated on the theoretical and methodological foundations of the present inquiry into the implementation of two externally-initiated stove programmes in Nigeria and Kenya. The empirical data gathered in the course of the investigation provide the basis for the discussions and analyses presented in this chapter and the next two chapters.

This chapter presents the findings of research on the CleanCook project implemented in Nigeria by Project Gaia, a United States-based international non-governmental organisation working to improve the access of energy-poor populations in developing countries to clean cooking technologies. The chapter sets out to answer the question of how the CleanCook project objectives have translated into the Nigerian context. It compares Project Gaia's expectations of the project with its actual performance upon interaction with the context and examines the extent to which the project, claiming to operate on appropriate technology principles, fulfils the premise of context-responsiveness assumed by those principles. Importantly, the chapter examines Project Gaia's objective to establish a consumer-driven market model for disseminating the CleanCook technology in Nigeria, highlighting the impact that pursuit of this objective has had on the implementers' performances of context-responsiveness.

The chapter is divided into three main sections. The first section describes the origins of Project Gaia and the CleanCook technology, both of which are intertwined. The section also examines Project Gaia's objectives and motivations for initiating the CleanCook project, and reflects on how these have informed the implementing strategy employed in various developing country contexts to date. The second section discusses Project Gaia's introduction of the CleanCook technology to Nigeria via the platform of pilot projects. The outcomes recorded in the pilot and post-pilot phases of the project are assessed in the light of Project Gaia's original projections, enabling recognition of the assumptions that informed the organisation's strategy. The third section examines the implementers' proposal for creating a market-based dissemination network for the CleanCook technology in Nigeria.

The primary data employed in this chapter were generated mainly from interviews with Project Gaia staff located in the pilot project community and with key staff of partner organisations that have been assigned different responsibilities in the proposed market dissemination phase. The observations made during attendance at a meeting of 'stakeholders' involved in planning the market phase have also contributed to the body of data used here. Secondary data sources include official project documents and electronic mail correspondence with a member of Project Gaia staff located outside of the project community.

4.1. The CleanCook: Introducing a 'Proven' Stove and Novel Fuel Technology to Developing Economies

When the CleanCook technology was unveiled by Project Gaia in the third phase of stove development, improved biomass stoves had achieved widespread acceptance in the field as the de facto prescription to address the problems associated with solid biomass use in developing countries. The CleanCook technology represented a break with the incremental model of change presumed by improved biomass stove promoters and instead presented energy-poor populations with an alternative that offered to help them make a radical leap to a modern technological solution. Project Gaia's 'novel' approach to tackling the phenomenon of energy poverty thus constituted a challenge to the status quo and attempted to diverge from established patterns in the field of stove development, as seen in the following statement made by the pioneers of the technology:

'It would seem, for example, that the way to improve on the use of wood as a domestic fuel is to make a more efficient wood-burning stove and then pipe the decreased but still very significant smoke and fumes out of the house or the courtyard. But this is not the best solution. The best solution is to depart completely from tradition...'
(Ebbeson et al. 2000a, p. 2)

For Project Gaia, a departure from tradition, one characterised by a shift from the use of biomass stoves and fuels to the use of more modern cooking technologies, is necessary for two main reasons. The first the organisation's assertion that improved biomass stoves do not offer permanent solutions to the environmental and health problems most commonly associated with the widespread use of biomass in developing countries. Secondly, they cite the results of their own studies in some of those countries in which households cooking with 'inferior' biomass fuels expressed a desire to 'move up the energy ladder' (Project Gaia Nigeria

Staff 1) to more modern, cleaner energy sources. The CleanCook intervention has therefore been framed by its implementers as a relevant, even necessary, response to the articulated preferences of local citizens in developing countries. According to Stokes and Ebbeson (2005), the ultimate goal of Project Gaia in introducing the CleanCook technology to developing economies is to tackle the phenomenon of energy poverty among target populations on a scale equivalent to the size of the problem.

Contrary to the dominant international discourse beginning in the late 1990s which has placed the need for improved health at the centre of improved stove interventions, the initial CleanCook strategy derived from Project Gaia's interest in environmental and natural resource conservation. This inclination, reminiscent of the interests of outsider organisations operating in the first phase of the 1970s, informed Project Gaia's early proposal of liquid methanol harnessed from natural gas as a viable alternative to solid biomass fuels. The reasoning was that the substitution of methanol for fuelwood and other biomass sources would simultaneously reduce pressure on local forest resource and open up a profitable means of utilising or cleaning up the abundant quantities of natural gas that are mostly untapped or flared in a number of resource-rich developing countries. Over the course of the past decade, however, the original CleanCook objectives have evolved to reflect more closely the present concern of the international community with mitigating the effects of indoor air pollution in poor households that cook with solid biomass. This alignment of objectives serves to further advance the promoters' message regarding the need to switch completely from reduced-smoke biomass technologies to the zero-smoke CleanCook technology.

Figure 4.1: The traditional three-stone fire



Figure 4.2: The modern CleanCook stove



Source: <http://www.dometic.com/cleancook>. Accessed December 2010

The idea to use methanol as an alternative cooking fuel is not entirely unique to the CleanCook energy poverty alleviation programme. The CleanCook stove-and-fuel technology was in the first instance an innovation of Dometic AB, a Sweden-based manufacturing company whose core business is to provide products and services tailored to the recreational industry. The alcohol-fuelled stove was first marketed under the brand name *Origo* in 1979, as a device that was exceptionally safe for cooking on leisure boats and recreational vehicles: alcohol fuels, particularly methanol and ethanol, are highly miscible with water - and an alcohol-fuelled fire is quite easily put out with water. In the early 2000s, the United States-based Stokes Consulting Group (SCG), a firm of experts in energy and conservation issues, identified the alcohol stove-and-fuel technology as being potentially advantageous to energy users in poor countries who had restricted access to clean energy. SCG subsequently teamed up with Dometic to establish Project Gaia as a platform for promoting the uptake of the technology amongst such populations:

‘The true potential of this alcohol burner technology has never really gotten out, the stove has languished in niche markets, and we are trying to change this, by seeking to adapt it to developing world markets where the alcohols are an especially appropriate fuel.’ (Email correspondence Project Gaia International Staff 1)

The members of this purpose-built expert team were aware that the *Origo* stoves manufactured for the recreational industry in the global North were ‘too expensive for the developing country marketplace’ (Ebbeson et al. 2000b, p.9). Their first consideration was thus the need to scale down a rather ostentatious product that had hitherto been exclusively available in rich developed-country markets to a basic version that would meet the essential cooking needs of the poorest households in developing countries.

The redesign of the *Origo* stove was carried out by Dometic engineers working from factories in Slovakia and Sweden. The result of this modification process was the CleanCook stove, produced at less than half the cost of the original stove. By Project Gaia's assessment, the CleanCook stove fulfilled the criteria necessary for it to be considered appropriate technology: it was an 'economy stove' which retained all of the safety and durability features of the more expensive *Origo* stove and which would prove to be one of the least expensive stoves available in the developing world marketplace when its cost was spread over its minimum expected life of 10 years (Ebbeson et al. 2000b). Project Gaia essentially marketed to energy-poor populations a stove which was sound in terms of both technology and economy, one whose functionality surpassed that of traditional alternatives and which was inexpensive enough 'for use in the humblest household' (Ebbeson et al. 2000a, p.1).

Project Gaia sought to further emphasise the distinction between traditional household energy interventions and the CleanCook intervention by stressing that the latter goes beyond merely giving households in developing countries access to a new kind of stove, as household energy projects routinely do. Instead, the CleanCook technology from the onset offered a new stove *and* a fuel which would be produced in industrial plants that were already available on the global market (Stokes and Ebbeson 2005).

Having identified the stove and the alcohol fuel as 'the two keys to building the entire system' (Ebbeson et al. 2000b, p.9) in various countries, the team at Project Gaia expressed confidence in the viability of the project, since 'both [stove and fuel] are available and both have been

proven in use together' (ibid.). The organisation aims to offer project partners in developing countries access to the very best of appropriate energy technology: a clean-burning stove certified by its manufacturers to be 'Best Available Technology' (Project Gaia, n.d., p.1) and alcohol fuel production plants already commercially available, all ready to be deployed wherever needed. On the basis of these provisions, the CleanCook technology would appear to transcend a critique commonly directed at the notion of appropriate technology, namely that it offers technological options to the poor that are inferior to the advanced technologies marketed in rich countries (q.v. Schumacher 1993). However, as will be evident in the case of the CleanCook, adopting an alternative philosophy that privileges the provision of 'best available technology' to poor populations in developing countries is likely to present its own set of challenges in different local contexts.

Project Gaia's dissemination strategy is based on the assumption that the CleanCook stove and the alcohol fuels it utilises are 'intertwined' (Project Gaia Nigeria Staff 2); that the unprecedented capacity of the stove to burn alcohol fuels efficiently and safely will enhance the popularity of the fuel and lead to the CleanCook being recognised for the 'good' stove that it is.

'There is no mystery as to why ethanol has never been truly popularized as a cooking fuel, as propane and butane and other modern fuels have. It is because there was never a good stove, one that could burn ethanol efficiently, with adequate heat, and avoid problems in doing so.' (Email correspondence Project Gaia International Staff 1)

The efficiency of the technology thus established, the other major consideration for Project Gaia was how economically alcohol fuels could be produced in various project countries – including, to date, Brazil, Ethiopia,

Nigeria, and South Africa. At the initial stages, methanol was the preferred fuel for most of the project locations, as early estimates showed that methanol produced locally from natural gas could be up to 50 percent cheaper than ethanol (Stokes and Ebbeson 2005). It was expected that, with the gas-to-methanol conversion technology available, it would be possible to process the significant natural gas reserves that were either being wasted (as in the case of Nigeria) or underutilised (as in the case of Ethiopia).

Indeed, the economics of local fuel production is a crucial factor for Project Gaia in deciding what developing countries it will form technical partnerships with. Citing the implementers' experiences across different pilot studies and projects, Stokes and Ebbeson (2005) report their crucial finding that stove efficiency alone was not sufficient to engender widespread uptake of the technology; it was equally essential to local populations that availability of the alcohol fuels required to run the stoves was guaranteed. This assertion indicates awareness on Project Gaia's part of certain dimensions of local contexts that need to be taken into consideration for the CleanCook technology to function optimally. However, the experiences recorded in Brazil and Ethiopia indicate that this demonstration of reflexivity may be limited in its applicability to the contingencies identified during implementation of the intervention in those contexts.

In Brazil where there is an established market for ethanol in the transport sector, Project Gaia identified a unique opportunity to introduce the CleanCook stove in the expectation that the availability of ethanol in the nation's commercial energy mix would aid acceptance and uptake of the

technology by local citizens. However, it became apparent during the pilot project implemented in 2006 that the reverse was more likely to be the case: because the ethanol produced in Brazil is primarily sold to local and global markets for blending with petrol, its price is affected by world oil prices (Couto 2007). As such ethanol prices tend to be competitive with those of petrol, and poor households in the pilot communities found ethanol expense to be too high when initial project subsidies were removed. Project Gaia therefore started to explore the possibility of setting up decentralised community-owned ethanol micro-distilleries for local production, an option which proved to come with its own complications, on account of government policies restricting the sale of ethanol produced by micro-distillery operators in the country (ibid.). In Ethiopia, initial vision to harness the country's 'underutilised' natural gas reserves for industrial methanol production has not materialised. Instead, Project Gaia has collaborated with an indigenous company in the local sugar industry to make use of the ethanol distilled from the by-products of sugar production (Kassa 2007). This shift suggests that the organisation found it more practical to operate within the bounds of existing infrastructure than to introduce a novel fuel production technology into the system.

These accounts of the project's experiences in Brazil and Ethiopia give an indication of the difficulties encountered by Project Gaia in operating within different local contexts. The findings from empirical research carried out in Nigeria however constitute firsthand data on which to base analysis of the performance of the external intervention within a particular context and to more accurately identify the working assumptions of the outsider organisation. The rest of this chapter is devoted to outlining Project Gaia's expectations of the CleanCook project in Nigeria, and tracing how those

projections have materialised within the context of the country's social, economic and political framework.

4.2. The CleanCook Strategy in Nigeria

'So now... the beauty of it all is the transition now. How do people embrace this? We did the pilot, we introduced the stove, that's the CleanCook, to homes, baselined homes across income level, and urban and rural dichotomy, and we introduced the stove to them. Before we did that we had to educate them about the new fuel – ethanol, methanol. We educated them... we taught them how to use it. It's a new product, so we went through the process of innovation and diffusion and all that. We educated them and we introduced the stove to them.' (Interview Project Gaia Nigeria Staff 2)

This section details Project Gaia's efforts to introduce the CleanCook technology in Nigeria. In Project Gaia's view, the way to get households acquainted with the idea of replacing traditional biomass with alcohol fuels 'in any given market area' is to introduce a few hundred CleanCook stoves into selected communities through the vehicle of pilot projects (Ebbeson et al. 2000a). This section begins by examining the shape that this projection has taken in the pilot community in Nigeria. It then goes on to discuss how the organisation's plans for local fuel production in the post-pilot phases have interacted with the local context, in the process drawing out some of the assumptions that have informed the organisation's implementation strategy in the country.

4.2.1 Introducing a Novel Stove Technology to Nigerian Households

In 2003, Project Gaia launched a series of consultations with the Centre for Household Energy and the Environment (CEHEEN), a local non-governmental organisation in Nigeria with prior experience in improved

biomass stove development and dissemination (Project Gaia Nigeria Staff 1). On the strength of these consultations, an alliance was birthed between the two organisations which came to be christened Project Gaia Nigeria. This North-South collaboration subsequently opened the way for the institution of top-level partnerships between the CleanCook project and relevant departments within state and local governments in the proposed pilot region of the Niger delta (Stokes and Ebbeson 2005).

Project Gaia's choice of pilot location in Nigeria was consistent with the organisation's overall strategy of prioritising natural resource availability in its deployment of the CleanCook technology. The Niger delta region holds one of the world's largest reserves of natural gas, from which Project Gaia considered that it should be easy to produce methanol fuel in commercial quantities. This, in Project Gaia's view, made Nigeria 'the ideal place to begin a project' (Project Gaia Nigeria Staff 1):

'If you want to attain low economics of production, you have to be able to use affordable feedstock to produce the fuel. You have to use feedstock which is not so expensive that it will affect your cost of production. And also you have to consider the availability of feedstock. Availability impacts on the final cost of your product. And here is Nigeria sitting atop a huge reserve of the feedstock with which you can economically produce the two principal alcohol fuels. So, we put the options on the table and find that Nigeria, more than anywhere else in the world has comparative advantage in producing clean fuels.'
(Interview Project Gaia Nigeria Staff 1)

Notwithstanding the abundance of oil and gas resource in the Niger delta however, the area remains grossly underdeveloped, blighted by environmental degradation and economic deprivation (Owabukeruye 2000). Oil spills resulting from the oil exploration activities of multinational corporations (MNCs) pollute groundwater and ruin cropland, threatening

the fragile subsistent peasant economy and bio-diversity of the region (O'Neill 2007, Owabukeruyele 2000). Between 1976 and 2001 alone, the number of documented spills amounted to 6,817 – amounting to one spill a day for 25 years – an estimate that analysts suspect may be as little as one-tenth of the actual number of spills in the period (O'Neill 2007). The gas flares that have burned constantly for decades release greenhouse gases into the atmosphere and cause acid rain (ibid.). Indeed, the gas flared on the oil fields of the Niger delta constitutes about 20 percent of the global total, making Nigeria the world's leading gas flaring nation (Project Gaia Nigeria Staff 1).

Project Gaia estimates that the quantities of gas flared or otherwise sealed off on those delta oil fields, if harnessed, are enough to supply cooking gas to the 320 million people in West Africa over a 50-year period (Project Gaia Nigeria Staff 1). Obueh (2008) and Stokes and Ebbeson (2005) report that, amidst this abundance of energy resource, at least 95 percent of Niger delta residents have no access to modern energy sources and depend partially or wholly on solid biomass fuels for cooking. Stokes and Ebbeson (2005) assert that 'of those who use improved fuels, most use kerosene in cheap wick stoves on an occasional basis' (p.33). Obueh (2008) attributes this energy use trend to widespread poverty in the Niger delta: about 70 percent of residents rely on subsistence farming to survive. Project Gaia, noting this juxtaposition of opportunity and deficiency, therefore targeted the CleanCook pilot at the 95 percent of the Niger delta population occupying the bottom of the energy ladder and socio-economic pyramid – those citizens that, according to Obueh (2008), are 'desperate for clean cooking energy' (p.4).

Based on these clearly stated project aims, Project Gaia found Delta state a particularly attractive location for the pilot phase. Endowed with 40 percent of Nigeria's total oil and gas resource, Delta is simultaneously the most productive of six oil-producing states in the Niger delta area (Obueh 2008) and the state most negatively impacted by gas flaring activities (Stokes and Ebbeson 2005). Poverty, environmental degradation, and fuelwood dependence combine to create this scenario vividly described by Obueh (2008, p.4):

'It is ironic that the people of Delta state must cut down their valuable forests to cook literally in the sight of oil rigs and flow stations. As one travels throughout Delta state, fuelwood gathering from forests that have become marginal, together with long queues of people waiting to purchase kerosene that is perennially scarce, is in evidence everywhere. For the most part, women are seen in the evenings returning home carrying enormous bundles of fuelwood on their head after a full day's drudgery of wood gathering.'

Project Gaia set out to explore how the CleanCook stove and fuel could alter this picture by drawing up a detailed plan for a pilot project implemented in three parts: a mini-pilot study, a baseline study, and a full pilot study. The objective of the pilot phase was to generate local interest in the stove and fuel, with a view to analysing the market opportunities available for the technology:

'A key purpose of the pilot study is to map opportunities and problems, and advance as far as possible prior to crafting business agreements and commitment of investment capital.' (Stokes and Ebbeson 2005, p.32)

The 'opportunities' that prompted the implementation of the pilot phase in Nigeria included, apart from natural resource availability, a sizeable regional market of 320 million citizens (Project Gaia Nigeria Staff 1). It is apparent therefore that Project Gaia, from inception, envisaged the kind of

consumer-driven dissemination model typical in developed country markets for the CleanCook stove and fuel.

The mini-pilot study carried out in 2003 with just 15 stoves was, according to Obueh (2004), a field test carried out in anticipation of a more comprehensive study. The published results of this study were extremely positive, stating that 'all respondents, representing 100 percent of the study group, say they would buy the stove to replace their current cooking device, if there would be regular supply of methanol fuel to run the stove' (Obueh 2004, p.13). The stoves in the mini-pilot phase had been fuelled with imported methanol (Project Gaia Nigeria Staff 2), and this sort of response was the encouragement Project Gaia needed to embark on full-scale production of methanol from local gas flare sites. Indeed, following the success recorded in the mini-pilot project, the implementers became even more certain that the CleanCook technology offered Nigeria a viable means of putting its natural gas resources to good use (Stokes and Ebbeson 2005).

Upon completion of the mini-pilot study, Project Gaia proposed to undertake a second pilot study to test the stoves over a wider area. This 'full' pilot would involve placing CleanCook stoves in 150 homes across 9 communities within Delta state. First though, a baseline study of the 150 project homes was commissioned to determine the precise configuration of local household energy use patterns. Participating households were selected randomly across three income groups – low, middle and high – in both rural and urban areas. The baseline study sought to establish the types of cooking stoves and fuels used in households across the income classes as well as the average annual fuel expenditure made by those

households (Bailey et al. 2006). The conclusion published at the end of the baseline study was that low-income households (categorised by Project Gaia as those earning US\$ 0-130 per month) were mostly firewood gatherers/buyers or kerosene users, middle-income households (earning US\$ 130-750 per month) were mostly kerosene users, and high-income households (earning over US\$ 750 per month) were mostly liquefied petroleum gas users (ibid.).

The significance of this pattern of energy use to the CleanCook project will be seen later on in this section when the role of kerosene in Nigeria's household energy sector is discussed. Determining the average annual fuel expenditure across the various income groups gave Project Gaia an indication of how much households within each income group would be willing and able to pay for alternative alcohol fuels. Overall, the baseline data indicate that the rungs along the energy ladder correspond to the segments within the income pyramid.

The full pilot study commenced in 2007, and as in the mini-pilot study, the stoves were fuelled with imported methanol. At this stage, the project received part-funding from the Partnership for Clean Indoor Air programme of the United States Environmental Protection Agency (Obueh 2008), apparently on the basis of its stated commitment to tackle the problem of indoor air pollution associated with solid biomass use.

The implementation approach taken by Project Gaia in which a team of experts directed the process and participants were only allowed minimum input (mostly feedback on stove and fuel performance) is perhaps an early

indication of an inclination towards a top-down approach, despite the initial promise of context-responsiveness shown by the project:

'We demonstrated to the members of [the households] how the stove is operated; we introduced alcohol fuel and how it is used in the stove; we described the different parts of the stove; how to remove and replace filled canisters; lighting and turning off the stove and cleaning the stove. This demonstration was done to enable the household members learn how to operate and use the CleanCook stove effectively.' (Project Gaia 2006, p.2)

Following these demonstration sessions, participants were 'monitored' closely over the three-month duration of the project with the aid of bi-weekly questionnaires and daily logs detailing pattern of stove and fuel use (Project Gaia 2006).

The full pilot study attempted to be representative of the population in Delta state, hence the selection of households by income level and geographical location. As pointed out earlier, the results of the baseline study showed a disparity in type of fuel used across the low, middle and high income groups. Generally, the lower households are in the income pyramid, the lower they tend to be on the energy ladder. In Nigeria, kerosene occupies a middle position on the energy ladder: it is higher than solid biomass fuels but lower than high-end fuels like gas and electricity. Having inferred from the baseline results that the energy ladder corresponds to the income pyramid, it is not surprising that kerosene has, for the most part, established itself as the fuel of choice for the middle income group. According to the baseline data though, even low income households in urban areas tend to use kerosene as their primary fuel source – unlike their rural counterparts that mostly rely on lower rung biomass fuels to meet their cooking energy needs. As such, kerosene has

a dual status in Nigeria as a predominantly urban and middle-class household fuel.

Kerosene's position as a middle fuel in Nigeria may be partly attributable to the federal government's long-standing policy of subsidising the cost of petroleum products to citizens (Bacon and Kojima 2006). Such kerosene subsidy policies, according to Bradsher (2008), encourage energy users in developing countries to use more of kerosene and less of fuelwood. This would seem to be the case in Nigeria, where households turn to fuelwood and other biomass sources and reduce the number of meals they cook when kerosene prices rise (Adebayo 2009).

In the course of the pilot phase, the implementers identified several challenges faced by kerosene users in the project communities, most significant among which were lack of quality control, inefficient distribution systems, and indiscriminate price hikes (Obueh 2008). Project Gaia responded to these newly identified problems by explicitly broadening the scope of the CleanCook intervention to address them. By adjusting its programme to cater to the needs of kerosene users who experience a different set of challenges than the original target group of biomass users, Project Gaia can again be seen to demonstrate a degree of sensitivity to the conditions and requirements of the local context. However, as the discussion in section 4.3 below will reveal, context-responsiveness in this case has not incorporated consideration of other concomitant variables within the system, most notably the significance of the relationship between socio-economic status and energy use in Nigerian households and its likely implications for the outcomes of the project. For now, we turn to

discuss Project Gaia's plans for industrial methanol production following the acclaimed success of the three-part pilot phase in the Niger delta.

4.2.2 *Integrating a Novel Fuel Technology into Nigerian Society*

So far, this section has outlined the tentative steps taken by Project Gaia in introducing the CleanCook technology to households in a particular region of Nigeria. Encouraged by the enthusiastic reception given to the technology in the pilot location, Project Gaia determined that a full-fledged commercial scale-up of the intervention that would cater to energy-poor households across the country was appropriate. At that point, it became essential for the project to follow up on its earlier plans regarding local production of the methanol fuel needed to run the stoves. The organisation therefore proceeded to locate a viable gas flare site in Ughelli town, Delta state, and invited investors 'from outside' (Project Gaia Nigeria Staff 2) to install and operate a methanol distillation plant close to the facility. However, it was not long before Project Gaia and interested investors realised that, despite the apparent feasibility of setting up operations in Ughelli, they could not record any significant progress without the buy-in of the project community:

'It's not as if these Americans cannot come here and set [the methanol plant] up. They can! But what is the guarantee that what they're setting up here will run? The communities, they must have at least a controlling share in what is going on there... The local content, there are contributions that will come in from the local angle, and all that.' (Interview Project Gaia Nigeria Staff 2)

In the context of the Niger delta, making provision for 'local content' in such a project would include involving indigenes in major transactions such as the acquisition of land on which to locate the methanol plant. The 1978 Land Use Act of Nigeria vests ownership of all land in the state (Laws

of the Federation of Nigeria 1990). In practice however, it is common for families to claim ownership of land based on ancestry (Onuoha 2008), a custom which can be intensified in resource-rich areas like the Niger delta (Akpan 2005). For this reason, a seemingly straightforward transaction such as land acquisition for commercial purposes in the delta can become complex and conflict-ridden:

'Now, the next stage is land acquisition. [Investors] have to go into memorandum of understanding with host communities, and all those corporate social responsibilities and all that. That one must be settled before anything is done.' (Interview Project Gaia Nigeria Staff 2)

The difficulties encountered by Project Gaia in attempting to locate the methanol plant in Ughelli are best understood in the context of the wider history of the Niger delta. It was stated earlier in this chapter how, despite the abundant wealth that has been drilled from the delta oil fields by multinational corporations (MNCs) since the late 1950s, the socio-economic development of the region remains stunted. The widespread reaction among citizens to this age-long situation in their homeland is one of discontent and disillusionment. Indigenes view themselves as victims, the MNCs as looters and the federal government as a co-conspirator in a state-multinational capitalist system that systematically robs their land of its wealth and denies development to present and future generations (Omoweh 2005). The environmental and health hazards posed to local residents by the waste and by-products of oil exploration are also a source of contention, with government again viewed as an ally of the MNCs for not enforcing environmental legislation upon the latter. The history of the Niger delta is replete with instances of militant uprisings instigated by groups of citizens who demand justice and claim to fight for the collective rights of people in the region to better treatment by the MNCs. What has

resulted is a palpable atmosphere of distrust of government (and MNCs) among locals:

'People feel cheated, you know, the government has not also been fair to the people. Let's be candid. People keep talking about Niger delta, because they've seen that the government is not effective!' (Interview Project Gaia Nigeria Staff 3)

Obueh (2006) reports that Project Gaia had earlier been forced to conduct a week-long 'community relation and awareness exercise' (p. 107) prior to the commencement of the baseline study, when conflict arose in a certain community over the intentions of CleanCook project staff. There is however no indication that this element of community involvement was integrated into Project Gaia's overall strategy following the incident. Project Gaia's negligence in incorporating citizen participation as an explicit component of its efforts to 'introduce' the methanol production technology into the Niger delta region despite being aware of the fragile political climate in the location reflects the assumptions of an expert-led implementation approach. The next section draws out some of those assumptions and introduces the alternative strategy proposed by Project Gaia for pursuing its energy poverty alleviation objective in Nigeria.

4.2.3 Evaluating the CleanCook Strategy in Nigeria

The previous sub-section highlighted some of the complications that arose on the CleanCook project when Project Gaia attempted to establish an industrial-scale plant for commercial methanol production in the Niger delta. The hostile reception given the methanol production plan by citizens in this location challenges Project Gaia's basis for introducing the technology to resource-rich countries, namely that the availability of a natural resource in a locality necessarily translates into accessibility. This

assumption appears to have informed the organisation's rather straightforward implementation strategy, which can be summarised thus: introduce a tested and proven stove into energy-poor developing countries that have the potential to manufacture the required alcohol fuel locally, and the technology eventually finds its place among the household energy options available in the local market. Indeed, Project Gaia's official statement that 'we have the technology, we can create the market' (Project Gaia, n.d., p.1) reflects the commonly-held assumption in development policy and practice that technology and market forces can act as a panacea for many of the problems faced by the poor, regardless of context. This statement of the organisation's expectations does not recognise the variable effects that local conditions can have on the implementation and outcome of an externally devised project such as the CleanCook.

It is apparent that Project Gaia's implementation strategy in the Niger delta was predicated on the assumption that technology can be taken from industrialised countries and modified to become appropriate to the needs of poor populations in developing countries. It is important to note that the organisation's considerations regarding the production of appropriate technology were largely economic: specifically, the need for lower production costs to make the end product more affordable by target populations. The findings from both of the stove programmes considered in this study show that while economics can be an important consideration in the decision to adopt or reject appropriate technology, there are social, cultural, institutional, and even political dimensions that also need to be taken into account to ensure that technology is wholly appropriate to local contexts. In particular, the discussion in the next chapter of Practical

Action's intervention in Kenya will reveal Project Gaia's definition of appropriate technology to be at variance with the principles of small-scale, indigenous and participatory technology development advocated by proponents of the notion.

In sum, Project Gaia's inability to successfully establish industrial methanol production in a location originally certified to be 'ideal' for such a project does not provide support for the organisation's core belief in the invincibility of its techno-commercial strategy, or for some of the other crucial assumptions which constituted the original premise of the CleanCook initiative.

In light of the complexities involved in establishing infrastructure for centralised methanol production, Project Gaia has chosen to adopt a seemingly less complicated alternative: smaller scale, decentralised production of ethanol in micro-distilleries operated by hundreds of local small and medium business enterprises. The following statement by a member of Project Gaia staff illustrates the difference in scale between the original plan for methanol production and the new plan for ethanol production:

'The [ethanol] micro-distillery is a project that you can scale up anytime. If your location is no longer comfortable you just call in your engineers, they will uncouple [the micro-distillery]. And you relocate to another place. Now, when you talk of the methanol plant, it's a multi-million dollar project. It's not a small one.' (Interview Project Gaia Nigeria Staff 2)

As was the case under the original methanol production plan, Project Gaia expects the recourse to ethanol production to be unproblematic because 'ethanol is easily produced from agricultural material' (Project Gaia Nigeria

Staff 1) and Nigeria has been certified the world's largest grower of cassava (IFAD 2008), which is a viable agricultural feedstock for ethanol production.

To facilitate implementation of the new plan, Project Gaia has gone into partnership with Cassava Agro-Industries Services Limited (CASL), an indigenous company with experience in industrial cassava production. This partnership is particularly important for the project considering that a relatively high degree of agricultural specialisation is required to realise the new cassava-to-ethanol conversion plan. Cassava, unlike flared gas, has to be cultivated before it can be used as feedstock for ethanol. Further, setting up a decentralised system of ethanol production requires more in-depth knowledge of local business processes than Project Gaia possesses. This chapter goes on to explore the significance of the partnership between Project Gaia and CASL, and how the emphasis on a market-based model for scaling up the CleanCook intervention has played a major role in redefining the objective of the CleanCook project in Nigeria.

4.3. Commercialising the CleanCook in Nigeria

It was established in the preceding section that the objective of Project Gaia from the outset was to ensure continuity of the CleanCook stove and fuel project beyond the pilot phase in Nigeria, and the consensus amongst the implementers was that this goal could best be achieved through the mechanism of the market. This section highlights the various working relationships initiated by Project Gaia and CASL towards this end, resulting in a significantly broadened network of actors operating at the local, regional and global levels. The section also examines CASL's interpretation

of the CleanCook project within the Nigerian context, revealing interesting points of convergence and divergence between the specifications of the original programme and those of its local derivative.

4.3.1 Generating a Network for Market Dissemination

In Project Gaia's view, the modicum of potential that the CleanCook project in Nigeria seems to have demonstrated for survival beyond the pilot phase is attributable to the proactive manner in which CASL has embarked upon generating a market model for the project which incorporates several other local business actors:

'[CASL] is entrepreneurial to the core and is trying to construct a model that will work on its own - lots of small businesses being given access to the implements they need to construct a self sustaining system that will create livelihoods for people and thus, one hopes, will be nurtured. [Project Gaia's] popularization strategy is always to take on partners or collaborators who are wiser and smarter and stronger than us, because the mission of getting this stove out and disseminated potentially to millions of users is actually a very big task, one that is beyond us.' (Email correspondence Project Gaia International Staff 1)

Project Gaia's 'collaborators' in this proposed commercial phase are wide-ranging, including actors from business, government, international and non-governmental organisations. This sort of collaboration is representative of the type of 'sustainable development partnerships' (Levy and Chernyak 2006) that the UN Global Compact encourages between international organisations, governments, civil society, labour, and business towards realisation of the Millennium Development Goals and the broader development goals set by the UN (United Nations 2008).

The commercial phase of the project is scheduled to begin operations within a 'controlled' market environment, with 'soft' loans and carbon financing to be provided by various project partners. The soft loans, designed to be easily repayable by small businesses over a 10-year period, will be provided by the African Development Bank. In principle, the project may be eligible to receive carbon credits within the Clean Development Mechanism framework initiated under the Kyoto Protocol to enable developing countries to generate greenhouse gas emission credits through investment in emission reduction projects (Michaelowa and Jotzo 2005). CASL's intention is to 'harness the maximum carbon credit potential of the project' (CASL Staff 1), so that the funds that accrue to the project from the carbon credit scheme can then be used to subsidise the cost of the technology to local citizens. It must be noted, though, that this may not be a reliable financing strategy to adopt: according to Lane (2010a), carbon policy to date has been so unpredictable that investors have long since written off carbon as a factor and fund only those projects that can survive without carbon credits. The statistical evidence would appear to support this assertion: according to Haigler et al. (2010), carbon markets have penetrated less than 0.2 percent of the substantial 'global market' for improved stoves to date.

In the plans for commercial scaling up, the state has been assigned a behind-the-scenes role while private-sector actors have taken full charge of business operations. This strategy adheres to market liberalisation ideology which advocates that businesses, rather than governments, ought to be the principal agents of development (Reed and Reed 2009). The neoliberal approach privileged in this case may however be easy to justify on account of the weakness of existing policy and institutional

structures in Nigeria. One of the most relevant institutions in this regard is the Energy Commission of Nigeria (ECN) - the government organisation responsible, in principle, for enacting policy and coordinating public and private sector activity across the energy sector (Anozie et al. 2007, ECN 2003). Interview data however reveal that the ECN has not been active in exercising this mandate – with the result that the energy sector is quite loosely held together by a weak centre unable to ensure joined-up, coordinated, effective policy making and implementation within and across sub-sectors (ECN Official 1).

Notwithstanding the weak position of the state, Project Gaia envisages a function of policy support for the former based on the realisation that an enabling policy environment is vital to the success of the proposed market phase:

‘...tangible government and policy supports are vital to making a new program work and mature into its own commercially, where perhaps it can be self sustaining. I believe this to be so true with improved biofuels; it requires unwavering government backing and the right policies, programs and even regulations to make new biofuel economies work. The solid fuel stoves are only an incremental change from business as usual that is small enough that it can happen perhaps entirely in the marketplace. Liquid biofuels, however, cannot. There is a host of things government must do to help.’ (Email correspondence Project Gaia International Staff 1)

It remains to be seen whether the level of policy support available will be sufficient to facilitate the kind of outcome anticipated for the project by the implementers. Of particular significance to the commercial phase is the Pan-African Cassava Initiative - a policy framework initiated not at national, but at regional level under the New Partnership for Africa’s Development, a socio-economic development initiative of the African

Union. The relevance of this policy framework to the project is considered in greater detail in section 4.3.3 below.

CASL is currently acting in the capacity of project manager for the commercial phase, coordinating three groups of 'business people': small-scale contract farmers, ethanol micro-distillery operators and marketers (Acha 2009). In assuming overall management of the CleanCook project in Nigeria, CASL has fulfilled Project Gaia's original expectation that business actors would eventually take over the project and facilitate dissemination of the technology through the market. Indeed, CASL has come to completely 'own' the project, even 'lovingly' renaming it the 'Cassakero project' as part of a local branding effort to better adapt it to the Nigerian context:

'[People] need a word that sticks. A word that explains to them without too much grammar, what the fuel is. When you say Cassakero, immediately they remember kerosene. Cassava-based kerosene, or the intention is, ethanol, a cooking fuel produced using cassava as raw material. So to reduce all of this to just one word that people can remember, we use the word 'cassakero'. Cassakero was more fun, it sounded more trendy, and could explain what we're trying to say.' (Interview CASL Staff 1)

In the above statement, CASL is unequivocal regarding the group of energy users expected to benefit from the CleanCook technology in the market phase. If, during the pilot phase, Project Gaia signalled a broadening of the scope of the CleanCook project to include kerosene users, CASL's intervention in the market phase precipitated a restructuring of the project objectives to cater exclusively to kerosene users. Under the Cassakero plan, the CleanCook technology has largely metamorphosed from an intervention targeted at solid biomass users into one promoted as a cleaner and cheaper alternative to kerosene. Obueh (2008) links the

new focus with Project Gaia's original indoor air pollution mitigation objective by listing 'high emission of soot and particulate matter' (p.4) as a health hazard associated with the use of contaminated kerosene in Nigerian households. It should be noted however that this assertion is not supported by the conclusions of wider studies in the field of stove development, such as those carried out for the World Health Organisation by Mehta and Shahpar (2004) and Smith and Mehta (2000) in which kerosene is classified as a 'clean fuel' along with electricity and gas, as opposed to 'dirty' biomass fuels that are responsible for the bulk of global exposure to indoor air pollution. This implies that the targeted problem of indoor air pollution applies more to solid biomass users than to kerosene users, and so improved stove interventions such as the CleanCook that seek to address the issue can potentially make a greater impact on the former group than on the latter.

CASL's kerosene-replacement campaign gained momentum particularly following the federal government's announcement of its plans to completely deregulate the oil and gas sector in the last quarter of 2009 (q.v. Onwuka 2009). Implementing a deregulation policy would mean government discontinuing the subsidy it currently gives on kerosene, and so users would have to begin paying at least twice as much for the fuel (ibid.). Amidst the heat of public protest against the proposed deregulation move, CASL presented the Cassakero initiative as a timely solution to the looming household energy crisis for which citizens would pay well below the deregulated price of kerosene.

Indeed, the Cassakero project has articulated a medium-term plan to displace 60 percent of the kerosene used in Nigerian homes with ethanol

by 2013, because the implementers claim their studies have revealed that 'that is what Nigeria needs' (Project Gaia Nigeria Staff 1). It is clear from this objective that the Cassakero project has gone off at a tangent to the CleanCook, and can even be said to have evolved into a different project altogether.

CASL, in operating the type of 'conventional business partnership' model described by Reed and Reed (2009), takes an expert-led approach to coordinating the Cassakero project. The organisation acts as the sole link between the hundreds of small businesses involved in the project and the technical and financial resources essential to its implementation. In its performance of this intermediary role, CASL does not prioritise engagement of these and other stakeholders in decision making and 'corporate-community involvement governance' (Muthuri et al. 2009) processes. This was evident in the proceedings of a multi-stakeholder meeting convened during the fieldwork period, in which there was little provision for incorporating the knowledge and experience of the small-scale farmers and ethanol micro-distillery operators who are expected to be most directly involved in implementation.

Here, as in Muthuri et al.'s (2009) account of community participation in a corporate-led development initiative among the Maasai tribe in Kenya, questions arise as to the extent to which a business actor can reasonably be expected to make its decision-making processes open to public scrutiny and participation. According to Carson (2009), public participation in corporate decision making is likely to engender a greater sense of ownership of the project within the community, which is in turn likely to enhance project sustainability (Padawangi 2010). This throws open a wider

question – examined in some detail in Chapter 6 of this thesis - of how effective the kind of top-down corporate strategy favoured by CASL can be in achieving the end of poverty alleviation among the most vulnerable populations. The following sub-section proceeds to examine the technical details of the implementation strategy mapped out by CASL for the Cassakero project in Nigeria.

4.3.2 *The Cassakero Strategy: A Blueprint for Technology Transfer*

As at October 2009 when fieldwork for this research was carried out, the Cassakero project was in its advanced planning stages, with ethanol production scheduled to commence in a few distillation plants across the country before the end of the year. However, at the time of writing in May 2010, implementation of the project is yet to commence, signifying that the project is several months behind schedule. This section highlights pertinent aspects of the project plan as it was presented in October 2009.

In a briefing summary of the Cassakero project prepared by CASL, it is stated that the stoves will be imported from 'a partner factory in Ethiopia and Dometic in Sweden' (CASL 2009, p.2) for the first year of the project. Considering that Dometic has insisted on retaining sole production rights to the fuel canister - 'the technology behind the stove' (Project Gaia Nigeria Staff 2) – to ensure quality control, 'partner factories' such as the one in Ethiopia are only stove assembly plants where ready-made fuel canisters imported from Dometic factories are inserted into locally-produced metal cladding units. CASL and Project Gaia have stated their intention to have the stoves produced in Nigeria in the medium to long term, but again, that would only apply to the outer metal cladding. This is a significant point, because Dometic making the stove available in

developing countries without granting access to the core component that makes it work amounts to the organisation facilitating a process of technology transfer exclusive of the element of innovation. Indeed, Dometic's possession of the patent on the fuel canister contravenes the claims of appropriate technology made by Project Gaia for the CleanCook stove and fuel. The arrangement here instead exemplifies the technology transfer model described by Chambers and Ghildyal (1985) in which technical knowledge is concentrated in a well-informed 'core' or centre that generates technology which is then spread or transferred to the peripheries over time.

Similarly, the ethanol micro-distilleries are to be imported from Brazil, the 'owners of the technology' (Project Gaia Nigeria Staff 2):

'[The micro-distilleries] are modular plants, already fabricated. We're just bringing them to install. They're already assembled. We'll bring them in containers and deploy them. It takes only two weeks to manufacture.' (Interview CASL Staff 1)

Clearly, CASL seeks to employ an 'externalist' approach (Nye 2006) to dissemination, which assumes that technology is transferable from one location to another regardless of innovation context, and that processes and systems of invention are immaterial to the successful adaptation of a technological system to any given context. In non-industrialised countries like Nigeria where science and technology innovation capacity is weak (Commission for Africa 2005, Hassan 2008), there appears to be a widespread inclination to function within this sort of externalist paradigm, with little consideration for the impact that such an approach might have on the self-sustainability of technology-led projects. Chapter 6 dwells

extensively on the implications that the adoption of this paradigm may have in the particular case of the Cassakero project.

For the time being, CASL expects the 'roll-out' of the CleanCook technology in Nigeria to be quick and hitch-free, with new micro-distilleries and stoves being added to the network 'every week, every month' (CASL Staff 1). The plan is to implement the project in phases over a four-year period. In the first year, it is expected that 1,000 ethanol micro-distilleries will commence operations. This will be followed by an additional 3,000 micro-distilleries every year for the duration of the project, for a total of 10,000 micro-distilleries at the end of four years. Each micro-distillery is expected to produce ethanol for 400 stoves, so that by the end of the first year, a total of 400,000 households would have been served by the Cassakero network. Considering the substantial sum of the domestic energy requirements of the 14 million households in Nigeria (Offiong 2003), this is a small start indeed. CASL has however pointed out that 'initial introduction... is not for everybody' (CASL Staff 1), and moreover, access to the Cassakero intervention would have been significantly improved by the end of the 4-year project period when a total of 4 million stoves would have been introduced into the market.

In the earlier pilot studies conducted by Project Gaia, it was established that an average-sized family comprising two adults and two children required 1 litre of methanol fuel per day for cooking. Based on these calculations, the ultimate target of the Cassakero project is to build sufficient technological capacity to consistently generate enough ethanol to satisfy a considerable portion of household energy demand:

'We want to build a national dedicated production capacity with a dedicated output of 4 million litres per day. This will translate to about 1.4 billion litres of ethanol per year, dedicated for use as household fuel to replace kerosene for cooking, for lighting, for heating - and other household uses.' (Interview CASL Staff 1)

The above statement reminds us of CASL's deliberate framing of the Cassakero initiative as a viable alternative for kerosene users, with the effect of excluding households that cook using the mostly 'dirty' biomass fuels below kerosene on the energy ladder.

While the Cassakero project is the first initiative in Nigeria to direct ethanol for use in the household energy sector, the fuel already has a variety of established end uses in the manufacturing and transport sectors. In 2007, the federal government enacted a national biofuels policy with the objective to 'firmly establish a thriving fuel ethanol industry utilizing agricultural products as a means of improving the quality of automotive fossil-based fuels in Nigeria' (NNPC 2007, p.7). The biofuels policy aims to provide an enabling environment for the national E10 programme under which ethanol is blended with petrol at a ratio of 10%:90% by volume for use in automobiles (Dayo 2008). The E10 programme makes provision for a 'seeding' phase during which the government will import all the ethanol needed from other countries, primarily Brazil (Ohimain 2010), but anticipates that the country would have developed sufficient local capacity to fully satisfy its ethanol requirements by 2020 (NNPC 2007). A recent survey of bioethanol projects that have emerged locally following the enactment of the biofuels policy identifies a total of twenty public and private initiatives in their conception, planning, construction or operational phases (Ohimain 2010). It is interesting to observe that, even though household demand for

ethanol as a replacement for kerosene is nearly thrice the demand for blending it with petrol (ibid.), the focus of the emerging initiatives is disproportionately on producing for the transport sector, and the Cassakero is the only project that is explicitly targeted at the household sector. This trend in practice mirrors the emphasis of the biofuels policy on the transport sector, and raises questions about the level of policy support available for domestic ethanol production.

As pointed out earlier in the example of Brazil, ethanol produced for use in the commercial and industrial sectors tends to be priced out of the reach of domestic users. In Nigeria, industrial ethanol prices are currently several times higher than the recommended retail price of ethanol that will be produced for household use under the Cassakero scheme. CASL has identified a 'temptation' for ethanol micro-distillery owners to sell their produce to these 'more lucrative' markets: selling to the household sector would yield a 50 percent profit margin, while selling to the alcoholic beverage industry, for example, could yield profit margins of up to 1,000 percent (CASL Staff 1).

In light of the goal of the Cassakero project to keep the retail price of its ethanol competitive with kerosene - and much lower if the government's deregulation policy is eventually effected - CASL has devised what it calls a 'loyalty platform', a fail-safe price regulation strategy to discourage diversion of household ethanol to other markets. Ethanol micro-distillery owners will be required to honour the terms of a contract stipulating the maximum percentage profit allowed, failing which CASL withdraws the technical and financial support crucial to the survival of those relatively small businesses:

'Within the first 4 years, we have iron-clad control. Because [micro-distilleries] are going to depend on us for many things, without which their plants will shut down. In releasing the money for the loan, we don't release it 100 percent, we release it according to milestones. So if you don't comply, we find a way of shutting down your business. And we're tightly controlling the feedstock, which is the most critical success factor because it [accounts for] more than 85 percent of the total cost of production. So we believe that within the first 4 years, compliance will be fairly high. With that, the price will be below the price of kerosene.' (Interview CASL Staff 1)

This situation, apparently advantageous for CASL, is much less so for the small business owners who, owing to the top-down design of the project, do not have much influence over its implementation. CASL nonetheless insists that it has adopted this strategy of absolute control for the good of the project and the country at large.

The implementers' great expectations of the Cassakero project are articulated in the claims that have been made in public forums regarding the revolutionary impact that the project will have on the country's energy sector. According to Acha (2009), not only does CASL expect the project to empower individuals economically by offering them investment opportunities; it also expects that it will rectify 'all the errors of the oil industry' by providing a cheaper and more widely available alternative to crude oil. This rather bold statement of CASL's expectations indicates that the project is expected to go beyond improving material aspects of citizens' existence to address the issues of injustice and inefficiency that have long attended oil drilling and distribution activities in the country.

The main beneficiaries of the Cassakero initiative, CASL stresses, will be rural farmers. The project plans to employ a total of 550,000 farmers on contract basis to supply raw cassava to all 10,000 ethanol micro-

distilleries over the 4-year duration of the project. According to CASL, participation in the project will transform this hitherto marginalised and exploited group of local farmers into 'champions and oil merchants' (Acha 2009). It is even anticipated that the financial rewards to farmers will be of sufficient magnitude to instigate a reversal of the rural-urban migration trend in the country (ibid.).

The Cassakero plan according to CASL seemingly reads like a sure recipe for improved energy supply, unmitigated economic prosperity and social justice for local citizens. However, critical examination of the plan brings to light potential points of conflict, the most significant of which are identified in the following sub-section discussing the cassava cultivation component of the programme.

4.3.3 The Cassakero Agricultural Plan: Opportunities and Challenges

So far, this section has focused on detailing the technical and business arrangements made by CASL to facilitate the ethanol manufacturing and distribution component of the Cassakero programme. The section now turns to examine the details of the agricultural component, drawing attention to some of the limitations that may be encountered in spite of the revolutionary promise held out by the technological and economic provisions of the programme.

The agricultural component of the Cassakero project is of utmost centrality to the viability of the entire programme, as it is the source of the feedstock required for ethanol production. To ensure uninterrupted feedstock supply, CASL's contract farmers are expected to cultivate

cassava on plots of land dedicated to cassava-for-ethanol production.

According to CASL, cassava was the crop of choice for 'good reason':

'All cassava can be grown on marginal land. Nigeria has too much unused arable land and marginal land. There is wasteland! Land that is not used for anything. So what we're talking about is incremental land. New lands and new production not used for food.' (Interview CASL Staff 1)

The central point alluded to by CASL here is that there is enough land in Nigeria that the Cassakero project plan to dedicate some of the available land to non-food production poses no threat whatsoever to food production. There are two assumptions implicit in this position: first, that all available land anywhere in the country can be acquired for commercial use (thus ignoring the complexities of traditional land tenure systems); and second, that land availability is the only factor to be considered in estimating the potential for food shortage.

Irrespective of land availability, the status of cassava as a staple food crop in Nigeria raises the possibility of a food vs. fuel conflict in a country where 30 percent of the population of children is underweight due to poverty and hunger (Handley et al. 2009). To mitigate the risk of conflict, CASL has announced plans to collaborate with the International Institute of Tropical Agriculture (IITA), an international research centre located in Ibadan, Nigeria, to develop non-edible high-yielding varieties of cassava which will be dedicated to ethanol production. This way, it is expected that the market for edible cassava will not be adversely affected by the cassava-to-ethanol programme. Chapter 6 looks at the effectiveness of these apparently rational measures when they are implemented in the particular social and cultural contexts of local communities.

With the aid of the soft loans to be administered by CASL, it is expected that contract farmers will upgrade their farm practices in the time it takes to set up the project. The programme, labelled the Mechanized Agric Small-scale Credit Investment Scheme, requires the average cassava farmer to scale up their farm size by about 75 percent. The aim is to enable farmers to increase overall cassava productivity by employing efficient farm practices and modern agricultural equipment in cultivating the high-yielding cassava varieties developed by the IITA. The assumption here is that local farmers will easily set aside their own priorities, perspectives and resources in favour of those prescribed by the project. Overall, CASL has expressed confidence that, with the kind of scientific and technical know-how at the disposal of the Cassakero project, problems related to low farm productivity and food shortage can be quite expertly sidestepped on the journey to economic growth and prosperity.

Nigeria's recent experiences on the Pan-African Cassava Initiative (PACI) initiated by the New Partnership for Africa's Development (NEPAD) however belie the unproblematic supposition that technology-enhanced productivity will address all the development challenges faced by people in non-industrialised countries. A brief review of the objectives and outcomes of the PACI will be relevant at this point because it is the framework within which the Cassakero ethanol production plan was birthed.

NEPAD is an integrated and comprehensive socio-economic development programme which was initiated in 2001 by African heads of state with the overarching objectives of 'eradicating poverty, promoting sustainable development and arresting the marginalisation of Africa under globalisation' (NEPAD official website). The NEPAD framework recognises

that hunger is one of the biggest challenges facing the continent: in contrast to the Millennium Development Goal of halving hunger and poverty by 2015, it is expected that the number of undernourished people in sub-Saharan Africa will increase from 180 million in 1995 to 184 million by 2015 (NEPAD 2004). For NEPAD, the situation is particularly paradoxical given that 80 percent of the continent's population is directly or indirectly dependent on agriculture for their livelihood (ibid.). The NEPAD framework was launched on the premise that Africa's agricultural sector, with appropriate financial, institutional and technical oversight, can potentially play an enormous role not only in eradicating hunger amongst entire populations but also in driving economic growth on the continent. The framework thus envisions an agricultural pathway to development that will simultaneously reduce food insecurity and poverty and elevate the continent's economic status by expanding its export opportunities (FAO, n.d.).

In 2003, NEPAD identified cassava as an important food security crop for Africa because of its ability to thrive even in hostile climatic and soil conditions (NEPAD 2004). By this time, cassava was already being widely grown by a large number of smallholders across several ecological zones in Africa. However, NEPAD envisioned an even more productive role for cassava in Africa's economy, and launched the Pan-African Cassava Initiative (PACI) in partnership with the International Institute of Tropical Agriculture (IITA) 'to maximise the potential and opportunities of Africa's key food crop' (ibid.). NEPAD, with its focus on economic growth, recommended that the PACI be based on a strategy which emphasises better markets and better organisation of private sector actors to ensure financial sustainability of the initiative (FAO, n.d.). Thus the PACI sought

to promote cassava production for industrial use, effectively seeking to transform cassava from a food crop into a cash crop:

'Cassava in sub-Saharan Africa is a major or *the* most important food security crop. But we know that cassava can play a role greater than food security. So under [the PACI], we want to quickly get past the role of cassava as a food security crop that produces surplus, far above food requirements and create a commercial surplus that will target industrial utilisation. There are over 1,000 value-added products that can be produced from cassava. So there are over 1,000 different industries that you can set up. So cassava can play a major role in industrialising Africa, just like wheat, potato, soya beans, maize, played in the Agro-Industrial Revolution of Europe and America in the late 17th and 18th century all the way to the 19th century. Cassava can be what maize and the other crops were to Europe to Africa. So the essential role of NEPAD is to be able to create the policy framework, to be able to provide the advocacy and to be able to provide support to the private sector to make this happen.' (Interview CASL Staff 1)

Implicit in the strategy articulated by the Pan-African Cassava Initiative is the rationale that, by inducing economic growth through industrialisation and trade, the problem of poverty will be overcome and the resultant increase in individual incomes will guarantee food security for everyone. Past experience however indicates that the Initiative has not necessarily opened the financial floodgates for local farmers, nor has it eliminated the threat of food scarcity to local populations. The IITA, NEPAD's research partner on the Initiative, notes that cassava's overall potential for poverty reduction in sub-Saharan Africa has not been fully realised partly because resource-poor farmers continue to face several limitations such as poor market access and recurrent seasonal production glut (IITA 2009). At the level of the marketplace, prices of cassava-based food items rose astronomically at the start of the PACI's cassava export programme in

Nigeria, rendering the various derivatives of the staple crop prohibitive for many citizens (Nwoji 2005).

Evaluating the Cassakero project in light of the Pan-African Cassava Initiative framework helps to contextualise the former's stated commitment to the economic empowerment of local cassava farmers and small businesses. In harnessing cassava for local production of ethanol, the Cassakero project aims to break new ground in the PACI's overall strategy to industrialise what the Consultative Group on International Agricultural Research (CGIAR) has labelled 'the breakout crop of the 21st century' (CGIAR 2007). The CGIAR has expressed optimism that cassava's burgeoning relevance as a bioenergy crop is poised to elevate its status as an industrial raw material which will open multiple opportunities locally (ibid.).

Given that the PACI framework provided the policy foundation for the agricultural component of the Cassakero project, it is perhaps not surprising to note that the project strategy reflects the assumptions of the framework. Underlying both initiatives is the uncritical tendency to narrow the means and ends of development to the twin indices of technological progress and economic growth. Chapter 6 will further examine the degree of correlation between these macro-level processes and the 'social freedoms' (Sen 1999) that local citizens tend to value in their lived realities.

Conclusion

This chapter has discussed the objectives of Project Gaia, a non-governmental organisation with origins in the global North, in introducing

the CleanCook stove-and-fuel technology to developing country markets. The explicit aim of the CleanCook project at inception was to offer a permanent, modern technological solution to the environmental and health problems associated with the widespread use of solid biomass fuels, particularly amongst populations identified as being simultaneously resource-rich and energy-poor. Originally developed for niche markets in industrialised countries, the CleanCook technology has undergone modifications in factories removed from developing country contexts to better adapt it to the economic specifications of energy-poor households in those contexts. On the basis of this seemingly context-responsive approach to North-South technology transfer, the CleanCook has been labelled appropriate technology by its implementers.

Empirical research carried out on the CleanCook project in Nigeria however revealed that Project Gaia's interpretation of context-responsiveness, with its emphasis on technological and cost efficiency, only partially reflects a consideration for appropriate technology principles which do not only pay attention to technical project requirements, but also advocate the engagement of local citizens in addressing the non-technical aspects of local networks required to successfully operate the technology. Project Gaia's strategy for engaging with the Nigerian context was seen to envisage various roles for civil society and public sector actors in planning and implementing the CleanCook pilot project while restricting the participation of local citizens in those processes. The limitations of this non-participation strategy were apparent in the outsider organisation's inability to successfully navigate the social and political complexities of the Niger delta to realise the project's initial plans for centralised gas-to-methanol production in the region. Notwithstanding Project Gaia's

attempts at context-responsiveness therefore, the strategy adopted on the CleanCook project was found to be consistent with an expert-led implementation approach that has not sufficiently engaged with the realities of the local context.

Project Gaia's alternative plan for local cassava-to-ethanol production, branded the Cassakero project, similarly engages a strategy which excludes local citizens from planning processes. The takeover of implementation by Cassava Agro-Industries Services Limited, a private sector actor, precipitated a shift in objective of the market-based Cassakero plan towards catering primarily to the energy needs of kerosene users who are higher up the income pyramid and energy ladder than the original target group of solid biomass users. However, despite the divergence of the local Cassakero plan from the original CleanCook plan in terms of implementation strategy and objectives, the former was seen to also derive from an expert-led policy framework which emphasises technological and market efficiency as the key drivers of social change in developing country contexts.

Chapter 5: Stove Development as Context-responsive Intervention in Kenya

'The reliance on solid fuels is so pervasive, it's not going to stop. Not in a hurry. Even where there is gross fuel scarcity... It's not like a motor vehicle recall. 5,000 vehicles have had an incident with their cigarette lighters, we'll call them back, replace that, problem solved. No, it's not like that.' (Interview Practical Action East Africa Staff 2)

In the preceding chapter discussing Project Gaia's implementation of the CleanCook project in Nigeria, the outsider organisation's novel stove-and-fuel technology was seen as presenting a radical solution to the widespread incidence of energy poverty in developing countries. This chapter discusses the stove programme implemented in Kenya by Practical Action, another international non-governmental organisation, to address the same issues associated with solid biomass use that were originally targeted by Project Gaia in Nigeria. However, as indicated in the above interview excerpt, Practical Action articulates a starting point for its intervention in Kenya that is opposed to Project Gaia's radical prescription for a permanent technical fix to the perennial problem of solid biomass use in the South. Practical Action's emphasis on starting from the *existing* skills, experiences and resources of local citizens assumes a participatory approach to developing appropriate technological solutions for poor populations. This chapter examines the values that have contributed to shaping Practical Action's particular outlook, and looks at how the organisation's outlook has in turn shaped the implementation of its stove programme in Kenya. Further, the chapter evaluates the organisation's stated values and objectives against empirical data gathered from project communities to determine the extent to which they have been borne out in reality in those contexts.

The chapter is divided into four main sections. The first section examines the philosophical underpinnings of Practical Action's operating strategy and discusses how these foundational values inform the organisation's approach to project implementation. The second section gives an overview of the organisation's improved stove programme in Kenya from the 1980s to date. The third section sets Practical Action's stove programme in context by highlighting the social, cultural and economic realities of local citizens in the two communities where empirical research was conducted. The aim is to provide a background for the fourth section, which evaluates how the objective of smoke alleviation stated by Practical Action relates to the priorities of citizens in those communities. This evaluation facilitates observation of the interactions between the 'immanent' priorities dictated by citizens' lived realities and the 'intentional' ones (cf. Cowen and Shenton 1996) introduced by external interventions, and sheds light on the enduring tensions between the two.

Primary data employed in the discussion were obtained from interview sessions with members of Practical Action staff and local citizens in West Kochieng and Kasewe locations, as well as from a one-week participant observation session conducted in Kasewe location. Secondary data were obtained from relevant project documents published by Practical Action.

5.1. Practical Action: The Philosophy of Intermediate Technology

In 1973 – just over two decades into the modern development era – German-British economist Ernst Schumacher published what was at the time a set of revolutionary ideas in a volume titled *Small is Beautiful*. As highlighted earlier in Chapters 1 and 2, the conventional wisdom of the era was that 'underdeveloped' countries of the South could achieve progress

by adopting those technological and economic platforms credited with engendering development in industrialised countries of the North. A prominent example of the implementation of this conventional development model can be seen in the Green Revolution of the late 1960s and early 1970s, during which modern agricultural practices and equipment were employed to solve problems of food shortage in Africa and Asia, with inequitable outcomes for rich and poor farmers (Chambers and Ghildyal 1985). The ideas presented by Schumacher in *Small is Beautiful* challenged commonly-held notions of large-scale industry and 'big' economics, ultimately proposing decentralised forms of production and commerce as a more viable route to achieving development that is sustainable for the planet, for the resources in it, and for humankind in general.

Schumacher questioned the tendency in the global North to measure progress, whether of industrial or non-industrialised countries, in purely economic terms. *Small is Beautiful* proposed that productivity could be qualitatively, as opposed to quantitatively, increased by the application of alternative, *intermediate* technologies in developing countries. Schumacher considered this especially relevant in light of the 'economic boundaries and limitations of poverty' (Schumacher 1993, p.157) in developing countries which necessarily prevented them from being able to effectively adopt and maintain the high-end technologies employed in rich industrialised countries:

'The system of *mass production*, based on sophisticated, highly capital-intensive, high energy-input dependent, and human labour-saving technology, presupposes that you are already rich... The technology of *production by the masses*, making use of the best of modern knowledge and experience, is conducive to decentralisation,

compatible with the laws of ecology, gentle in its use of scarce resources... I have named it *intermediate technology* to signify that it is vastly superior to the primitive technology of bygone ages but at the same time much simpler, cheaper, and freer than the super-technology of the rich.' (Schumacher 1993, pp. 126-7)

Schumacher was, in other words, advocating the development and dissemination of technology that the poor in so-called developing countries could afford to purchase and maintain with the material resource and knowledge base already available to them, rather than struggle to attain the unsustainable production and consumption standards set by rich countries. In any case, Schumacher argued, intermediate technology was bound to be much more appropriate to Southern contexts:

'The intermediate technology would also fit much more smoothly into the relatively unsophisticated environment in which it is to be utilised... It is wrong to assume that the most sophisticated equipment, transplanted into an unsophisticated environment, will be regularly worked at full capacity.' (Schumacher 1993, p.149, 151)

The kind of intermediate technology proposed by Schumacher had to possess the following characteristics if it was to be considered appropriate: production must be labour-intensive rather than capital-intensive and carried out in small-scale rather than large-scale establishments; and the product must be fairly simple to understand, suitable for local maintenance and repair, and cheaply available. Crucially for Schumacher, it must be technology 'to which everybody can gain admittance and which is not reserved to those already rich and powerful' (Schumacher 1993, p.123).

An economist, Schumacher proposed the notion of intermediate technology primarily as a solution to what he viewed as the twin socio-economic problems in developing countries of mass unemployment and

mass migration from rural to urban areas. In Schumacher's view, these problems had been exacerbated, rather than mitigated, by the widespread quest of developing countries to pattern their 'modern sectors' after the macro-industrial and commercial growth model appropriated by developed countries. A more localised approach based on the application of intermediate technology could stimulate the creation of many new local workplaces in the poverty-stricken 'non-modern sectors' of these countries, providing a springboard for economic development outside of the towns and cities. It can thus be surmised that Schumacher was not only making a case for the development of intermediate technology, but also for the nurturing of *intermediate marketplaces* in which the poor could participate more actively.

Based on the principles published in *Small is Beautiful*, Schumacher had earlier set up (in 1966) the Intermediate Technology Development Group (ITDG), a United Kingdom-based organisation that took on the task of advising bilateral and multilateral development agencies – some of which had started becoming interested in the Group's revolutionary ideas of development and economics - on the development and use of technology that was appropriate to the developing country contexts they were working in. In the years that followed, ITDG expanded from performing a purely advisory function to engaging directly with local communities in developing countries, but it was still primarily concerned with providing technical assistance in those countries (Schumacher 1993). This primary focus on technology started to broaden - especially in the years following Schumacher's death in 1977 - to include social, economic and even political aspects of development. In its use of technology as a tool to challenge poverty, the organisation states a long-standing preference for a

bottom-up approach which builds solutions around local citizens, not around the technology. This approach, based on the premise that 'technology is only half the story' (ITDG 2001), seeks to not only develop and implement appropriate technological interventions, but also to impact on livelihoods and enhance the economic empowerment of marginalised people in local communities. The organisation changed its name from ITDG to Practical Action in 2005 (Bates 2005).

Practical Action has now achieved the status of an international non-governmental organisation, with regional offices in East Africa (this office is hereafter referred to as PA-EA in specific references), Asia, South America, Southern Africa, and field operations in Kenya, Sudan, Zimbabwe, Sri Lanka, Nepal, Bangladesh and Peru (PA-EA Staff 1). The head office remains in the United Kingdom, where an International Director oversees the various Country Programmes implemented in the areas of energy, water, sanitation, agriculture, disaster mitigation, climate change, shelter, transport, and information and communication technologies. All of these activities are organised around four specific international programmes or 'aims' as follows: reducing vulnerability (Aim 1); making markets work for poor people (Aim 2); improving access to basic services (Aim 3); and responding to new technologies (Aim 4). Aim 2, 'making markets work for poor people', embodies Schumacher's vision for economic empowerment of the poor in non-modern societies, and is usually woven into projects whose main objectives fall under any of the other aims. Practical Action's improved stove programme in Kenya, an 'Aim 3' initiative described in detail in later sections, illustrates how this integration of aims might work in practice.

Decisions regarding the content and implementation of country programmes are jointly influenced by staff in the head office and respective country offices:

'Agenda setting is both national and international. At the international level, we're looking at what the global agenda trends are like, and at the local/national level, we're looking at how local situations can develop local flavours for what is happening at the global level. For example, something like carbon funding. It's something that's very global, but how do you set up things to move in that regard at the local level? It would be up to us to look at what opportunities exist, define what will happen or not happen, set up scenarios and give the geographical situations or locations, identify geographical locations where that would happen. So I would say it's not in any one place fixed.' (Interview PA-EA Staff 2)

The statement above suggests that the range of development interventions proposed by Practical Action in its various country programmes is shaped by the interaction between global directions and local specifications. According to PA-EA Staff 1, particular interventions are implemented based on the expressed priorities of national governments in locations shown by national statistics to be most in need of those interventions. When a potential project location has been identified, the organisation makes clear that it does not initiate implementation without first going through a rigorous process of engagement with the community involved:

'And having selected that area, you engage the people and say look, under this characteristic like, say, energy, what are your challenges? What are the problems? What are the things that you might say you want to address? How would you like to address it? Based on the discussions with the communities, then we go out and write it down, and then bring it back and say, is this what we agreed? Is this what you thought? Have we written the right thing? Have we missed anything out? And then we pass it on to our respective donor. And once we're funded, then we go back and say, remember, 18 months

ago, we were talking about this? Then we start to implement. We never sit here, think of a project idea and then think, where can we implement this? We always think about the people...' (Interview PA-EA Staff 1)

To further demonstrate its commitment to a people-centred approach, Practical Action states its determination to facilitate representativeness and equity in processes of citizen engagement by working with 'sub-units' within communities rather than approaching the community as a homogenous unit:

'Like in Nakuru, we have 3 locations we're working in that are quite large. But we zero in to a group of households, maybe 10. And another group, and another group. That way, you bring the benefits, the discussions, the engagement a little closer to the people. The umbrella community helps coordinate those. So we don't say to them, what do you think we should do? We say, 'can we get to smaller units?' And that distributes the messages, the benefits, the discussions, the engagement much better than when you work with one umbrella unit.' (Interview PA-EA Staff 1)

The above claims to context-responsiveness made by Practical Action are of tremendous significance in light of the aims of this research. Working with empirical data gathered in the course of fieldwork, this thesis will evaluate the organisation's claims in order to determine how they have manifested in the particular case of its improved stove programme in Kenya.

Practical Action views its work in local communities as 'ongoing programmes of work' (PA-EA Staff 2) rather than as individual projects, for the stated reason that the organisation finds it impractical to initiate isolated projects that will not require any form of follow-up or subsequent upgrade. The preferred strategy is thus to implement a series of interventions in a country or region, where each successive intervention

builds on and improves upon previous ones. This approach allows Practical Action's projects to maintain a 'work in progress' status at any point in time, work which in a future phase will naturally progress to 'another level' (PA-EA Staff 2):

'It's difficult to get a piece of work that is standalone, where you propose the activity, and then in 3, 4 years, you're done with it, and there's nothing more to add to that, no. That's very difficult, because we're a development organisation. So there is always something, that element of progression that requires us to maintain a relationship with a funder who is interested in the same kind of progress.' (Interview PA-EA Staff 2)

The above statement implies that Practical Action finds it important to maintain programmes of work in order to establish a record against which donor organisations can measure the impact demonstrated in every phase against their current priorities, and make informed decisions to either continue funding a particular programme or withdraw support. Ultimately, therefore, Practical Action's stated commitment to context-responsiveness is set within a broader, global-level framework, the implications of which are explored in greater detail in the next chapter. The analysis of the implementation of Practical Action East Africa's improved stove programme in Kenya presented in the rest of this chapter and the next illustrates the path taken by the organisation in negotiating the complexities of the local-global terrain within which it operates.

5.2. The Practical Action Stove Programme in Kenya

This section examines the content and objectives of Practical Action's improved stove programme in Kenya which began in the second, context-responsive phase of international stove development described in Chapter 2. The examination reveals a shift in the main issues addressed by

Practical Action from the 1980s to date that is consistent with the wider trends identified in the field of stove development. First though, to set the discussion in context, the next sub-section briefly considers the field of stove development in Kenya as it was constituted by other local and international actors prior to Practical Action's arrival on the scene.

5.2.1 *Stove Development in the Kenyan Context*

Efforts to develop improved biomass stoves in Kenya date back to the late 1970s, when government and non-governmental institutions were searching for solutions to what they identified at the time to be an urban energy crisis (Hyman 1987). The traditional charcoal *jiko* - Swahili for 'stove' - used by the majority of urban dwellers consumed a lot of charcoal, delivering only 10-20 percent of the heat generated to the pot (Kammen 1995). As a result, urban households frequently spent a significant portion of their incomes on the purchase of cooking fuel (ibid.). Research and development efforts between 1977 and 1980 produced several 'improved' charcoal stove models which only had very minor improvements over the traditional stoves and were not popular amongst target populations (Hyman 1987). The breakthrough in urban stove development came in the early 1980s when the Kenya Renewable Energy Development Project (KREDP) was initiated by the Kenyan Ministry of Energy. The project was facilitated by Kenya Energy and Environment Organisation, a local non-governmental organisation, and funded by the United States Agency for International Development. The KREDP embarked on a long, continuous process of stove design and testing from 1981 until 1984, when a satisfactory solution was finally found in the improved Kenya Ceramic Jiko (KCJ) (Kammen 1995). The KCJ subsequently achieved such widespread diffusion that, a decade after its

introduction on the market, more than half of all urban households in Kenya were found to have substituted it for the traditional charcoal *jiko* (ibid.).

The KCJ revolution experienced in urban Kenya, however, did not extend to the majority of rural and peri-urban households in the country that only participate marginally in the market economy and rely mainly on fuelwood and other non-commercial biomass fuels for cooking. Stove development efforts specifically targeted at this population began in 1983 in western Kenya with the Women and Energy project again initiated by the Kenyan Ministry of Energy and facilitated by the German Agency for Technical Cooperation (GTZ) (Blum 1990). Working with the *Maendeleo ya Wanawake* (Women in Development) women's group, project staff developed a less expensive wood-burning variant of the KCJ and named it the *Maendeleo* stove, after the women's group. The discussion provided in section 5.2.3 below will afford deeper insight into the relevance of women's groups to rural stove development efforts in Kenya.

At a cost of about US\$ 1.50, the Maendeleo was the cheapest available improved stove on the Kenyan market, saving 30-50 percent of the fuelwood used in traditional stoves (Blum 1990). The stove basically consisted of a clay liner (similar to the one used in the KCJ) inserted into a fixed mud surround and held in place by sticky soil, stones or any other suitable material locally available to the user. The attraction of the Maendeleo lay in its simple, easily transferable and locally available technology. The main technical component of the stove – the clay liner – was quite easily produced by the existing pottery industry which is traditionally dominated by women in western and central Kenya (Overseas

Development Institute, n.d.). Notwithstanding the enabling environment, the Maendeleo failed to achieve widespread dissemination amongst fuelwood users in Kenya. Even at very low prices, the cost of a Maendeleo stove was still significant relative to average incomes particularly within the mostly rural households at which the technology was targeted (ibid.).

Under the GTZ-facilitated Women and Energy project, a number of support strategies and subsidies were introduced in an effort to improve the rate of Maendeleo dissemination. According to Khennas (2003), this subsidy approach yielded largely negative results: it shielded the stove producers and users from actual market conditions, compromised the sustainability of the Maendeleo enterprise after the project wound up in 1994, and even inhibited later efforts to develop a commercial model for dissemination. Prominent among such efforts is the work done by Practical Action, described in the rest of this section, to establish a market-based dissemination model for the Maendeleo and other improved cooking technologies in rural Kenya.

5.2.2 Practical Action: 'Technology is only Half the Story'

Practical Action's improved stove programme in Kenya is a component of its international energy programme, which is mainly concerned with facilitating provision of appropriate, affordable and accessible renewable energy technologies in poor communities (ITDG 2001). Small-scale energy technologies that have been developed and promoted via various country programmes include solar lanterns, wind turbines, biogas plants, micro-hydro systems and improved cooking technologies. In Kenya, the energy programme has concentrated mainly on promoting the use of improved cooking technologies amongst poor populations. Under the programme,

Practical Action works with local citizens, mostly using locally sourced materials and equipment, to devise technologies that enable more effective and efficient use of biomass for cooking. The organisation expresses this preference for a bottom-up approach to addressing the phenomenon of traditional biomass use based on a perceived need to start from where local citizens are, essentially operating within what Schumacher (1993) termed the 'limitations of poverty' among poor populations. This premise is in direct contrast with Project Gaia's rationale for implementing the CleanCook project, described in Chapter 4, which sees a departure from local citizens' established way of life as the most appropriate solution to the energy poverty situation in developing countries.

Since its inception in 1986, Practical Action's stove programme has focused mainly on rural and peri-urban communities in the western region of the country (hereafter referred to as western Kenya); areas which, according to national statistics, have some of the highest poverty indices in the country (PA-EA Staff 1). The strategy for the improved stove programme is based on the 'technology is only half the story' principle which holds that technology development alone is not sufficient to address the substantial scale of need existing in energy-poor communities; non-technical processes which complement the technology and facilitate the development of local industries around it also need to be established. In Practical Action's view, these non-technical elements – such as access to finance and training in entrepreneurial and management skills – are essential to the establishment of locally sustainable markets for technological products (ITDG 2001). 'Sustainable' here refers to not just environmental sustainability, but also, and especially, to financial

sustainability. Under the improved stove programme, subsidies are viewed as a disincentive to development, and therefore Practical Action's aim is to facilitate the establishment of local stove enterprises that will ultimately operate free of financial support from the programme.

As previously alluded to, the organisation runs its stove programme in Kenya as a component of Aim 3: 'improving access to basic services'. From its inception however, the programme has incorporated the goal of empowering women in project communities economically and socially. For this reason, women's groups have historically served as the main points of entry into those communities. To facilitate understanding of the significance of Practical Action's seeming predilection towards a particular group of citizens, it is necessary to consider the status of women and women's groups in the communities targeted by the stove programme. Empirical data generated from individual and group interviews conducted over a four-week period with local women in West Kochieng and Kasewe locations provide insight into the constitution of gender relations in those societies, and form the basis of the discussion in the following sub-section.

5.2.3 A Focus on Women in Society

In West Kochieng and Kasewe, women are culturally assigned a subordinate position to men. For women in these communities, this is a reality that is reflected even in the routine of everyday life: in the absence of her husband for instance, a woman is expected to simply tell visitors who come knocking that 'no one' is at home, a response which tacitly discounts her own existence as an individual. The woman's secondary status is also expressed in more significant ways: she is not allowed by tradition to undertake 'major' tasks such as building, planting, and

harvesting if she does not 'belong' to a man - i.e., if she does not have a status as a married or 'inherited' woman. Wife inheritance is a common practice in both communities - according to tradition, a widow should either remarry or agree to be inherited by a man from the community whose primary function is to grant some form of legitimacy which authorises her to undertake those tasks she would not normally be allowed to perform as a single woman. A widow who fails to do this risks being perpetually accorded a lower status than her married peers, a condition which can place restrictions on her freedom to avail herself of social and economic opportunities that arise within the community.

Formal education can however play a vital role in fostering gender equality in those communities. Generally, women tend to have lower levels of education (up to primary level or none at all) than the men. Education up to at least secondary level significantly increases a woman's chances of negotiating for herself a higher status than society customarily affords her, not least because it enhances her income-earning opportunities. Realising this, some of the women actively seek opportunities to boost their educational status or earning power within the boundaries drawn out for them by society.

Perhaps unsurprisingly, women's participation in community forums is very low. In theory, the women are welcome to attend *barasas* - fortnightly community meetings convened by community Chiefs - but they do not in practice, ostensibly because they are not interested in the sorts of issues that men talk about in those meetings. By not attending community *barasas*, the women exclude themselves from an important

platform for ensuring that their interests are represented within the community.

Although their participation in general community forums is low, women in those communities value membership of community-based women's groups that exist traditionally to further certain shared interests which may be social or economic, but hardly ever political. However, within these common-interest groups, typically consisting of between 15-25 women, there may be significant differences between group members in such respects as level of education or income. Women's groups are so numerous and ubiquitous that it is difficult for any individual to be aware of all the groups that exist at any given time in a community. These groups, which must be registered with the Ministry of Culture and Social Services to be recognised by the Kenyan government¹¹, are fairly easy to put together: for instance, a number of women already engaged in a set of income-generating activities such as mat-weaving or pottery may agree to register as a group 'to uplift themselves as members' (West Kochieng Citizen 8). Usually, each member is required to contribute a certain amount of money to the group on a regular basis, and after an agreed period, the sum collected is either redistributed amongst all the members or claimed by a single member. In the case of the latter, collection is rotated around the group until all members have had a chance to claim and a full 'cycle' is completed. At the end of a cycle, individuals may decide to withdraw from the group or the group can agree to disintegrate. This kind of cooperative savings scheme is locally referred to as a 'merry-

¹¹ Women's groups in Kenya are categorised as community-based organisations (CBOs), all of which must be formally registered, usually with a certificate as proof, to be considered legitimate by the government. While registration generally provides no direct material benefits to CBOs, the inclusion of a CBO in the government register can, in principle, facilitate its access to services and opportunities that may otherwise be closed to members.

go-round', and according to Bates (2005), it is the most common mode of operation adopted by women's groups in western Kenya.

Women typically use their collections from merry-go-round schemes to purchase household items like plastic chairs for their living rooms and chinaware for their kitchens. The decision to appropriate savings in this way may be judged elsewhere as lacking economic value, but it performs the very important function of boosting the women's self-esteem. Hospitality is a matter of serious importance in those communities, and it is infinitely more dignifying for a woman to serve food to her visitors on china dishes than to do so on plastic plates. Some groups allow the women to bank a percentage of their regular contributions so that, in the event of an occasion of immense social and cultural significance such as the death of an immediate family member, they can access the funds to conduct funeral ceremonies in a socially and culturally acceptable manner. By enabling women to make these kinds of social statements in the community, merry-go-round schemes fulfil an important function that cannot be quantified merely in monetary terms, and serve as a practical example of Schumacher's general argument regarding the limitations of economic measures.

Membership of women's groups is the most common form of collateral required by microfinance institutions, probably because it is often the only one available to the women. This membership benefit is particularly valued by women running some form of micro-enterprise, many of whom view access to finance for business expansion as the key to alleviating their poverty. In the focus group interview conducted with members of Keyo women's group - the most prominent stove producer group in Kenya -

nearly all the participants identified access to credit as the most important benefit they had derived from belonging to the group.

While membership of women's groups may be socially and economically desirable, it is by no means mandatory. Some women may belong to two or three groups at a time while others, for whom membership contributions may be too much of a financial strain, may not belong to any group at all. Membership is also not restrictive; it is quite common for women to move freely between groups, especially in cases where conflict or disintegration has occurred in a previous group.

The traditional socio-economic function served by women's groups in Kenya seemingly makes them an ideal host for Practical Action's economic empowerment-focused stove development intervention. Upon the organisation's entry into a community, the office of the Chief - the closest appointed representative of the government to local citizens - 'links' project staff to a few women's groups which it considers capable of working with the organisation on the proposed project¹². Khennas (2003) asserts that this model of working with women's groups on improved stove projects has proved to be very effective in reaching rural women in Kenya.

In Practical Action's work with women's groups, two participatory methodologies can be identified which apparently correspond to the technological and market components of the improved stove programme: the Participatory Technology Development (PTD) and Participatory Market System Development (PMSD) methodologies. According to Bates (2005),

¹² This constitutes an example of how the principle of group registration can enhance the legitimacy and access of a community-based women's group to external opportunities.

PTD is a framework that enables local women to define their own training needs, take the lead role in technology development utilising their indigenous skills and experiences, and participate at all levels of the decision-making process - with Practical Action assuming no more than a supportive role in the entire process. PMSD, a strategy developed under Aim 2 - 'making markets work for poor people' - is aimed at enhancing knowledge of local production and marketing networks and strengthening them in order to facilitate the creation of sustainable stove enterprises (PA-EA Staff 1).

In the following sub-sections describing successive projects in Practical Action's improved stove programme, some of these participatory elements will be identified. As the chapter goes on to discuss, the stove projects under the programme were implemented in two distinct but overlapping phases: the first from 1986 to 2001, when the focus of the programme was on fuel efficiency, and the second from 1998 to date in which the focus has been on mitigating the harmful effects of kitchen smoke on the health of biomass users.

5.2.4 1986 - 2001: Creating a Market for Fuel-efficient Stoves

When Practical Action started its improved stove programme in 1986 – three years after the commencement of GTZ's Women and Energy project described in section 5.2.1 above - its focus was on training local women in production of the Maendeleo stove developed by GTZ and construction of appropriate supporting infrastructure such as improved firing kilns (PA-EA Staff 2). However, persuaded that 'sustainability was hinged on successful commercialisation' (PA-EA Staff 2), Practical Action set out to develop a dissemination model which would be free of the kind of subsidy component

present in the Women and Energy project. Working with the Keyo women's group in western Kenya, Practical Action implemented a pilot project in which group members were not only trained in Maendeleo stove production, but were also taught marketing skills to help them build profitable stove enterprises (Khennas 2003). The pilot project was declared a success, and on that basis the Rural Stoves West Kenya (RSWK) project was launched in 1990 (ibid.).

The RSWK project ran from 1990 to 1995, during which period more than 13 women's groups (approximately 200 people) were trained in stove production and taught group organisation, management, and marketing skills. According to Practical Action, all aspects of this training process were participative and allowed the women to identify their own training needs, devise the programmes and control their pace (ITDG 2001). In this period, though the stove remained technically unchanged, its name was changed to *Upesi* – Swahili for 'fast' - to advertise a key characteristic of the stove in the hope of increasing its marketability (Abbot et al. 1995).

In 1996, a follow-on project - the Upesi Rural Stoves project - was launched (Waudu and Muchiri 2003). While the RSWK project had sought to establish a market for the Upesi stove in western Kenya (Khennas 2003), the Upesi Rural Stoves project launched an intensive campaign to improve the sustainability of stove-related income generating activities among women's groups (Waudu and Muchiri 2003). The latter aimed to give economic relevance to improved stove production in rural Kenya, and in so doing create a sustainable incentive for market growth. All efforts were directed towards ensuring the stove industry's survival at the end of the project. A whole new stove supply chain comprising producers,

stockists, promoters and retailers was established, and linkages were created between the various intermediaries. As the project went along, Practical Action sought to minimise its intervention and create an environment in which the activities of stove producers, users and intermediaries in the supply chain would be the principal forces driving the market. Each intermediary along the chain received payment for services rendered, so that the final cost to the user closely reflected the true costs of production and distribution.

In spite of higher stove prices, the Upesi Rural Stoves project is considered to have yielded significantly better results than those before it: by the time the project ended in 2001, a total of about 1,950,000 Kshs¹³ (£16,578)¹⁴ had been generated by the intermediaries in the supply chain, and local production continued to thrive at 87 percent of total capacity after the end of project (Waudu and Muchiri 2003). Based on these figures, it would appear that the project successfully demonstrated that a market-based dissemination model for improved wood stoves was indeed viable in rural Kenya. Further on in this chapter and the next, empirical data from the currently-running smoke alleviation programme are employed in discussing some of the successes and limitations evident in the organisation's market dissemination strategy.

5.2.5 1998 - Date: *Promoting Smoke Alleviation Technologies*

'We didn't start with the smoke work, we started with improved stoves. Then it moved on to the smoke work, and the results are that we now understand the kind of respirable particulates, the levels, the type that exists in households that use poor technologies in burning

¹³ Kshs = Kenyan shillings

¹⁴ Conversion based on June 2010 exchange rate of £1 = 117.6 Kshs

biomass for cooking. Beyond that, there is still more work...'
(Interview PA-EA Staff 2)

The start of Practical Action's 'smoke work' coincided with the beginning of the third phase of international stove development efforts, in which experts identified an adverse relationship between the use of solid biomass for cooking and the health of users. As the smoke alleviation projects described in this section show, this second stream of Practical Action's stove programme ushered in the addition of a new range of 'smoke alleviation interventions' to the standard Upesi stove. This second phase can be viewed as a continuation of the fuel efficiency-focused promotion that Practical Action began in the 1980s, but it is also possible to view it as a completely different stream in which the progression of the first phase – from initial introduction of the technology to eventual scaling up through market routes - was repeated all over again.

In a 2004 Practical Action publication explicating the problem of biomass smoke-induced indoor air pollution in developing countries, it was averred that the vast majority of people at risk are too poor to change to cleaner fuels such as liquefied petroleum gas (LPG), kerosene and biogas that would most effectively reduce smoke levels in the home (Warwick and Doig 2004). In light of this, Practical Action advocates the development of 'simple, low-cost solutions' (*ibid.*, p. *vii*), some of which have the capacity to reduce the exposure of biomass users to smoke by up to 80 percent. Table 5.1 below outlines the most prominent 'low-cost' interventions that have been introduced by Practical Action to alleviate biomass smoke in poor Kenyan households.

It is important to note that within this 'package' of interventions introduced by Practical Action, only two - the LPG stove and the solar cookit - are effective as standalone smoke alleviation technologies. The other four - the Upesi stove, the fireless cooker, the smoke hood and eaves spaces - are complementary and need to be used in conjunction with one another if substantial reductions in smoke levels are to be achieved.

Table 5.1: Description and cost of smoke alleviation interventions promoted by Practical Action in Kenya

Intervention	Description	Cost Implications
Eaves space	Narrow horizontal slit cut into the wall directly beneath the roof and over the hearth to improve ventilation	The cost is variable: cutting of eaves spaces was a service originally intended to be provided by skilled workers, but some households create their own spaces without having to pay for the service
Upesi stove	Fired clay liner inserted in fixed mud surround or portable metal cladding	The fixed version costs 350 Kshs (£2.98); the portable one costs 750 Kshs (£6.38)
Solar cookit	Kit comprising a pot, outer polythene wrap and flat reflective surface which concentrates the sun's rays to generate heat energy for cooking	Standard price of 1000 Kshs (£8.50)
Fireless cooker	Insulated basket designed to be used in conjunction with a stove	Sold in various sizes at prices ranging between 600 Kshs (£5.10) and 1,200 Kshs (£10.20)
LPG stove	4.6 kg gas bottle with a single burner directly screwed on top	Filled bottle with burner costs 5,000 Kshs (£42.51); subsequent gas refills cost 1,500 Kshs (£12.75)
Smoke hood	Extractor (ideally constructed of metal) fixed over the Upesi to direct smoke outside the kitchen	Standard price of 5,500 Kshs (£46.76)

The range of interventions in the smoke alleviation package is shown below in Figures 5.1 to 5.6.

Though Practical Action has introduced all of these interventions in poor communities through various projects implemented from 1998 onwards, this thesis will show how a number of cultural and economic factors combine to undermine the impact they can have on smoke reduction particularly in the poorest households.

First, however, a description is provided of three projects which highlight Practical Action's smoke alleviation efforts in Kenya to date: the Smoke and Health project (1998-2001); the Smoke, Health and Household Energy project (2001-2005); and the USEPA project (2009-2010).

In the Smoke and Health project, Practical Action set out, using participatory methods, to develop and introduce smoke alleviation interventions in fifty households spread across two rural communities (ITDG 2002). According to a member of project staff (Bates 2005), the approach adopted in this pilot study was technology-neutral: the particular interventions implemented in each community were not pre-determined; rather, they emerged out of consultation processes which allowed households in each community to identify what would work best for them out of the range of interventions proposed by Practical Action. At the end of these consultations, two different sets of interventions emerged which were appropriate to the different socio-cultural practices and preferences within each community (ITDG 2002).

Figure 5.1: Eaves space



Figure 5.2: The fixed Upesi stove



Figure 5.3: The portable Upesi stove



Figure 5.4: The solar cookit



Figure 5.5: Fireless cookers



Figure 5.6: The LPG stove



Figure 5.7: The smoke hood



The Smoke and Health project was declared a success, with the published outcome that it had found 'appropriate and sustainable ways to reduce smoke substantially in the kitchens of low-income communities in two regions of Kenya' (ITDG 2002, p. 57). According to Bruce et al. (2002), this positive outcome was facilitated by the participatory approach taken with project households. Bates (2005) asserts that, apart from the immediate benefits to project communities, the participatory approach employed on the project could potentially contribute to the development of a replicable and sustainable methodology for working with poor people to alleviate kitchen smoke. Thus the next line of possibility to be explored after the pilot project was how a sustainable infrastructure could be created for smoke alleviation interventions which was devoid of subsidy and not reliant on project resources (ibid.).

In this vein, with a research grant from the UK government Department for International Development, Practical Action launched the two-part Smoke, Health and Household Energy project in 2001 to explore 'pathways to scaling up sustainable and effective kitchen smoke alleviation' (Bates 2007). The first phase of the project was implemented with ninety households split evenly across three different communities in Kenya, Nepal and Sudan (Bates 2005). In Kenya, the focus of this study, thirty households in two divisions – namely Winam and Kadibo - were engaged in the type of technology-neutral participatory process employed on the Smoke and Health project, with the aim once again to identify which interventions would be most appropriate for households in each community (ibid.). The two divisions were selected on the basis that, though poverty levels were such that residents mostly relied on biomass for cooking, they still lived 'within the money economy of the town' (ibid.,

p.5). The assumption underlying this selection was that, at such close proximity to the provincial capital town of Kisumu, those peri-urban communities had a degree of access to formal market arrangements which would enhance their capacity to participate in the sorts of monetary transactions required to establish a viable market model for disseminating smoke alleviation interventions. Further on in this chapter, a discussion is provided of how the realities of citizens living in those communities may present a challenge to the organisation's assumption of a straightforward relationship between market proximity and market participation.

The first phase of the Smoke, Health and Household Energy project was again considered successful, albeit insignificant in light of the scale of indoor air pollution globally (Bates 2007). Therefore the second phase of the project set out to investigate the possibility of deriving a 'semi-commercial' framework for scaling up those interventions that had been identified in various project communities as appropriate (ibid.). In an attempt to overcome the barrier of limited access to finance, the project established revolving finance mechanisms within project communities to enable entrepreneurs with insufficient up-front capital to purchase smoke alleviation technologies for resale. However, the revolving funds only applied to the more expensive interventions, particularly smoke hoods and LPG stoves, which less than a dozen households purchased outright throughout the duration of the project (ibid.).

According to Bates (2007), the ultimate aim of the second phase of this project was to transform the 'beneficiary' into the 'customer', and to create a local supply chain that would eventually render external assistance unnecessary. To create this kind of self-sustaining

infrastructure, Practical Action considered it essential to be able to 'transfer ownership of the problem of smoke alleviation from the project to the community' (ibid., p.6). The principle is that if poor households can be made to sufficiently appreciate the gravity of the smoke problem in their kitchens, they will be motivated to make incremental changes even if they cannot immediately access costlier interventions. The next sub-section describes the smoke alleviation project currently being implemented by Practical Action, and draws on interview data obtained from a member of field staff as well as local citizens in West Kochieng and Kasewe to evaluate the potential for transferability of outsider priorities to local communities in the particular context of smoke alleviation interventions.

5.2.6 2009 – 2010: The USEPA Smoke Alleviation Project

In January 2009, Practical Action commissioned a two-year project to develop market systems for the dissemination of smoke alleviation interventions in western Kenya (PA-EA Staff 3). The project, funded by the United States Environmental Protection Agency (USEPA), has simply been christened the USEPA project. It focuses on eight locations within Kadibo, one of the two divisions which hosted the two-part Smoke, Health and Household Energy project implemented between 2001 and 2005. Kadibo is one of numerous divisions under Kisumu district, which is one of several districts distributed across eight provinces in Kenya.

Within the framework of the USEPA project, Practical Action is working in partnership with Solar Cookers International - a US-based non-governmental organisation which promotes the use of solar cooking and solar water pasteurisation technologies in poor communities - to market the full range of low-cost interventions introduced in previous projects.

The USEPA project has set a two-fold target to reach 3,500 Kadibo households with appropriate smoke alleviation interventions and make 30,000 residents aware of the risks of indoor air pollution associated with solid biomass use.

A key focus of the USEPA project is economic empowerment of local women through marketing and sales of smoke alleviation interventions. Notably, the women on the USEPA project mostly do not engage in production of the standard Upesi stove liners, but mainly serve as retailers and installers for the product. Retailing involves purchasing the stove liners in bulk from a stove producer group (in this case, the Keyo women's group), stocking them, marketing them to prospective buyers, and going out to do the installation work when a sale is made. In November 2009 when fieldwork for this research was conducted, the project was only assisting retailers with making financial and logistic arrangements for bulk stove purchase. From the point of delivery of the stoves, each retailer was expected to find her own buyers, sell the stoves without assistance from the project, take out her profit, and give the capital back to the project towards the purchase of another batch of stoves. The process is described in detail by a member of project staff:

'The stoves that we're doing in Kadibo, we've not been taking them in Practical Action vehicles. I send somebody to go to Keyo, they get a pickup [truck] from here. They buy 100 stoves. I don't allow them to buy less. We wait until, from [the women], we have money for 100 stoves. We pushed in the first batch [of stoves] from Practical Action funds. Then after pushing in that first batch, they have to pay back. So, when they pay back, we get another 100. So we're like selling 100 stoves a month.

The first batch we put in, we paid for 100. I took a pickup from town to Keyo, loaded the stoves, took them to Kadibo. Transport costs

about 4,000 shillings and if you have 100 stoves, you have spent about 40 shillings per stove. Each stove is bought at 150 shillings from Keyo. If you add, that is 190 per stove, and the installers pay 200 for the stove. And when they pay the 200, they sell to the household at 250, this 50 is their profit plus the installation fee. It is a question of bringing these people to see, one, that there is a markup that they get for the stoves, that is, in terms of profit. And they have got to be reasonable profits. So this also depends on the numbers that you sell. So if you install 2 stoves in a day, you earn like 300. And wage here is just about 100 shillings a day.' (Interview PA-EA Staff 3)

It is apparent from the description given above that retailers are not required to pay at the point of collection of the stoves, but only after they have sold the stoves and realised a profit. This system, adopted to circumvent the women's inability to gain access to adequate start-up capital, means that the women have no share in the capital invested in the stove enterprise. At the time of fieldwork, Practical Action's objective was the establishment of mechanisms that would help wean the enterprise off project support and eventually enable the women to run the business independently. The responsibility for organising bulk purchase of the stoves had already been transferred from project staff to one of the women, and the possibility of facilitating access to capital through the channel of village savings and loans schemes was being explored:

'But now the locations that we have started working in, we have now created 6 groups, and these groups have currently started what is called... it is not microfinance, but it is called village savings and loans. And so when they raise money here, we are trying to talk to them, that when their loans get to the level that they can get 100 stoves by themselves, we will leave that. They get 100 stoves, and they come and sell. So it becomes like revolving for them. In the initial phase they didn't have a lot of sales, but their sales are growing. They didn't have a way of mobilising resources as a group, so that they put together enough money. And I have a feeling that if they agree to do that, then this should work, because one group that started – they've just had 3 or 4 meetings – the group has mobilised

up to about 7,000 shillings. That is their value, the value they can have as a loan.’ (Interview PA-EA Staff 3)

Such community savings and loans schemes – succinctly referred to as ‘COSALO’ in the localities where they operate – are usually initiated by development agencies working to improve different aspects of livelihoods, and they appear to be gaining widespread acceptance in Kadibo division. The COSALO is different from the traditional merry-go-round schemes in several respects. When an individual takes out a loan, it is expected to be used strictly for income generation, though there is no restriction or specification regarding the sorts of income-generating activities it may be used for. The loan amounts that can be taken out by individuals are usually proportional to the value of their contribution to the fund. A small interest rate is usually applied which constitutes the main source of income for the group and goes towards building up the group capital. Practical Action expects that the COSALO scheme will contribute to resolving the challenge of limited access to capital present at all levels of the local stove distribution chain:

‘Each group has got about 10-15 installers. So they could agree that when they have got like 15 to 20,000 shillings for a loan, 10 of them, or whichever number could agree, they take 2,000 each, pool it together, and then they get stoves as a team. We’ve calculated that 20,000 is enough for them to get the stoves from Keyo to their places. So, we are taking them through that process where it can sustain itself. I told you we started with the installers, this group that has reached 7,000 shillings was trained this July. They only started the community savings and loans in early October. And that means they need time to build their fund. And so I really hope, before the end of the project, all these groups will be able to get their own stoves and to install.’ (Interview PA-EA Staff 3)

The principle here is that if 10 group members take loans of 2,000 shillings each and pool their individual sums together, with the bulk sum

they can arrange for purchase and delivery of a batch of 100 stoves. When the stoves are delivered, each woman collects her quota and, as usual, conducts the marketing, sales and installation by herself. The challenge here however is that since the COSALO platform is purely transactional and members are free to use their loans to pursue any commercial activity as long as they can repay, there is no guarantee of getting up to 10 women who will be willing to invest their capital in stoves at any given time:

'It is still individuals and it is still individual businesses. We're pooling them together because we found that the community savings and loans, they are able to do together. That is just mobilising resources amongst them. The challenge we have is as to whether, when you take, she takes, they are going to all agree that we pool it again to purchase stoves. That's why I'm telling you we still have to talk to them so they understand that there is need to pool it again.'
(Interview PA-EA Staff 3)

In the course of fieldwork, I observed a COSALO meeting of a group of stove producers and installers in Kabondo, another division about 70 kilometres away from Kadibo. The observations I made during the meeting, as well as conversations I had with individuals in both Kadibo and Kabondo, indicate that access to credit/capital is highly valued in those communities. However, these facilities are often sought for the purpose of initiating or expanding a range of micro-businesses that may not be related to smoke alleviation. Thus in attempting to persuade COSALO group members to invest their resources in stove enterprise, Practical Action seeks to influence priorities on the supply side in the same way that it has set out to 'transfer' the urgency of the smoke problem to citizens on the demand side.

This kind of priority transfer may be particularly difficult to achieve on the supply side as only a few group members, some of whom are seen by their peers as the stove 'experts', rely on the stove enterprise as their main or only source of income. Usually, these experts receive additional financial and logistic support from Practical Action to market and sell other smoke alleviation technologies, especially the fireless cookers and LPG stoves. Although smoke alleviation technology enterprises offer higher profit margins than most local micro-businesses do, many of the women in the Kabondo COSALO group stated that they found it difficult to establish the market links required to derive a steady income out of stove enterprise. This point will be elaborated in Chapter 6, where the limitations of the group stove enterprise model are discussed.

This section has taken a look at the various projects that have constituted Practical Action's improved stove intervention in Kenya to date. The next section describes the economic and socio-cultural realities of local citizens in West Kochieng, one of the USEPA project locations where empirical research was conducted for this study. As indicated earlier in Chapter 3, the empirical study was extended to Kasewe, a location within Kabondo division with similar socio-cultural characteristics as West Kochieng. Despite not being involved in the USEPA project, Kasewe was included in the study because it afforded the opportunity to gain a slightly broader view of the different realities experienced within poor communities in western Kenya. The next section draws mainly on data obtained from interview and observation sessions with local citizens in West Kochieng and Kasewe to illustrate pertinent aspects of the socio-economic realities which prevail in both communities. Following this description, the chapter goes on to analyse how Practical Action's smoke alleviation interventions

have interacted with citizens' realities in the particular context of West Kochieng.

5.3. Citizens in Society: The Socio-cultural and Economic Context

For administrative purposes, Kenya is divided into 8 provinces – Nairobi (the capital city); Central, Coast, Eastern, Northeastern, Nyanza, Rift Valley, and Western¹⁵ provinces (Brass and Jolly 1993). Each province is divided into several districts, under which there are divisions (comprising up to 1200 homes), then locations (between 200-300 homes), sub-locations (about 100 homes), and finally villages (clusters of about 10 homes) (PA-EA Staff 3).

West Kochieng and Kasewe locations are situated in Nyanza province, which is home to the Luo people¹⁶, who constitute the third largest ethnic group in Kenya. The Luo are a close-knit people who live communally: the unit of spatial demarcation is not the household, but the 'homestead' which comprises several individual homes – occupied by extended family members - arranged around an open courtyard. The Luo, particularly those who reside in rural areas, attach great significance to the observance of tradition and custom, eschewal of which would cause an individual/household to be regarded by society as an outcast. The influence of culture is all-pervasive, touching on every area of individual and communal life, from living arrangements to hospitality codes to the attribution of gender roles. Some of the connections between Luo culture and citizens' lived experiences are explored in the following sub-sections

¹⁵ This is not to be confused with western Kenya, which comprises Nyanza and Western provinces.

¹⁶ Nyanza is also home to the Kisii tribe, a distinct group of people who live in the highlands apart from the Luo, who occupy the region of the province along Lake Victoria.

employing data gathered during field observations and interactions with individuals and households in West Kochieng and Kasewe locations.

5.3.1 Citizens' Socio-cultural Realities Determine Space Management

In Luo culture, the ideal kitchen is a separate structure located outside the main house. According to the women, this tradition came about because men have always been uncomfortable with smoke wafting around in the main house. This is particularly undesirable considering that the traditional main house is a small mud structure partitioned into two rooms – a main outer room to receive guests and a smaller room which was originally conceived to be used as a bedroom but which actually accommodates several other uses, oftentimes including cooking. It would therefore appear that the element of kitchen smoke has always been unwelcome in Luo households, and that international organisations' concern with eradicating it is not so innovative. However, the objectives for wanting to be rid of kitchen smoke are slightly different on both sides: while international organisations advocate smoke eradication for health reasons, Luo households originally took kitchen smoke outside the house mainly to prevent accumulation of soot on the walls – particularly of the living room – because it was important to a man that guests did not perceive his home to be dirty or ill-kept. Therefore from the perspective of a Luo man living in the country, moving the kitchen outdoors may be a more legitimate solution to the problem of indoor smoke than installing an improved stove in an indoor kitchen area.

Indeed, as the next section discussing citizens' priorities makes apparent, building an outdoor kitchen is a higher ranking priority for rural Luo

households than acquiring a Upesi stove with or without a smoke hood. Many women who cook in the main house regard their kitchen space as temporary, and prefer to wait till they have an outdoor kitchen before they acquire a Upesi which, once installed, becomes a permanent fixture in the kitchen. Building an outdoor kitchen, apart from traditionally requiring male authorisation, is capital-intensive. This means that a woman usually has to wait till her husband decides that he has enough resources to provide an outdoor kitchen and then gives the go-ahead to build. For many women, the waiting period stretches into years, even decades. A lot of women therefore do their cooking in spaces that are not really kitchens at all, but instead are small corners unceremoniously carved out of their inner rooms which simultaneously serve many functions. Taking the kitchen outdoors would not only free up valuable space inside the main house, it would also provide extra space which can be used overnight as chicken coop, goat pen, granary, or even an additional bedroom when space is tight indoors.

Whether detached from the main house or incorporated into it, kitchen spaces are furnished with elements designed as answers to everyday problems encountered in the course of living and cooking. The obligatory *ugali* tray hangs from a nail driven into the wall for just that purpose, ready to be pulled down the one or two times a day that it is needed. Pots of food nestle in tightly woven ropes hanging from the rafters to prevent rodents, pests, and stray animals from getting to their contents. In the same vein, openings in kitchen walls are kept to the barest minimum to further secure the space against unwelcome elements foraging for food. In rural Luo context, this objective is clearly of higher importance than having large wall openings to improve natural ventilation in the kitchen

space. This is one reason for the unpopularity in the region of eaves spaces, one of the smoke alleviation interventions described earlier which basically involves cutting a space into the wall to let smoke escape rather than twirl back into the kitchen. Suggestions have been made to modify eaves spaces by adding closable flaps or wire mesh to minimise intrusion (Bates 2005), but the cost implications of these options have limited their uptake.

The fireplace sitting in the corner of the kitchen is very much a part of the cultural architecture of the space in the same way that the hanging pot rests and *ugali* tray hook are. In a few of the kitchens I visited, the women have devised slightly advanced versions of the open fire by constructing raised fireplaces out of broken stones or clay pot shards.

Overall therefore, the kitchen space reflects the social, physical, cultural and economic realities in which the people live. This suggests that any interventions from outside like those proposed by Practical Action need to take as their starting point the lifestyles that have informed the constitution and evolution of the space over centuries.

5.3.2 *Citizens' Economic Realities Determine Home Management*

For the majority of households in rural Nyanza, poverty is a reality that is evident in every aspect of life, from the way the people build to what they eat. In Kasewe where each homestead grows its own food on an adjoining farm plot or *shamba*, livelihoods are mostly at subsistence level. In the absence of paid employment, people have very little money to exchange for goods and services in the formal market. Where people are engaged in micro-scale crafts and businesses, sales and profits are modest. For

example, an interview with a clay potter in the location revealed that potters in the area can only make a maximum of 30 clay pots per week with the limited resources available to them (Kasewe Citizen 4). Selling at an average of 35 Kshs per pot (ibid.), it is possible for a potter, in theory, to realise up to 1,050 Kshs (£8.89) per week. However, according to the interviewee, her business is an uncertain one - she cannot know in advance how many pots will emerge unbroken from her makeshift firing kiln each week. In a particular week, she only managed to get 18 intact vessels out of the kiln, so selling at an average price of 35 Kshs, she was only able to record sales of about 630 Kshs (£5.34) that week.

The soil in West Kochieng on the other hand is not fertile for planting, and so people have to pay for their food in addition to everything else they need. Thus apart from being cash-poor, West Kochieng citizens are also resource-poor. What they lack in cash, they can't always make up for in kind, unlike their provincial neighbours in Kasewe. Not only does the barren soil in West Kochieng restrict access to food; it also makes shelter more expensive, as people have to spend more to get suitable soil - the main building material - from other, more fertile locations.

More people in West Kochieng therefore have to take up some form of paid employment - usually on a casual basis - in the nearby provincial capital of Kisumu, or run micro-enterprises (sale of fruits, vegetables, fish, cow's milk, second-hand clothes) with customer bases that do not extend beyond the immediate locality. Depending on the size of the business, average sales range between 100 Kshs (£0.84) and 170 Kshs (£1.44) per day. Food, fuel and water - the three recurring expense items for West Kochieng households - take up a large percentage of incomes. Food alone

costs at least 200 Kshs per day for a family of five. Fuelwood, which is scarce in the region and so is mostly purchased, can cost up to 40 Kshs a day¹⁷. These items are usually purchased on a daily (or meal-by-meal) basis partly because many households cannot afford to buy them in bulk and partly because storage facilities are lacking.

In West Kochieng especially where food is not normally grown for household consumption, meals are predictable and lacking in variety. Lunch almost invariably consists of the staple *ugali* (maize flour) eaten with *sukuma wiki* ('push-through-the-week') greens. Leftover vegetables from the afternoon meal are sometimes carried over to the evening meal, so that then only a fresh round of *ugali* needs to be made. Households in rural Nyanza can normally save on the cost of maize flour by growing maize on their *shambas*, but in West Kochieng location, this cost cannot be avoided. A family of five that spends 72 Kshs on a tin of maize flour per day would have spent 2,160 Kshs at the end of the month on maize flour alone. Protein, usually fish, is optional and considered to be a luxury – this much is evident in that the local fish seller in West Kochieng only sells about 5 portions of small-sized *obambo* fish per day. Fingerlings or *omena*, selling at 15 Kshs per tin, are preferred - probably because there is more to go round and they are cheaper than the *obambo* fish priced at 20 Kshs per portion. The situation is ironic because the Lake Victoria region, where West Kochieng and Kasewe are situated, is a major fishing hub in Kenya. However, the best of the fish caught in these rural locations is sold in towns and cities at prices that rural households can scarcely afford.

¹⁷ Those using the Upesi stove are able to make significant savings, spending only 20 Kshs per day on fuel.

Against the socio-cultural and economic backdrop provided in the last two sub-sections, the next section uses interview and observation data from West Kochieng to examine how the problem of kitchen smoke targeted by outsider organisations and their concern to mitigate the associated health risks relate to the priorities of individuals and households within project communities.

5.4. Smoke Alleviation Technologies in Society

Preceding sections of this chapter have examined the efforts that Practical Action has made from 1998 onwards to disseminate the message that smoke emitted by the three-stone fires and 'rudimentary stoves' (Bates 2005, p.1) commonly used in poor households of developing countries is a 'killer in the kitchen' (Warwick and Doig 2004, p.vi). This message is now widely recognised by different development organisations working to improve other aspects of rural livelihoods not directly related to smoke alleviation, with the result that these organisations increasingly tie diverse interventions in areas ranging from sanitation to agro-forestry around smoke alleviation technologies (PA-EA Staff 2).

Similarly, there is evidence of Practical Action (and other organisations) having worked to get the information out on the importance of getting rid of kitchen smoke in project communities: promotional posters and calendars hang conspicuously from living room walls, there is widespread awareness of the smoke alleviation technologies available and many local citizens seem to agree that it is indeed desirable to switch to these technologies. It would therefore appear that Practical Action is gaining considerable ground in its objective to raise the profile of the indoor air

pollution problem internationally and locally. However, the empirical findings presented in this section reveal that the ultimate goal expressed by the organisation to *transfer* ownership of the smoke problem to biomass users in poor communities is a problematic one, as externally-derived notions of what is important are sometimes in conflict with the priorities of citizens in those localities.

During an interview with a widowed woman in West Kochieng who has established a relatively profitable enterprise in Upesi stove and fireless cooker sales, she indicated that awareness of the dangers of kitchen smoke altered her perception of the risks several years ago and consequently led her to adopt the Upesi stove, fireless cooker and eaves spaces in her outdoor kitchen. By her account, when Practical Action introduced the smoke alleviation interventions to her group in 2005, very few members initially showed any interest in them. Lately however, 'awareness' has increased within the group, and the collective response to the interventions is more favourable:

'Awareness is what has increased. Because people now are actually realising. First of all there isn't much money. Secondly there is isn't much firewood. So now is when people are realising that this thing is able to save them, because it costs less and it uses less firewood. And they have seen people around them using it, and it is now real to them that it can save cost.' (Interview West Kochieng Citizen 1)

It is apparent from the statement above that the members of the group in question articulate a different kind of awareness – i.e., of increased fuel efficiency and potential cost savings – than awareness of the risks of indoor air pollution which constitutes the core of Practical Action's smoke campaign. Indeed, interview responses indicate that the best-known advantage of the Upesi stove in West Kochieng is its capacity to reduce

fuelwood use by about 50 percent - or, in the more practical terms expressed by the women, that a meal which requires 3 or 4 sticks of firewood to cook over a three-stone fire will only need 1 or 2 sticks with the Upesi. This and other concerns are expressed in the following responses given by two women to direct questions regarding what they considered to be the most important benefits of the Upesi stove:

'Upesi *jiko* is very important because it doesn't use a lot of firewood. Yes. And in the dry season, I normally use the Upesi *jiko*, because I can get firewood around. And it is easier for the children to use. When there is a fire, you can just remove the *sufuria*, it does not burn.' (Interview West Kochieng Citizen 3)

'The advantage the Upesi has is that it reduces accidents in the house. Unlike the three-stones where flames come out from different directions, the flame is under the pot. And then when the stove is hot, food can still continue steaming, even if you use 1 or 2 sticks, it will still continue cooking. I don't see any disadvantage to the Upesi. I haven't made one, but I've seen my mother-in-law's stove. I see that food cooks very quickly. I would compare it with the LPG.' (Interview West Kochieng Citizen 6)

Fuel saving ranks highly on the list of benefits for West Kochieng households because fuelwood is relatively scarce in the location and most residents are forced to spend a proportion of their limited resources on fuel. In areas like Kabondo and parts of Kadibo division close to the shores of Lake Victoria where people can still gather biomass freely in substantial quantities, the incentive to save on fuel cost is much less and, 'if they were to prioritise their needs, they would not prioritise an improved stove' (PA-EA Staff 3).

Even in locations where households may be expected to have economic incentives to prioritise an improved stove, other realities exist for citizens which may pose a challenge to uptake. This is illustrated by data obtained

from an interview held with the local fish seller (FS) in West Kochieng referenced in the preceding section, presented below.

FS lives with her husband, also a fish seller, and four children aged 5 to 13. She is responsible for providing food for the family, while her husband takes care of other matters such as payment of the children's school fees. She actually maintains a small farm by the lake where she plants vegetables and tomatoes, so she usually only needs to buy maize flour and other food items as needed. Despite this, she spends most of her income on food: there have been days she has earned 100 Kshs (£0.84) and spent the entire sum on feeding her family for the day.

FS cooks mostly over a three-stone fire, which she augments with the traditional charcoal *jiko* (not the improved KCJ) during the rainy season when dry wood is scarce and expensive. In the dry season, she only spends about 200 Kshs (£1.68) on fuelwood per month and supplements her supply with anything else her children can gather from their surroundings: 'whatever tree or twig they get, it works'. However, the rainy season presents a problem, because then her children can't find as much dry wood to collect and she can spend up to 600 Kshs (£5.04) on fuelwood in a month. She makes up for the extra expense of 400 Kshs (£3.36) in the rainy season by sacrificing items such as soap to buy fuel, because 'firewood is a priority'. When they can't buy soap, FS and her family either wash up with plain water or use soap borrowed from their neighbours.

FS has learnt about the Upesi stove from her neighbour across the road, who has become one of the most prominent stove retailers in the location

courtesy of Practical Action's smoke alleviation projects. FS has plans to buy the stove, but she cannot afford it on her present income. At the time of the interview in November 2009, she was considering the possibility of using her merry-go-round collection - which she had used in previous months to buy blankets and sheets for her family, and to pay her own hospital bills - to acquire a Upesi stove. She cites fuel saving as her major reason for wanting to buy the stove. When asked if she wasn't concerned about the effects of kitchen smoke on her family's health, she responded, 'I know that smoke is not good for their health, but there are times when there is no money or I think of other costs, so I would rather persevere while I wait to acquire something better'.

Like the fish seller in the above example, some of the women in the interview sample identified smoke reduction as an added benefit of the Upesi stove, usually after they were prompted. However, other women asserted that the quality of fuelwood used, rather than the quality of the cooking device, was the major factor determining smoke emission levels. The drier the wood used and the higher its quality, the less smoke is emitted during cooking, regardless of cooking device. As such wet or damp wood will emit copious amounts of smoke if used in a Upesi stove, just as it will if used in a three-stone fireplace. Most cooks know the value of dry wood and buy it when they can. However, as demonstrated in the case of the fish seller, there are times when women and children gather bits and pieces of wood and whatever else they can find from their immediate surroundings to save on fuel costs, unmindful of quality. In such cases, families that gather low-quality biomass fuels will experience similar levels of smoke regardless of whether the cooking is done over a Upesi stove or a three-stone fire.

Indeed, Practical Action project reports state that the Upesi as a standalone intervention does not do much to reduce smoke levels, and only makes a significant impact on smoke alleviation when used in conjunction with the smoke hood or eaves space which can reduce indoor air pollution by up to 80 percent and 60 percent respectively (Warwick and Doig 2004). Kishore and Ramana (1999), in their analysis of the efficiency of improved stoves in India, assert that a programme that just installed chimneys to channel smoke out of the kitchen (as smoke hoods do) would have achieved the purpose of smoke reduction whether or not those chimneys were used with improved stoves. Similar conclusions were reached on the Practical Action Smoke and Health project described earlier in this chapter: that 'smoke hoods were undoubtedly the most successful intervention in terms of smoke alleviation' (ITDG 2002, p.43), and that 'there was no statistically significant reduction in indoor air pollution through using stoves' (ibid.).

According to PA-EA Staff 3, those women who associated the Upesi stove with smoke reduction might have done so because the Upesi uses less fuel and cooks faster than the three-stone fire, which means that the women may be spending less time exposed to smoke in the kitchen. According to ITDG (2002) however, reduced cooking times do not necessarily translate into reduced health risk for the women. This is because the products of solid biomass combustion which pose a hazard to the health of users are those which are emitted in large quantities at the start of a fire (ibid.). Field observation indicates that this is true whether the cooking device used is a three-stone arrangement or a Upesi stove. The length of time for which the fire burns is therefore immaterial to achieving a reduction in

indoor air pollution levels. The upshot of the scenario described above is that the technologies in Practical Action's range of interventions that can fulfil the objective of smoke alleviation are different from those that are required to meet the objectives of fuel and cost saving valued by West Kochieng citizens. This means that it is possible, within the provisions of the smoke alleviation programme, to address the primary concerns of local citizens independently of the core objective of the outsider organisation. Chapter 6 examines the implications of this scenario for the thirteen West Kochieng households included in the field study.

Another pertinent set of relationships requiring consideration in the context of Practical Action's intervention is the status of the outsider organisation's smoke alleviation objective relative to the basic need of local citizens for food security. During the fieldwork period in West Kochieng, I tried to schedule daily visits to households to coincide with cooking times. Overall, I was able to spend time in five kitchens within the location, ranging from between 25 minutes to one hour in each kitchen. The informal interviews and observations conducted during those visits yielded valuable insight into the cooking practices of households in the location. On some occasions, the women told me in advance not to visit because they would not be cooking lunch the next afternoon. This did not necessarily mean that those families did not eat at lunchtime; in some cases it meant that they were planning to eat food left over from breakfast. The relative food shortage in the location meant that people did not actually spend so much time in the kitchen – a number of cold fireplaces attested to that. Even in households where a fire was lighted thrice daily, actual cooking times per meal were usually minimal. Breakfast often required little more than boiling the tea kettle or warming leftovers

from the previous day's dinner. A meal of *ugali* and *sukuma wiki* would be ready in under an hour; when there was *obambo* or *omena* fish to be cooked, total preparation and cooking time could go up to an hour. Foods which may be more nutritious but take longer to cook (such as beans) were generally avoided, to keep fuel expenditure to a minimum.

Generally, the more food people can grow or the more income they earn, the more variety they can afford to cook and the more time they get to spend in the kitchen – sometimes up to 2 hours for a single meal. This was evident during participant observation in Kasewe where, despite low cash incomes, the availability of fertile land meant that homesteads could grow a variety of crops including maize, millet, sweet potatoes and beans on adjoining *shambas*. This signifies that the relationship between food availability and kitchen smoke is a direct one: households that can least afford to eat well are the ones that are least exposed to kitchen smoke and that can least afford to purchase smoke alleviation technologies. For these households, therefore, the issue of priority is not kitchen smoke, but food security. Practical Action's experience on the Smoke, Health and Household Energy project underscores this: project staff encountered a few households that were so poor they had to be given food to cook to enable the scientific team monitor kitchen smoke levels using 'WHO funding and standards, EPA protocols, etc' (PA-EA Staff 2).

Another point of interaction that must be considered in the present context is the relationship between the objective of smoke alleviation expressed by Practical Action and the need for outdoor kitchens experienced by local citizens. West Kochieng households consider outdoor kitchens to be a fundamental prerequisite to the acquisition of a comprehensive smoke

alleviation package comprising the Upesi stove and smoke hood or eaves spaces – all of which are usually installed as permanent fixtures. It would appear that this local priority has not been sufficiently integrated into the outsider organisation's smoke alleviation scheme. This is significant because an outdoor kitchen is a prerequisite which itself is subject to the fulfilment of certain economic and cultural conditions, some of which were summarised earlier in this chapter and were more precisely articulated by a woman in West Kochieng:

'I have a plan to make the Upesi. But I would like to prepare a kitchen first outside there, so after preparing it, then I will buy the Upesi... A kitchen is even 2,000 or 4,000, because you have to buy sheets, you have to buy wood, then you have to search for money for labour. So we have to save money for the kitchen... I can't use my group contribution towards building the kitchen. That is the work of my husband, not my work. We may share, but I'm not the one who's responsible.' (Interview West Kochieng Citizen 9)

Further interviews with two West Kochieng citizens revealed that the decision to build an outdoor kitchen can be further complicated by traditional living arrangements among the Luo. All adolescent males born to a Luo family are required to live in separate structures built on either side of the 'main' house within their parents' homestead until they are financially capable of moving out to start their own homesteads. The first son is however the only offspring who is mandated by tradition to leave the homestead, and no other son is allowed to leave ahead of him. Society places some pressure on a first son to move out as early as possible, but the financial implications of a move may exert greater pressure to stay on for longer than necessary. It is therefore usual for sons to start their own families whilst still in their parents' homesteads. Regardless of how long he stays on however, a first son will not want to build a permanent outdoor kitchen for his wife while living in temporary quarters. The same

applies for second, third and fourth sons who plan to move out eventually but have to wait for the first son to do so.

The conditions described above signal the need for smoke alleviation technologies to be regarded as much more than 'interventions' and redefined as context-integrated systems whose adoption and use are contingent on the fulfilment of prerequisites which may not necessarily fit into the well-defined parameters of a smoke alleviation programme. Chapter 6 picks up on the significance of context for the viability of externally-derived stove programmes in the local communities under consideration in this study.

This section has attempted to evaluate Practical Action's aim to transfer the responsibility for smoke alleviation to local communities in the light of citizens' priorities and lived realities. As stated previously, the outsider organisation's aim is premised on the assumption that local citizens would prioritise smoke reduction if they could be made to understand the links between ill-health and indoor air pollution (Bates 2007). The working principle is that 'priorities, like poverty, are not absolute' (ibid., p.136); increased understanding of the health risks of kitchen smoke would cause people to move smoke alleviation up their list of priorities and increase their willingness to make resources available for acquisition of smoke alleviation interventions. The data examined in this section however suggest that, regardless of increased awareness about the objectives of external programmes, citizens in local communities will most value aspects of those external interventions that relate to their own immanent priorities. Prominent among these immanent priorities in West Kochieng are fuel saving and associated cost savings, food security, and the cultural

requirement for an outdoor kitchen. Smoke alleviation has been acknowledged by some local citizens as an added benefit of Practical Action's intervention; however, specific economic and cultural restrictions, discussed in greater detail in the next chapter, would appear to preclude simultaneous fulfilment of priorities expressed on both sides.

Conclusion

In this chapter, Practical Action's stated preference for a participatory approach to appropriate technology development which starts with the realities of local citizens has been examined in the context of its improved stove programme in Kenya. It was noted that the objective of the stove programme has shifted from improved fuel efficiency in the 1980s to smoke alleviation beginning in the 1990s to date. With this shift in objective, Practical Action expanded the scope of its intervention to include a range of 'smoke alleviation technologies' comprising the eaves space, solar cookit, fireless cooker, smoke hood and LPG stove in addition to the standard fuel-efficient Upesi stove. From its inception in the second phase of stove development, Practical Action's stove programme has operated on the principle that technology development must be complemented with the creation of local market networks to facilitate project sustainability in those communities. However, unlike the formal market networks created for the Cassakero project in Nigeria, Practical Action's model for market-based stove dissemination has at its core the enrolment of local women's groups in participatory market system development processes to facilitate their socio-economic empowerment and create intermediate marketplaces for improved cooking interventions that are more accessible to the poor.

In West Kochieng location where fieldwork was conducted, Practical Action's context-responsive approach was seen to promote local awareness of the hazards associated with biomass smoke and the smoke-alleviating impact of some of the organisation's improved cooking interventions. However, the organisation has found it less straightforward to persuade citizens to prioritise the smoke alleviation objective of the stove programme, for the reason that citizens' priorities are dictated by the realities of the local context rather than by externally-imposed targets and objectives. It is instructive that, although the fuel-efficient Upesi stove does not achieve the outsider organisation's smoke alleviation objective, it is valued by local citizens because it enables cost savings, a high-priority item for low-income West Kochieng households. Similarly, citizens' need for improved nutrition and food security ranks above the smoke alleviation imperative, particularly in the poorest households. The cultural prerequisite of an outdoor kitchen structure, ideally with minimum wall openings, was also shown to constitute a barrier to citizens' uptake of most of the smoke alleviation interventions. The chapter noted the difficulties of reconciling the priorities expressed by Practical Action on the one hand and local citizens on the other, concluding that a move is required beyond a context-responsive approach towards a context-integrated approach if external interventions are to be wholly appropriate to local contexts. The next chapter discusses the impact of Practical Action's context-responsive approach to market-based stove dissemination in relation to the organisation's objective to empower marginalised women socially and economically.

Chapter 6: Performances of Participation in Market-based Stove Development in Nigeria and Kenya

'In one way or another everybody will have to take sides in this great conflict. To "leave it to the experts" means to side with the people of the forward stampede. It is widely accepted that politics is too important a matter to be left to experts. Today, the main content of politics is economics, and the main content of economics is technology. If politics cannot be left to the experts, neither can economics and technology.' (Schumacher 1993, p.130)

As was established in Chapter 1, the participation of local citizens in shaping the decisions that have traditionally been made on their behalf by 'experts' is a topic of long-standing concern in the development studies literature and, more recently, in the Science and Technology Studies literature with its predominant focus on industrialised countries of the North. The above statement by Schumacher, originally published in the 1973 edition of *Small is Beautiful*, expresses the *raison d'être* of the participation movement which, despite having emerged since the beginning of the 20th century, did not gain momentum until the 1970s (Pandey 1998). The statement, typical of arguments presented in the participatory development literature, essentially challenges conventional understandings of the way that technology and the market, regarded by Northern-affiliated outsider organisations as indispensable tools for development in the South, should be governed and harnessed towards development that is meaningful for citizens in those countries. Schumacher's counterproposal of intermediate technology, or 'people's technology', presupposes careful consideration of the conditions of the poor majority in developing countries whom technology and market infrastructures are meant to serve. The development of intermediate technology and market solutions therefore tends to be participative in nature, and in this sense it can be seen as an antithesis of the prescriptive

technology transfer model which, according to Jasanoff (2002), is keen to make up for the perceived technological deficiency of poor societies by bringing them up to date with what has already been achieved by their rich counterparts.

The accounts of the development of improved cooking technologies in Nigeria and Kenya given in Chapters 4 and 5 of this thesis can be broadly divided along these lines: while Project Gaia and CASL's work in Nigeria has relied to a large extent on the transfer of 'best available technology' that has been proven to work well in a niche market in Northern contexts, Practical Action's work in Kenya has sought to address the issue of energy poverty from the ground up, taking local citizens' needs and resources as the starting point and engaging them in technology and market development processes.

This chapter examines the discourses and performances of citizen participation (and non-participation) in the development of stove technologies and markets towards the end of alleviating energy poverty among target populations in Nigeria and Kenya. Using empirical data from the stove programmes under consideration, the chapter addresses the question of how a context-responsive approach combines with the neoliberal ideal in view of outsider organisations' objective to improve energy access for the poorest households in both countries.

In the first section, data obtained from key project documents and interviews conducted in Nigeria are employed to illustrate a significant shift in philosophy regarding citizen participation in the development of improved stove technologies. At the outset, the approach reflects

intermediate technology principles, but changes to one based on a model of technology transfer. Both local citizens and outsider organisations play a role in facilitating this shift. A discussion of the technological and market networks required to successfully implement the CleanCook/Cassakero project leads us to conclude that citizen participation is not just a desirable element of stove programmes aimed at alleviating poverty, but is fundamental to arriving at contextually appropriate solutions. The second section mainly uses data from individual interviews with women in Kenya to highlight the successes and limitations of Practical Action's participatory approach to developing an intermediate marketplace for dissemination of its smoke alleviation interventions.

The third section engages the case of the Practical Action stove programme to analyse the structure of the externally-initiated stove project and highlight the power relationships which in reality inform the degree of context-responsiveness afforded outsider organisations in participatory development scenarios. The analysis is based primarily on data from interviews conducted with members of Practical Action staff. The final section discusses the impact that the different approaches taken by Project Gaia/CASL and Practical Action in establishing local markets for improved cooking technologies have had in addressing the energy needs of the poorest in Nigeria and Kenya.

6.1. Changing Discourses of Participation: Towards an Expert-led Approach to Stove Development in Nigeria

This section examines the history of improved stove development efforts in Nigeria from 1997 onwards by the Centre for Household Energy and the Environment (CEHEEN), the local non-governmental organisation which,

as discussed in Chapter 4, later evolved into Project Gaia Nigeria. The discussion here captures the earliest attempts by the local organisation to develop appropriate solutions to what it identified to be the most pressing energy challenges faced by the majority of the Nigerian population. However, as will become apparent, the introduction of the CleanCook technology by Project Gaia coupled with new developments on the international development policy scene precipitated a shift in CEHEEN's perspective regarding the gravity of the problem and what would constitute an appropriate response. The section further elaborates on an observed distinction in the organisational strategy regarding the contexts in which local participation in stove projects is considered desirable, one which signals a movement away from a context-responsive implementation approach towards the privileging of an expert-led approach.

The section relies primarily on data from interviews with staff of Project Gaia Nigeria and CASL and with local citizens in middle-income households in Warri, one of the nine locations involved in the CleanCook pilot project. Supplementary data are provided by relevant official documents prepared by CEHEEN on the Improved Egaga project which, as indicated in Chapter 3, proved inaccessible in the field.

6.1.1 The Improved Egaga Stove as Appropriate Technology

In a 2002 CEHEEN report outlining the organisation's basis for implementing the Improved Egaga intervention, the gravity of the household energy problem in Nigeria was spelt out as follows: as a consequence of widespread poverty in the country, 80 percent of the population, most of whom live in rural communities, rely on fuelwood and

other sources of solid biomass to meet their cooking energy needs. In the report, CEHEEN established that this 'unwholesome trend' is further aggravated by the widespread use of inefficient technologies to burn biomass fuels: an estimated 98 percent of the biomass used domestically is burnt over open fires, mostly on unvented inefficient stoves, with the effect that high levels of indoor air pollution are produced, leading to high mortality and morbidity rates particularly within rural households (Obueh 2002).

To further underscore the magnitude of the problem, the CEHEEN report cited a 'startling' 1992 document published by the Federal Environmental Protection Agency of Nigeria in which about 50 million Nigerians were reported to be directly affected by deforestation due to declining fuelwood supply. Galvanised into action by the apparent gravity of the problem, CEHEEN launched an 18-month baseline study in 1997 in order to determine cooking energy demand and supply patterns in two communities located in the delta region of Nigeria. According to Obueh (2002), the results of the CEHEEN baseline study reflected the trends reported by the Federal Environmental Protection Agency, and even went on to suggest that the problem actually existed on a far greater scale than was generally assumed: the baseline results showed for instance that in some communities, 'all valuable trees within a 25-km radius had been lost to... an unrestrained exploitation of fuelwood over the years' (Obueh 2002, p.4). CEHEEN's articulation of a link between deforestation and fuelwood use in the late 1990s illustrates the disparity highlighted in Chapter 2 between specific local studies which disproved the link as early as the 1980s and global stove development practice.

At the time, CEHEEN expressed particular concern over the observation that no coordinated action had yet been taken to address the excessive use of fuelwood by the teeming poor in spite of the threat posed by the trend to the environment. Obueh (2002) contrasts the 'inaction and official neglect' (p.2) of the issue in Nigeria with the tremendous efforts that had been made by government and non-governmental organisations in China, as well as in Kenya and Sri Lanka on a smaller scale, to address similar problems. It should be noted however that the CEHEEN report did not take into consideration the peculiar socio-economic conditions - described in Chapter 2 of this thesis - under which the 'positive impact' of the improved stove programme in China, for example, was recorded.

CEHEEN concluded at length that the solution to the growing household energy problem in Nigeria was to 'appropriately design cooking devices' (Obueh 2002, p.2) to improve upon the inefficient ones used in poor households across the country. The preliminary telephone interviews conducted with CEHEEN/Project Gaia Nigeria staff ahead of the main round of fieldwork yielded pertinent data on the contextual realities which informed the decision to implement the Improved Egaga project. In Oghara and Benin, the two baseline study communities, the traditional Egaga stove was identified as the predominant stove used for cooking in the region. Essentially a locally manufactured metal stand used to support a cooking pot over an open fire, the Egaga stove had been in use in the project communities for over a hundred years. The bare bones structure of the traditional Egaga however means that much of the fuelwood stacked within its confines is exposed to the open air during cooking. Consequently, when the fuel burns, only a fraction of the heat energy is directed to the cooking pot placed over the fire.

CEHEEN set out to develop 'an appropriate cooking energy technology that potentially uses below 40% fuel than the traditional technology, and yet attaining more than 50% efficiency, while also reducing smoke impact by 60%' (Obueh 2002, p.3). In approaching this task, CEHEEN worked with two local women's groups, one in each community, to identify the preferences of local stove users, most of whom were women (Obueh 2001). An improved version of the Egaga stove was developed which was capable of saving up to 40 percent of the fuelwood used in the traditional model (Project Gaia Nigeria Staff 1) and conserving up to 60 percent of the heat dissipated by the latter (Obueh 2001). Upon testing of three different stove models – the improved Egaga stove, a sawdust-burning stove, and a charcoal burning stove in both communities, the improved Egaga stove was identified as the most preferred option (ibid.). The major reason given for its widespread acceptance was the familiarity of the technology leading to ease of adaptation (Project Gaia Nigeria Staff 1). The ensuing pilot activity saw the improved Egaga being disseminated in the two project communities to 5,222 households, selected on the basis of people's willingness to be involved and the degree of their susceptibility to the harmful effects of biomass fuel use (ibid.).

The Improved Egaga project was marked by a number of features which are of interest to this study. As can be deduced from the project reports cited above (Obueh 2001, Obueh 2002), a degree of local participation was incorporated into the project: women, who were the end users of the technology, were engaged at some level of decision making. Further, artisans in the local metalworking industry were involved in development of the technology and were employed to undertake production of the

stoves disseminated in the pilot project (Obueh 2001). In essence, CEHEEN incorporated existing local skills and experience into development of the project - an approach which, according to Obueh (2002), facilitated the identification of solutions that were appropriate to local requirements and that suited users' socio-cultural context. In summary, although it would appear from the accounts given in project reports that the opportunities for citizen participation could have been harnessed to a greater extent on the Improved Egaga project, it is clear that the project strategy was premised upon a perceived need to start from the existing realities and experiences of poor households in the two pilot communities.

6.1.2 Analysis of a Technological Transition: From the Egaga to the CleanCook

In 2001, the Improved Egaga project received international recognition with an award from the prestigious Ashden Awards for Sustainable Energy based in the United Kingdom. That year marked the end of the first phase of the project, following which an ambitious long-term goal was announced by CEHEEN to deliver 17.5 million improved Egaga stoves throughout Nigeria by 2010 (Ashden Awards website). In spite of this seemingly good start however, the Improved Egaga project did not progress beyond the first phase. As indicated in Chapter 3, when I got to the field in October 2009 with the intention of investigating the project, I discovered that CEHEEN had put a complete stop to it much earlier and had cut off every contact with the project communities. This made it difficult to unearth up-to-date information about the project. In the course of interviewing ex-CEHEEN staff now turned Project Gaia Nigeria staff, I experienced difficulty asking questions directly related to the Improved Egaga project. This was primarily because project staff, who invariably

regarded the project as an obsolete subject, were not particularly eager to talk about it. I however found it productive to ask questions investigating the reasons behind the shift of organisational focus from the wood-fuelled improved Egaga stove to the alcohol-fuelled CleanCook stove.

It is interesting to note that the termination of the Improved Egaga project coincides roughly with the introduction of the CleanCook technology into Nigeria in the early 2000s. As explained earlier in Chapter 4, CEHEEN initially began its collaboration with Project Gaia as a local partner organisation, and eventually merged with the latter to pursue the objectives of the CleanCook project in Nigeria:

'CEHEEN started as an NGO, was registered as an NGO. CEHEEN was promoting the Egaga stove that won the Ashden Award. So, in 2003, CEHEEN brought Project Gaia to Nigeria and the teams now formally merged with Project Gaia as one organisation. But not as an NGO anymore, as an alcohol stove group.' (Interview Project Gaia Nigeria Staff 1)

The above statement demonstrates how CEHEEN's original mission gave way to the new one introduced by Project Gaia, an outsider organisation which was at the time seeking access points into resource-rich, energy-poor countries for the CleanCook technology. According to ex-CEHEEN staff, the shift in the organisation's focus was further legitimated by new developments on the international development scene which prompted a realisation of the inadequacy of the improved Egaga technology to tackle the scale of the problem identified for biomass users:

'Just about then, the WHO came out with their report, that over 6 million people – deaths - are recorded every year from the use of biomass stoves. I mean, they said, even the best of biomass stoves still do not, is still not able to alleviate the problem at hand. And that's the problem of alleviating, reducing the incidence of indoor smoke.

And, because, stove efficiency in combustion is directly related to how efficient the stove is... Because the target is to cut down smoke completely. The only way you could do that is to use a clean-burning fuel. A cleaner fuel. Of course, if you're going to use a cleaner fuel, you need a technology that will complement the fuel. In other words, you need, you also need clean-burning devices to burn the clean fuels.' (Interview Project Gaia Nigeria Staff 1)

The latter part of the above statement reflects Project Gaia's prescription regarding what the most appropriate solution to the identified problem would be - a move away from traditional biomass stoves and fuels towards a more modern cooking technology. Local staff of CEHEEN/Project Gaia Nigeria have since 'keyed in' to this expert recommendation, and now dismiss the improved Egaga as 'just a biomass stove' (Project Gaia Nigeria Staff 1). As such, the view of the local organisation has changed with regard to its definition of what would constitute an appropriate solution to the energy poverty challenges faced by local citizens in Nigeria. Interview data discussed below show that the improved Egaga stove has evolved in CEHEEN's discourse from a technology that responded appropriately to the energy needs of poor biomass users in Nigeria to one that cannot adequately cater to the needs of the cross-section of energy users in the country:

'Biomass stove, we discover, discriminates. Biomass stove can only fit into a particular income group, income strata in the society. So, it discriminates. So, a technology that discriminates as we thought, would not be the best of options in resolving household energy crisis.' (Interview Project Gaia Nigeria Staff 1)

The point of the above statement is that, in light of the varied energy use patterns across the low, middle and high income groups in Nigeria, the improved Egaga stove 'discriminates' against energy users in the high and middle income groups who have been shown in Chapter 4 to be higher up the energy ladder than those in the low income group who are the major

users of biomass fuels. Contrasting the improved Egaga technology with the CleanCook technology, another member of Project Gaia Nigeria staff had this to say:

'Egaga was just, it was not representative enough, taking into consideration these criteria that we looked at.' (Interview Project Gaia Nigeria Staff 2)

By 'representative', the above interviewee was referring to the selection criteria used in the pilot phase of the CleanCook project described in Chapter 4, which ensured a spread of participating households across the low, middle and high income groups in both rural and urban areas of project locations.

Some of the responses given by project staff indicate that the move away from the improved Egaga technology was not only a response to the external stimulus provided by international organisations; it was also a response to growing pressure from energy users on the ground. The claim is that CEHEEN's transition was also fuelled by the general tone of the feedback received from energy users in poor households within local communities:

'Yeah, it was in the course of the pilot studies in early 2000 on the Egaga stove, the people's response, the people that used it, that there was this unanimous – I mean, it was just unanimous... Everywhere we went in the course of the pilot studies... You find out that people needed to move up the energy ladder. People were desirous to have something different.' (Interview Project Gaia Nigeria Staff 1)

It is apparent from the above statement that CEHEEN has interpreted local citizens' desire to 'move up the energy ladder' to mean a specific need for the CleanCook technology. The observed relationship between needs and desires would however preclude such an assumption: according to

Dowding (1996), a desire for something under a particular description can be fulfilled by any object that falls under that description, and does not necessarily translate into a need for a particular object.

The statement was followed by the assertion that 'in fact, there would be no CleanCook without the Egaga' – a submission which, in the context of the conversation, implies that CEHEEN would not have identified the need in Nigerian households for cleaner cooking technology had the initial, albeit less satisfactory Egaga technology not been deployed. Indeed, this discovery of people's desire for a better cooking technology is regarded by project staff as one of the most significant outcomes of the Improved Egaga project. The following interview exchange with Project Gaia Nigeria Staff 1 buttresses this, and further reveals a distinction in the significance accorded citizen participation in the development and introduction of each technology:

TS: According to the documentation that I read, there was some element of participation in the Egaga. I'm wondering if the same was present in the CleanCook.

PGNS: It was more, it was more with the CleanCook.

TS: Okay, how come?

PGNS: Yeah, because we felt that more people embraced the CleanCook. They felt it was a better technology, in terms of quality.

TS: Okay, though the kind of participation I'm talking about, you talked about some women's groups that you worked with, with the Egaga and how they actually contributed to identifying how the technology could be made better.

PGNS: Oh! Yeah, yeah. The participation was more with the, local participation was more with the Egaga than the CleanCook.

TS: Why was that?

PGNS: Yeah, because CleanCook found its market more, I mean it was easier for the middle class, the kerosene users and the LPG gas users to embrace the CleanCook than the Egaga. I think apparently because of the income...

It is interesting to note that the project staff in the exchange above has equated 'embrace' of the CleanCook technology by middle-income households with their participation in the project. This indicates that the focus of 'local participation' for CEHEEN/Project Gaia Nigeria has shifted from poor energy users to those higher up the income pyramid who are better positioned socio-economically to participate in the market. This leads us to another important insight conveyed by the exchange, which is the thinking that the degree to which local participation is required to facilitate the appropriateness of an external intervention is dependent on the income level of users and their position on the energy ladder. By associating the lower degree of participation by the middle classes in implementation processes with their higher capacity to participate in the CleanCook stove-and-fuel market, the implicit suggestion is that citizen participation in technology and market development is more desirable as a component of stove projects targeted at low income households at the bottom of the energy ladder.

The data gathered from CleanCook pilot participants during fieldwork conducted in a middle-income residential complex in Warri, one of the pilot project locations, appear to support the above suggestion. Of over 3,000 households located in the complex, only thirteen took part in the pilot study. Of those project households, I was only able to gain access to five, as indicated earlier in Chapter 3. Unlike the women in the Kenyan communities involved in the study, the women interviewed in Warri were all educated beyond secondary level and worked in various professional

capacities: in the sample group, there was a retired accountant, a retired nurse, and two schoolteachers. Consequently, these women are more empowered socially and economically, and generally have a wider range of options than their less educated counterparts in the Kenyan sample. I observed in the course of fieldwork in Warri that the women diversified their cooking energy sources as widely as their incomes allowed them to - typically using the cheapest available option that would suit their cooking purpose at any point in time. However, the women generally oscillated between kerosene and LPG: kerosene was the default fuel used for meals that took longer to cook, while the more expensive LPG was usually the fuel of choice when speed was the objective. For this group therefore, the CleanCook stove is likely to constitute a cheaper, second or third alternative to kerosene and LPG cookers depending on availability and appropriateness for the cooking task at hand.

Generally, the women in the interview sample seemed quite satisfied with the performance of the CleanCook stove and fuel and didn't seem bothered that they were not more involved in the details of project design and implementation. What mattered most to them was that the stove performed as advertised and that fuel supply would be as constant in the commercial phase as it was in the pilot phase. The following statement by one of the women is representative of the overall positive response to the project in those middle-income households even though it did not incorporate citizen participation as a key component:

'It was an interesting experience, like all other projects. You're exposed to being monitored and questioned intermittently by different people coming to see you in the house and so on and so forth. I'm used to it, so I quite enjoyed it. Actually, [the project staff] introduced it to me, he said there's a project going on now, and what it entails, to

utilise the available resources for a cheaper way of, and less hazardous way of cooking. So he actually told me, but not the details. All I'm interested in is something to use, that's all. That's it.' (Interview Warri Citizen 1)

This finding appears to pose a challenge to theories of participation which propound that the development objectives of outsider organisations cannot be fulfilled without the involvement of local citizens in the planning and development phases of a project, particularly one that is technological in nature. It should however be noted that the acceptance of the CleanCook intervention cited here is situated in a different context than the largely rural, low-income or subsistence contexts in which the Practical Action stove programme for instance, and indeed the majority of improved stove interventions, are implemented by outsider organisations in poor countries. The data presented here only account for middle-income urban households which have been shown in Chapter 4 to be mostly kerosene users; they do not demonstrate the impact of the project on low-income, rural biomass users within the project locations. As explained in Chapter 3, I was unable to gain access to rural or urban households classified by the project as being within the low-income range; however, the analysis of baseline study reports provided in the final section of this chapter gives some insight into the impact that the CleanCook intervention can be expected to have on this group of energy users.

6.1.3 The Cassakero Production and Market Network: A Contextual Analysis

So far this section has chronicled the efforts of a local non-governmental organisation, initially working alone and then in collaboration with an international organisation, to promote the uptake of improved cooking technologies amongst energy users in Nigerian households. The section

has noted how those development efforts exemplify a shift from an intermediate technology development model incorporating a degree of citizen participation to one based on the transfer of a novel technology from a rich country in the global North to a relatively poor country in the South. Within the framework of the technology-led programmes implemented at various times by these organisations - i.e. the locally-conceived Improved Egaga project and the externally-driven CleanCook project - it is interesting to note that the latter, based on a technology transfer model, is deemed a more appropriate response to local energy problems by the implementers as well as by a section of local energy users. This is perhaps not surprising, as the collective testimony of pilot project participants illustrated above with relevant interview excerpts suggests that the CleanCook technology can potentially offer a wider range of 'improvements' to users than the improved Egaga can. It must however be pointed out that the appropriateness of the technology - particularly its 'novel' fuel production element - to the social, economic and political context of Nigeria will be tested during implementation of the market-based Cassakero programme introduced in Chapter 4 as the local adaptation of the CleanCook project.

Both components of the Cassakero ethanol fuel production plan - the agricultural (primary) component and the manufacturing (secondary) component are dependent on technological and policy requirements which are only just beginning to be incorporated into the local knowledge and practice base in those sectors (q.v. Ohimain 2010, Oniemola and Sanusi 2009). In principle, the agricultural component of the project does hold some developmental promise, as elaborated below by a member of CASL staff:

'If Africa would turn to cassava to substitute import of petrol, that would provide a lot of what I call the framework, or the springboard, for rural industrialisation, for rural wealth creation and employment generation, and also for economic transformation. Because when you import, you create very few jobs. But when you produce the alternative from agriculture to replace what you import, you'll require a lot of hands to go back to work, a lot of idle lands to be put back into productivity. The bandwagon effect is amazing.' (Interview CASL Staff 1)

As CASL Staff 1 further noted, achieving the above aims would contribute to curbing the trend of migration from rural to urban areas in Nigeria, thus addressing the precise problems of mass unemployment and mass migration that Schumacher intended for intermediate technology to solve. There are signs that the stage is being set for all this to happen: according to Ojoma (2009), the Nigeria Cassava Growers Association has already signed a contract worth ₦56 billion (approximately £247 million) to make provision for its members to supply 8 million tons of cassava tubers to the Cassakero project when it commences.

The model of 'localised production for local sale' (CASL Staff 1) on which the project is expected to run also engenders some optimism that the benefits of the programme will be retained locally. The deliberate strategy to locate each ethanol micro-distillery at close proximity to the feedstock-supplying farms is meant to safeguard the mutual interests of farmers and producers as well as encourage sale of the final product to local markets. The initial capital outlay specified during the multi-stakeholder meeting I observed in the field came to ₦3.3 million (£13,200). Thus the micro-distillery investment is a substantial one - so that even with the soft loans available to potential investors, the enterprise can still prove to be a costly one for the 'small' businesses involved. This is likely to be the case especially as it came to light over the course of the stakeholder meeting

that there are a number of other substantial costs - such as purchase of land and other supporting equipment - that are not covered by the credit mechanism. CASL however claims to be making the investment opportunity accessible to large sections of the population by encouraging individuals to band together in local cooperative groups and jointly apply for investment slots. All this is meant to ensure that the benefits of the project largely accrue to citizens of local communities, thereby raising their welfare and living standards. In all of the above respects therefore, the Cassakero project can be said to be targeting the same goals as a project based on intermediate technology principles would. There is however a fundamental requirement of those principles that the project plan needs to take into account if it is to be viable: that of consideration of the wider context.

As described earlier in Chapter 4, the industrial cassava cultivation programme set in the policy framework of the NEPAD Pan-African Cassava Initiative is being developed in collaboration with the International Institute of Tropical Agriculture (IITA). The IITA is one of the locally-hosted research centres of the Consultative Group for International Agricultural Research (CGIAR) which, Jones (2005) notes, produces generic knowledge that is often not contextualised by national agricultural research systems in host African countries as was originally intended. Consequently the organisation has invested heavily in agricultural research on the continent since the 1970s, with 'disappointing' results (ibid.). The IITA's role in the Cassakero project is to provide expert scientific input by developing improved varieties of non-edible 'sugary' cassava species dedicated to ethanol production (CASL Staff 1). These high-yielding varieties are then expected to be used by local farmers, employing

modern agricultural equipment and 'improved' farming practices, to ensure bumper harvests of ethanol feedstock. Financing for all these new inputs is ensured by the soft loans available to the farmers on the programme. Having thus covered the scientific, technological and financial bases with respect to cassava cultivation, CASL is confident that feedstock supply will proceed unhindered.

Extensive arguments have been made in the literature (for example Chambers et al. 1989, Scoones 2005, Scoones and Thompson 1994) as to the inadequacy of applying standard technical, economic and policy prescriptions to agriculture in different contexts. Such arguments point to the failure of standardised approaches to substitute for deeply participative forms of interaction with farmers in specific local contexts to develop contextually relevant agricultural solutions. The Cassakero plan to launch a nationwide cassava cultivation programme with thousands of farmers scattered across the seven ecological zones in Nigeria (Okwa et al. 2009) certainly needs to take cognisance of this. According to Scoones et al. (2005), 'African agriculture' cannot rely only on generic scientific, technological and policy prescriptions given by 'expert' institutions – comprising, in the case of the Cassakero, organisations such as the IITA and NEPAD. Instead, more localised, painstaking participatory research needs to be carried out right down to farm level, so that the totality of the livelihood contexts of local farmers can be understood and factored into scientific research and policymaking.

With regard to processing of the raw material, CASL and Project Gaia expect that micro-distillery investors will be easily trained to operate the system for ethanol production. However, looking beyond the immediate

results that may be obtainable with this kind of targeted training programme, Schumacher (1993) asserts that if any technological superstructure is to be viable, it will require an 'invisible' support system, one that is intrinsic to the culture and organisation of the host country/society and does not have to be imposed upon it from the outside. According to Smith (2009), the workings of such a support system are developed so subliminally that they may not be completely understood even by the people that constitute it. Contrary to the working assumptions of many technology transfer-led projects therefore, it is not conceivable for that kind of support system to be incorporated into a single project; it must have developed over the course of a society's history. Such support systems are invariably present at the source of a technology since, as Jasanoff (2002) observes, every technological artefact is shaped by the very interaction of those invisible, 'non-human' factors in the society that produced it. To take for granted the viability of a technology in whatever context it is employed is therefore to ignore the most important, albeit intangible, preconditions for its performance.

Thus Project Gaia Nigeria and CASL, as much as they seek to offer a more attractive alternative to an intermediate technology such as the improved Egaga stove, may need to take additional steps to address the invisible gap that exists between the CleanCook technology and its surrounding context. Jasanoff (2002) suggests that issues relating to the inappropriateness of technologies in diverse contexts may be resolved by 'supplementing' the kind of top-down expert processes that have driven the CleanCook/Cassakero project with the sorts of bottom-up deliberative processes that led to identification of the improved Egaga technology. However, recommendations in the participatory development literature -

particularly those informed by interactions with local citizens, such as Chambers et al.'s (1989) 'Farmer First' proposition - suggest that the development of contextually appropriate technological solutions to local problems is best facilitated not by supplementing, but by *starting* from the skills, resources, and experiences of local people - however rudimentary these may seem to the 'experts'.

The next section examines how an approach that starts with local citizens, not only in the development of technology, but also in its dissemination, can generate empowering forms of participation in local markets. The section takes a closer look at Practical Action's implementation of its Participatory Market System Development (PMSD) model towards achievement of the stove programme's economic empowerment objective, pointing to its successes and highlighting some of its limitations within the specific context of women's groups in West Kochieng location. It concludes that even when bottom-up principles are applied in engaging local citizens in externally-initiated interventions, close attention needs to be paid to ensure that equitable results are achieved.

6.2. Participatory Stove Market Development in Kenya

In improved stove development practice, a distinction is usually made between the pilot and scaling up phases of a programme. This distinction is evident in the improved stove programmes in Nigeria and Kenya which have been discussed so far. Small-scale pilot projects are seen as performing a vital function in providing a platform for developing and testing the viability of solutions offered by outsider organisations to the household energy challenges of local populations (Rouse 2005). Notwithstanding the instrumental relevance of pilot projects however,

Rouse (2005) avers that, particularly in light of the fast-approaching 2015 deadline set by the United Nations Millennium Development Goals, scaling up of problem-solving interventions is essential if those solutions are to become widely available to the world's poor.

While there is little debate over the importance of scaling up improved stove projects, there is a considerable degree of uncertainty in the stove development field as to what exactly would constitute an effective approach to scaling up those interventions. The discussion of the second phase of international stove development efforts provided in Chapter 2 detailed how a large-scale stove programme – the National Programme on Improved Chulha – was run on a partial subsidy model by the Government of India. A description was also given in Chapter 5 of the relatively smaller subsidy-driven Women and Energy project – also a 'Phase 2' project - facilitated by GTZ in Kenya. In retrospect, these experiences were considered largely negative by experts in the field as the subsidy element was thought to have hindered the potential of those projects to continue unaided.

As noted in Chapter 2, following the general critique of the subsidy-based model, major funders of household energy interventions have begun to emphasise market-based stove dissemination models (Bailis et al. 2009). An example is the Shell Foundation which now promotes 'enterprise solutions to poverty' whereby the stove developers it supports are expected to become more innovative, efficient and profitable at what they do as a business (Hoffman et al. 2005). Brewis (2005) argues for the need to 'copy the private sector' (p.5) in developing stove dissemination strategies, particularly with respect to the emphasis that the sector places

on the profit motive, marketing and advertising. Increasingly, stove development organisations are subscribing to the ideology that the only way improved cooking technologies can reach the millions of poor households that need reaching is to adopt the practices associated with a fully functioning market system of the kind found in rich countries.

Today, very few voices of caution or dissent can be heard amidst the growing enthusiasm to establish market routes to scaling up cooking interventions. Among those are Bailis et al. (2009), who argue that a combination of long-term state and/or donor support and market-based strategies is needed to establish enduring stove enterprises in developing country contexts, and O'Neal (2005), who argues for the continuance of partial subsidy models on the basis that no matter how effective or low-priced cooking interventions are, those households in various countries of the world that are most in need of them cannot afford them. O'Neal (2005) further states that commercialisation may well be a good model to adopt among the 'somewhat affluent' in developing countries, but among the poor, subsidised stoves provided as a component of a broader poverty-reduction programme can be an effective package to mitigate poverty. These contrary perspectives articulated by Bailis et al. and O'Neal reflect an understanding of the context of poverty in which most stove interventions are implemented, rather than an unquestioning belief in the 'power' of the 'market' to provide appropriate solutions in all contexts.

Chapter 5 showed how Practical Action's stove programme, despite being specifically targeted at improving the lives of the poor and marginalised in Kenya, has historically favoured market-based dissemination approaches over the giving of subsidies and handouts. Apparently, this long-standing

philosophy is at least partly rooted in the understanding that if the full costs of an intervention are not passed on to local users, they may find it difficult to cultivate a sense of ownership or responsibility for the project. This is evident from the following statement - made in response to a question regarding the likely impact of handing out free stoves to households that need them - by one of Practical Action's Community Resource Persons, a local woman who retails smoke alleviation interventions in West Kochieng location:

'Even if you give them freely, they will not use. That's why they have to buy. They'll say that this *jiko* is for Practical Action, not theirs. Or it is for Anna¹⁸. Anna, come and see your *jiko*, whatever. And that's what they were saying even by the time they were sponsoring their kids. 'This child is for Speak for the Child'. You go and tell the Speak for the Child that their child is sick. And the child is mine. Now I want [them] to come and pick the child from my house to take to the hospital.' (Interview West Kochieng Citizen 5)

Practical Action's subscription to a market approach however seeks to take into account the realities of the socio-economic contexts into which smoke alleviation interventions are introduced, in effect privileging the needs of the poor over the inflexibility of market operations. This is the basis of the PMSD model geared towards meeting the organisation's 'Aim 2' to make markets work for the poor. Chapter 5 has noted how poor communities targeted by the Practical Action stove programme, in spite of geographical proximity to market towns, often have difficulty participating fully in conventional market environments. In attempting to create market-based dissemination models to serve those populations, the programme works with community-based women's groups to establish small-scale supply

¹⁸ This is a reference to the interviewee herself. The name has been changed here to maintain confidentiality.

chains for smoke alleviation interventions, as illustrated by the implementation of the USEPA project in Kadibo division.

It must be noted that the PMSD approach is different from that employed by Cassava Agro-Industries Services Limited (CASL) in creating a market for the CleanCook technology in Nigeria which, though planning to incorporate elements of subsidy through carbon financing, is much closer to a conventional market approach. In the multi-stakeholder meeting I observed in the field, the interests represented were mainly those of 'high-level' actors in the Cassakero project. The observations made during the meeting indicated that the interaction between CASL - the organisation in charge of overall implementation of the project - and prospective 'marketers' of the technology was minimal. It is apparent from the statement below that implementation of the market phase is based on a deliberate non-participation strategy in which prospective investors are more or less required to leave everything to the experts:

'We implement this project through thousands of consultants, sub-consultants. We do it as a turnkey service. Once you sign up by filling that expression of interest form, and you pay your counterpart contribution, we link you to the loan source. And as soon as you get a loan, you acquire your plant. We contract the entire process - the process of developing your business plan, feasibility study, feedstock plan, to overseeing the construction, civil works, installation, commissioning, all as a turnkey plant with different subcontractors implementing, and we coordinating implementation.' (Interview CASL Staff 1)

This chapter later considers the likely effects of CASL's expert-led approach to market creation on the poorest at whom the CleanCook technology was initially targeted. On the other hand, Practical Action's more context-responsive approach to market development appears to

have been quite specifically developed with consideration for the particular socio-economic requirements of its target populations. The chapter also reflects later on the question of whether this approach translates into substantive impacts for poor communities in the context of the organisation's donor-funded stove programmes. Presently, the chapter turns to examine some peculiarities of the unconventional market environment in which Practical Action's commercialisation efforts are focused.

6.2.1 *A Different Kind of Marketplace*

Chapter 5 provided a description of socio-cultural and economic conditions in West Kochieng and Kasewe, two locations in Kenya's Nyanza province, to provide a frame of reference for subsequent analysis of the impact of Practical Action's intervention in that region. The effect of tradition on ways of living and interacting was shown to be very significant in those locations. I observed, in the course of fieldwork in those communities, that some of the traditional and time-honoured practices valued by the local citizens would be considered as violating the modern economic norms of commoditisation and profit maximisation. A good example is the way that land is appropriated for building and farming purposes. Empty structures belonging to dead people are retained as they are, rather than being sold off or turned over to more 'lucrative' purposes. In fertile areas, individual *shambas* grow progressively smaller as land is divided and re-divided amongst however many sons are born into the household. Smaller farm plots definitely mean a decrease in individual farm yield, yet family land is divided as many times as is necessary because that is the way prescribed by tradition. As such, the widely proclaimed 'efficiencies' of a modern market system do not come into play in these contexts.

In those communities, cash circulation is low and trade-by-barter is still a valid form of exchange for goods and services. In Kasewe where Upesi stove liners are manufactured locally, it is possible for women to 'pay' for smoke alleviation interventions with maize cobs or chickens when cash is not available (Kasewe Citizen 2). In West Kochieng, retailers have to pay upfront when they purchase stove liners in bulk from Keyo women's group, and therefore they only accept cash payments from citizens further down on the stove supply chain. However, informal arrangements can sometimes be made with the retailer for single payments to be split into 2 or more instalments (West Kochieng Citizen 3). As such market exchanges in this system still have an overt relational touch - more so than the modern market model which, though designed in principle to be impersonal and free of any sense of moral obligation between parties (Berthoud 2010), is now routinely re-engineered by attempts to build consumer 'loyalty' in the marketplace.

According to the women who run stove enterprises in West Kochieng, conventional marketing and advertising tactics such as the use of 'memorable' radio jingles as suggested by Brewis (2005) are not very effective in reaching prospective customers. The women understand that their peers in the community respond better to more personalised forms of advertising such as one-on-one marketing and public demonstrations, and they respond accordingly:

'Advertising on the radio would help, but the more effective one is, bring it to the market and to public *barasas*. Direct marketing. Because some people who have never heard about it don't believe. They think, maybe there's some spirit inside there that will cook the food. So when they demonstrate, the people are actually ready to wait

and see. And when they see that, then they actually buy and some will say, 'okay, I'll give you the deposit' or they now place their orders that they're going to buy. After seeing. So the direct marketing has really helped.' (Interview West Kochieng Citizen 1)

Besides the local market and community *barasas*, other popular demonstration outlets for stoves include schools and churches - places where community members gather for social purposes not normally associated with buying and selling. Though sales and marketing of interventions are done individually, the burden of advertising is sometimes shared amongst members of a women's group.

Credit management is another aspect of this marketplace that has been modified to fit the requirements of local enterprise. During the focus group discussion held with the members of Keyo women's group, it was highlighted that the credit models which have been proven to work best are those that, like the COSALO scheme described in Chapter 5, harness the power of the group. Such schemes rest on the principle that members who take out individual loans will hesitate to default on repayments because they are accountable to their fellow group members, which is often the case. However, the peculiar challenges of living on low incomes in rural areas can sometimes undermine that premise: according to PA-EA Staff 3, a woman may take a loan for the purpose of expanding her small business, but the moment an emergency shows up in the form of a sick or hungry child, she promptly diverts the funds to healthcare or food as the case may be. The relatively flexible credit provisions of this marketplace, though not conducive to a conventional profit-maximising enterprise model, are essential to the viability of 'market-based' interventions seeking to improve aspects of citizens' livelihoods.

These are some of the contextual realities which have informed Practical Action's efforts to establish a market infrastructure for dissemination of its improved cooking interventions. In using women's groups as the focal point of local stove enterprise, the stove programme essentially harnesses the relational element of the marketplace to create production and marketing networks which are intended to generate empowerment opportunities that exceed the capabilities of any individual working alone. The next section discusses how this aim works in practice. The section shows with the aid of case studies from West Kochieng location that Practical Action's group enterprise model has indeed had empowering effects for the women, but these effects have not materialised evenly across the board.

6.2.2 Participatory Market Development and Women's Empowerment

This section examines Practical Action's expectations of the participatory stove market model implemented in West Kochieng against the actual experiences of local women on the programme, in the process highlighting the assumptions and limitations inherent in the strategy. The data employed were obtained during interview sessions with four women in the location, all of whom belong to groups which were, at the time of fieldwork, involved with the USEPA project launched by Practical Action in January 2009. Prior to the USEPA project, Practical Action had worked with those women's groups between 2005 and 2007 to establish a market for improved cooking technologies in the location. Of the four groups originally involved in the stove enterprise project, only one group was widely known to be 'active' in production and sales of the improved cooking technologies at the time of fieldwork in November 2009. Three of

the four interviewees cited in this section belong to this active group, while one is a member of one of the less active groups.

In principle, all members of the four participating groups were eligible to be trained on the project with Practical Action. However, Practical Action considered it impractical to train all members of the four groups (with an average of twenty women per group) given the limited project funding available to the organisation. Training therefore had to be done selectively: no more than four women were put forward by each group to attend the original training sessions that took place in 2005. 'Training' involved teaching the women to manufacture and market various improved cooking technologies, particularly the Upesi stove, the Kenya Ceramic Jiko, the fireless cooker and the LPG stove. Since training the initial set of 2005, Practical Action has sponsored a few additional training sessions for some of the women, especially with the launch of the USEPA project in 2009. These comprehensive training sessions are usually structured as residential courses taught in locations outside of West Kochieng for extended periods of time, sometimes for up to one month. This presents a challenge to some women who find it inconvenient or impossible to be away from home for such long periods. Availability is therefore a consideration when selecting group members to attend any of the training sessions. Selection is always done within the group, without any influence from external actors. The following statement by one group member indicates that the selection process does not adhere to any 'rational' set of rules, but rather relies on members' perception of who amongst them has the right character/skill set to 'represent' the group:

'You just look for the qualities. Because if you're in my group, you will stay there almost for 3 years. At least I've known you. You know that

so-and-so can make this. So-and-so is good in this. So maybe the letter can say that we want two people per group. So you delegate. So-and-so, you should go to the training.' (Interview West Kochieng Citizen 5)

While every member of the group may not be able to attend formal training sessions, the project requires trained members to pass their acquired skills to their peers within the group and to women in other groups when they return to the community. This model has however not functioned as prescribed, as this statement by a trained group member shows:

'Yeah. It is good for somebody, if you're from the training to do the feedback to your group. Because you've learnt something new. But some people are not taking in. They don't see the need. We quote for them the materials. Then we say if you're interested you can bring such amount, we buy for you. Then you come, the day we're making ours, also for you to see how we're making the fireless. Only two people have done that.' (Interview West Kochieng Citizen 5)

In addition to the comprehensive training module described above, a few women in the four participating groups have also been trained by Practical Action to install Upesi stoves. Installation training is done within the location, so in principle it is more accessible to local women than the comprehensive training courses run outside the community. However, the majority of the women have not responded to this opportunity to the degree expected of them. Further, of the few who have been trained, even fewer have become established as successful installers:

'Even there's one we did, was it in September? We trained 14 [installers] from this location, and mostly from this sub-location. And only 2 from this sub-location is doing well. And the other 2 from that sub-location. Out of 14! After training they said that the work is so tiresome, they can't do it.' (Interview West Kochieng Citizen 5)

The structure of the Upesi stove supply chain requires an installer to have made a sale and taken payment before she can physically install the stove in a customer's kitchen. As explained in Chapter 5, the USEPA project gives the Upesi liners to retailers on credit, but this facility is not extended to installers when they purchase liners from retailers¹⁹. As such, an installer must have 'found a market' for a Upesi stove before approaching a retailer with payment and purchasing a liner. Neither installers nor retailers have any assurance of being able to make a sale on a regular basis, but the condition of upfront payment may contribute to making the job even more difficult or 'tiresome' (Interview West Kochieng Citizen 5, above) for installers. Therefore, even though Upesi installation offers attractive earnings, many women hesitate to pursue a full-time installation career and instead combine installation with a 'main' trade which may give lower returns but does so on a relatively regular basis. The experiences of three women - all members of the only 'active' stove enterprise group in West Kochieng - are now described in an attempt to illustrate the variable impact of Practical Action's intervention in the location from 2005 onwards.

The first individual to be considered is Group Member 1 who describes herself as the 'locational representative' for the Practical Action stove programme in West Kochieng. As the sole retailer of Upesi liners in the location, Group Member 1 has direct access to the credit facility provided by the project. As one of Practical Action's Community Resource Persons, she also receives logistical support to sell all of the other improved cooking technologies. This gives her economic advantage over her fellow group

¹⁹ A retailer is typically a woman who has undergone comprehensive training in manufacture and sales of various improved cooking technologies. An installer is further down along the stove supply chain and her involvement in the enterprise is usually more limited with respect to the scale of her enterprise and the range of technologies she promotes.

members who are mostly installers and do not receive the same level of support from the project. Formerly a charcoal seller, she has now left the trade and has committed fully to her job as the resource person for improved cooking interventions in her location.

Along with two other members of the group who attended the initial training course sponsored by Practical Action in 2005, Group Member 1 has gained more exposure on the project than most of her colleagues. As her fellow group member describes it:

'There are about 3 of them who were initially trained. So they're the ones who are like the experts. They know a lot about these stoves. So whenever there's something an organisation wants, it's really, mainly, the 3 of them. The other group members also have an opportunity, occasional opportunities, but now they are viewed as the pioneers, since they were the first ones to be trained.' (Interview West Kochieng Citizen 8)

The interviewee goes on to describe how the influence that Group Member 1 has in the community extends beyond the group, and beyond the Practical Action stove programme:

'There are some people in the community who are automatically known to have influence, or are known around the community, and [Group Member 1] is one of them. So if an organisation wants something, there are times the Chief just refers them to her. She has always been known, even before the stoves.' (Interview West Kochieng Citizen 8)

Group Member 1 holds the position of Secretary in her group. This is a somewhat obvious position for her given that she is better educated than many of her peers and is able to communicate relatively well in the English language. This is significant in the context of rural Nyanza, because such women are usually the ones chosen to 'represent' their groups in forums

where any degree of interaction with outsider organisations is essential. Thus the prominent role played by Group Member 1 in stove enterprise, apart from yielding economic advantages for her, has the effect of consolidating her relatively strong position within the group and in the wider community.

The second individual under consideration is Group Member 2, who is Chairperson of the group. She has installed Upesi stoves and sold fireless cookers since 2005. Prior to Practical Action's intervention, she walked around the location on most days selling second-hand clothes. Now she goes around telling people about her improved cooking technologies, and makes deliveries on any orders that she gets. She also gets invitations to train other groups in the location in fireless cooker manufacture and Upesi installation. The token amounts she receives from these training sessions provide additional income for her. The increase she reports in her income is significant: when she was selling clothes, she could realise about 2,000 Kshs (approximately £16) in one month, and half of it would go towards debt repayments. With the stove enterprise however, she finds she can earn up to 5,000 Kshs (approximately £40) a month.

A widow, Group Member 2 can measure the impact of stove enterprise on her livelihood in real terms: following the death of her husband, she was able to take over the responsibility of paying her child's school fees. At the time of fieldwork, she had succeeded in sponsoring her child through school, and had even been able to pay his driving school tuition fees afterwards without having to resort to selling any property. Without her involvement in stove enterprise, she says, she would not have been able to manage life and care for her child as a widow.

Group Member 3 made a living selling tomatoes before she was introduced to stove enterprise in 2009. She holds no position in the group, and her involvement in stove enterprise has not been as advantageous as it appears to have been for Group Members 1 and 2:

'With the tomatoes I was guaranteed at least some income everyday, be it 50 shillings or 100. With [the Upesi], there is income but it's not there everyday. It's only if I get a customer. So sometimes I could go up to a month without getting anybody to sell to. And then later I get another customer, after that maybe I get another 2 or 3, so it varies.'
(Interview West Kochieng Citizen 8)²⁰

She has since switched from selling tomatoes to selling mangoes because she decided at a certain point that her tomato business was not profitable enough. She still makes an effort to sell the stoves, she says, because when she does make a sale, the income is always more substantial than what she earns from the sale of mangoes. The extra, albeit irregular, income enables her to occasionally meet pending household needs without needing to ask her husband for money to do so.

Group Member 3 does not consider herself to be an 'expert' in stove enterprise because she was not one of the three members of her group (the group Secretary, Chairperson and Treasurer respectively) who were originally trained by Practical Action in 2005. She considers it inevitable that the pioneering members who have had access to more training than she has had will have better knowledge of the enterprise than she does. While it may seem rational to expect that success in stove enterprise will be enhanced by higher skill levels and longer periods of participation, it is

²⁰ 'Group Member 3' and 'West Kochieng Citizen 8' refer to the same individual. The latter description has been used in this instance (as well as the next) to maintain a consistent format across all references.

evident from the profiles of Group Members 1 and 2 that the opportunity for substantive participation in the first instance may be linked to the level of education and influence that an individual has in the group or community. The requirement of the stove programme that trainees diffuse the knowledge and experience gained amongst their peers provides an opportunity to promote inclusion of progressively larger sections of the community; however, as has been shown, the 'trickle-down' effect expected of this training strategy has proved to be quite slow and limited in its reach.

Indeed, the following statement by Group Member 3 suggests that there may always be a limit to the effectiveness of the trickle-down model within and amongst women's groups in West Kochieng location:

'We always sort of have a higher place for anybody who initiates or introduces something to the group. So like in the case of [Group Member 1], though she's gone for many trainings, she has also managed to involve others. So there are some trainings where she doesn't just go alone. But in any project, whoever introduces the idea is probably selected to go and train and then come back and train the others.' (Interview West Kochieng Citizen 8)

Here, the women are seen making an attempt to balance a norm that has been internalised within the group with the requirements of an external intervention. Though Group Member 1 demonstrates a degree of compliance with the requirement of the project to ensure inclusiveness, it would appear that other group members are careful not to contest the 'higher place' reserved for her and other pioneering 'experts' in the stove enterprise. It is significant to note that this privileging of pioneers is not restricted to the group's involvement in the stove programme; according to Group Member 3 quoted above, it is a principle that regulates members'

involvement in any project that is introduced to the group. Thus, regardless of the specifications of an externally-initiated programme, an internal system already exists which delimits the extent to which each group member is allowed to participate. Such a system apparently places a restriction on the potential for equal participation by the women. The following sub-section elaborates on this observed tension between social structures and individual agency, and its implications for the participatory development situation.

6.2.3 *Structure, Agency and Participation*

The account given above reinforces Kothari's (2001) observation that participatory development projects can sometimes perpetuate the exercise of control and power by dominant individuals and groups and promote the expression of oppressive social norms. According to Kothari, the 'beneficiaries' of participatory development projects may choose to express their agency in ways that subvert the power of development and disrupt participatory discourses – not only by actively redefining the conditions of participation, but also through acts of self-exclusion and non-participation, as observed with those women in West Kochieng who consciously relegate themselves to allow their more influential peers to dominate the stove enterprise.

To facilitate equitable participation in stove enterprise within groups of marginalised women therefore, closer attention needs to be paid to the links between level of education or influence, access to opportunities and entrepreneurial success. In the case of West Kochieng location, the group stove enterprise model has been shown to be effective in engendering economic empowerment for women who, by virtue of education or

influence, are socially and culturally equipped to be 'lead participants' in the programme. While it may be the case that some women in the group/community do not wish to participate actively in stove enterprise, it is also the case that other women such as Group Member 3 described in the preceding sub-section who seek to participate are unable to maximise the empowerment opportunities presented to them by the enterprise due to certain social and cultural restrictions placed on their agency. In this vein, Cleaver (1999) has identified the need for outsider agencies to seek better understanding of what enables people to participate, and in particular to identify what community characteristics promote inclusion or cause exclusion.

Generally, it appears that awareness of the erroneous assumptions embodied in the 'myth of community' (Guijt and Shah 1998) is now relatively widespread in participatory development theory and practice. A lot of evidence has been given in the literature which points to the disempowering effects of approaching communities as homogeneous units of 'poor' or 'oppressed' people, and assumptions about the homogeneity of local citizens are increasingly being replaced with greater recognition of the conflicting interests of diverse groups within communities (Cornwall 2003, Crawley 1998, Holland and Blackburn 1998). This differentiation within communities is usually done along the lines of such distinct categories as gender, class and ethnicity. Women in particular are recognised as occupying a marginalised position in most societies and are characterised amongst the 'weaker and worse off' (Chambers 1997, p.183) whose interests are in danger of being suppressed by those of more 'powerful' members of the community, particularly their male counterparts.

It is apparent from our description of Practical Action's work with women's groups in Kenya that the organisation recognises these unequal societal structures and has specifically tailored its stove programme to cater to women. The specificity of Practical Action's target group enables us to analyse the dynamics of participation at the micro level of groups consisting solely of women who are homogeneously regarded as being 'weaker' than other members of the community. As has been shown, engaging women's groups in this way can give them access to an important networking and empowerment platform which is especially valuable in the context of societies such as West Kochieng where women are customarily accorded a subordinate status to men. However, the processes and outcomes recorded in West Kochieng location highlight another layer of complexity in participatory development practice. They show us that women's groups, while they represent a marginalised section of society, cannot be assumed to be homogenous in composition. Rather, within those groups in which marginalised women coalesce to pursue certain common social and economic interests, there may be variations in level of education and social status which impact on what opportunities they can have access to as members of the group. Therefore, an even more nuanced approach to categorising and addressing the empowerment needs of 'marginalised groups' within local communities is needed. The prevailing tendency in participatory development to treat such groups as homogenous can have the effect of masking the interests of the marginalised within the marginalised and obscuring any peculiar empowerment needs they may have.

This study has so far examined how the Practical Action stove programme has employed a bottom-up approach incorporating local participation to pursue the twin objectives of improved energy access and economic empowerment of local women. It has been shown that the approach taken by Practical Action has facilitated the development of intermediate technologies as well as the creation of intermediate marketplaces, the impacts of which fall short of ideal participatory development objectives, but which nonetheless have engendered a degree of socio-economic improvement among target populations. On this basis therefore, a degree of success can be declared for the stove programme.

It is however important to introduce a more fundamental issue here, one that has been partly prompted by Sen's (1999) assertion that the ultimate measure of success of any external intervention is the degree to which it enhances the economic, social *and* political freedoms that people have reason to value. Chambers (1998) advocates participation as a platform on which the poor and powerless can express those valued freedoms - which are conditioned by their realities and which often differ from those expressed by outsider agencies - so that their voices can be heard in the development process and acted upon. The next section evaluates how this ideal of political empowerment has worked in practice on the Practical Action stove programme in Kenya. The evaluation is done in light of the operational structures of the global-level institutions involved in international development and the implications of their widespread use of the peculiar vehicle of short-term projects to deliver development.

6.3. Disempowering Participation? The Politics of 'the Project'

According to Hirschman (1967), the development project is a 'special' kind of location-specific, time-bound investment, one which connotes a sense of purposefulness and direction on the part of the investor. The 'investor' in a development project is more commonly referred to as the 'funder' or the 'donor'. Chapter 5 discussed how Practical Action, a non-profit international non-governmental organisation, relies on maintaining strong relationships with various donor organisations which have interests in a range of development areas to keep its programmes running. The chapter also highlighted how the sustenance of a relationship between Practical Action and any donor organisation is dependent on an alignment of the priorities expressed by both recipient and donor at every point in time. When this is no longer the case due to a shift of priorities on either side, continuity of the donor-recipient relationship is not guaranteed. The following statement by a member of Practical Action staff illustrates how this funding dynamic can work in practice:

'Our relationship with DfID as an organisation ended sometime back. DfID had a research programme. And as they looked for organisations to roll out some activities and you know, you want an organisation that has this, that is present in this location, etc, etc. So that is how we ended up with them. They were [our main donors] for some time through the ATP (Appropriate Technology Project) and that was when DfID was ODA. That's quite a bit of a ways back. That was when we had automatic funding, significant funding from DfID. They funded a substantial portion of our work when Practical Action was still ITDG and then its work was largely in the development of the technologies.'
(Interview PA-EA Staff 2)

The above statement shows that the donor-recipient relationship was initiated by the donor on the basis that Practical Action possessed certain criteria required by the former. This observation lends credence to Eversole's (2003) assertion that donor organisations, by virtue of their

possession of the purse strings, hold considerable power in development relations. The dynamic of the funding relationship has the potential to impact on the quality of development process and outcomes: according to Fraser et al. (2006), despite the push for community participation in development projects, outsider organisations may be constrained to make results-oriented decisions simply to comply with the requirements of funding agencies, ultimately resulting in a top-down development process which alienates local citizens and fails to capture locally important factors. It is in the light of this broader picture that this section now examines how Practical Action's stated preference for a participatory route to development which puts the needs and realities of local people first has worked in practice. The section establishes that, in spite of the organisation's claim to start from where people are in addressing the challenges faced by solid biomass users in poor Kenyan communities, there is evidence to show that the issues addressed on the stove programme reflect priorities which are actually jointly constructed in a process of interaction between the realities of donor organisations, Practical Action and local citizens.

According to PA-EA Staff 2, Practical Action no longer has a 'main' donor as it did previously when the bulk of its operations was sponsored by the UK government Department for International Development (DfID); instead the organisation now maintains relationships with 'many bits and pieces of donors'. Practical Action is accountable to these donors for the way that it allocates project funding, and must run office and field operations efficiently to ensure that it meets stated targets with the funds provided. This sort of 'results-based management' system (Fraser et al. 2006, p.115) may enhance project efficiency, but such donor-funded projects

typically have short life spans and usually end before any significant impact can be observed in local communities. For instance, according to PA-EA Staff 3, a two-year smoke alleviation project for which funding has been received can effectively end up being implemented as a one-year project. This is because in reality, a period of about 6 months is needed to lay the administrative groundwork for the project before it actually commences, and another 6-month period is required towards the end to evaluate and monitor the project's impact on the community. Practical Action does not work these inevitable periods of inactivity into funding proposals because donor organisations usually measure progress according to neatly delineated targets and make no provision for the variable nature of projects implemented in local communities:

'Donors provide money, within one month they want to see results. They're not giving you a one-year grace period to understand the community. Yeah... because when they give you their money, we have what is called the activity schedule. The Gantt chart. From Day 1, what will you do? For how many days? And for how much? For what outcomes?' (Interview PA-EA Staff 3)

Within this kind of project funding dynamic, it is difficult for Practical Action to make decisions without consideration for the requirements of existing or prospective funding sources. The result is that the priorities expressed by the organisation are sometimes not independently determined, but are really 'borrowed' (PA-EA Staff 2) from donor organisations. Interview data reveal a process in which these borrowed priorities can be projected onto communities in participatory 'needs assessment exercises' conducted with local citizens:

'My need is a community that has identified smoke as an issue, and so I sell my need to that community, and that community immediately develops a need for smoke interventions because that is what the organisation is offering, and we do not want them to go away without

leaving something in this community. And so... information gathering sessions will identify smoke as a problem, because that is the need that I have, and even in the way that I present myself, my first foot forward is called smoke. And that is what they see, and they think, oh, they're selling smoke. Oh, smoke is such a problem in this community. Look at our kitchens. Look at the soot on the walls. Just look at that.' (Interview PA-EA Staff 2)

If the account given here is set against that outlined in Chapter 5 of a consultative process in which local citizens are invited to participate at all stages, it can be seen that citizens are indeed engaged in pre-programme deliberations, but the engagement takes place within a space that is framed and defined by the priorities of the outsider organisation prior to consultation. The result is that the 'needs' expressed by local citizens ultimately echo those programmed by the organisation, which were in turn negotiated within the framework of international project funding dynamics. This scenario provides support for Kothari's (2001) insight into participation as the enactment of 'performances' in participatory development in which citizens and outsiders contribute to the production of 'local knowledge' which legitimises the pre-determined project agenda rather than influencing project priorities. The encounter cited below between a Practical Action representative and a citizen of an extremely poor Kenyan community however indicates that such performances are not acted out in all instances:

'I was in Lodwar and I asked a few questions around. I wanted to note some of the energy issues and, a woman in the kitchen told me she doesn't have any problem with smoke. It's not an issue for her. And I looked at the kitchen, there was hardly any soot on the walls, the structure is very loosely woven together because there is very little rainfall, and it's a hot area. So ventilation is key. Space heating is not a felt need. And even though the smoke stung my eyes and affected my mouth, for her it was not a problem. She was very clear that she doesn't have a problem with smoke.' (Interview PA-EA Staff 2)

When interviewed with regard to the same community, another member of Practical Action staff expressed optimism that the attitudes and perceptions of local citizens would change over time with sustained intervention by the organisation:

'I think nobody is exposing people to some of these issues. Things become a programme as you increase your awareness and knowledge. And so I think by coming to this community where they are completely ignorant, we think that over time, the scenarios would have changed and everybody will be interested in taking care of their own health. It's not something that you want to turn on and off. It's something that has to be consistent with the right messages, with the right interactions, with the right engagement. I see a great potential.'
(Interview PA-EA Staff 1)

This is a case in which initial consultation has elicited a certain response from local citizens, but the outsider organisation is willing to keep intervening until the desired response is obtained. The case exemplifies a situation in which, despite the rhetoric of enrolling local knowledge in participatory development, the knowledge that is actually privileged in drawing up an agenda for 'development' is that which is co-produced by the implementing organisation and project funders. If, as Kapoor (2002) asserts, power is inevitably imbricated with the formation of knowledge, then an exclusion from knowledge formation processes equates to a lack of political empowerment. The apparent lack of citizen influence in the decision-making stages of the Practical Action stove programme belies the notion of a 'quiet revolution' heralded by Holland and Blackburn (1998) in which participatory approaches are supposedly opening up ways for development policy to be influenced by those who are poor, weak, marginalised and excluded. Essentially therefore, while the participatory approach taken by Practical Action may have opened up ways to develop context-specific technological and market solutions, it is nonetheless

premised upon a system of 'policy transfer' in which funding and implementation decisions made by powerful outsider organisations determine in the first instance the content of the participatory project.

This outcome does not meet the radical objective stated by proponents of participatory development in the 1970s - when the movement gained fresh momentum - to challenge the dominance of externally imposed forms of development planning by involving socially and economically marginalised peoples in decision-making over their own lives (Chambers 1992, Guijt and Shah 1998). Hence participatory development as conceived by early proponents held out the promise of empowering the poor, not just socially and economically, but also politically.

The very notion that local citizens can be politically empowered in participatory spaces as they are currently defined has however been challenged on several fronts. Leach et al. (2005) point out that participatory projects are set in institutional, often globalised contexts where unequal, top-down power relations shape the terms of engagement. Craig and Porter (1997) highlight a fundamental contradiction between the aim expressed on the one hand by participatory development proponents to foster local initiative and control and the requirements of outsider agencies on the other hand to meet certain objectives, many of which are already established long before the project begins. In other words, despite the seeming widespread acceptance of participatory development as a more empowering alternative to traditional top-down development models, the established hierarchical structures that characterise mainstream international development practice do not facilitate or permit a genuine opening up of spaces for political participation by local citizens.

For Friedmann (1996), the political disempowerment of local citizens is not just a corollary of the hegemony of global political structures; it is a *form* of poverty which is linked to, but quite distinct from, economic poverty. As such, externally-initiated energy poverty alleviation programmes operating within the restrictive political framework of international development are not able to address the totality of the phenomenon they have set out to tackle, even when - as in the case of the Practical Action stove programme - participatory development principles are espoused. The next section examines the nature and extent of the poverty-alleviation impact that the two stove programmes under investigation will likely have on energy-poor populations in Nigeria and Kenya.

6.4. Targeting Energy Poverty through the Market: Impact and Implications

In preceding sections of this chapter, it was shown that though Project Gaia/CASL and Practical Action have sought to promote various improved cooking technologies on the platform of the market in Nigeria and Kenya respectively, the former have adopted a largely expert-led approach to market creation while the latter has taken a more context-responsive route towards the same end. This final section evaluates the impact that each of these approaches has had on the specific issue of energy poverty targeted by the implementers in both countries, and make broader observations regarding the implications of those approaches for addressing the more general phenomenon of poverty among target populations.

6.4.1 *Impact of an Expert-led Approach on Energy Poverty in Nigeria*

Chapter 4 provided a description of the CleanCook project in Nigeria, detailing the original vision of the Project Gaia team to launch a radical and comprehensive solution to the problem of indoor air pollution associated with the use of solid biomass fuels for cooking in poor countries. Further, the project was shown to be based on an expert-led implementation model characterised by the transfer of a novel stove-and-fuel technology from North to South and the preference for a private sector-led market development model in scaling up dissemination of the technology within the framework of the locally adapted Cassakero programme. Importantly, the chapter observed that the shift from the pilot to the scaling up phases of implementation was accompanied by a shift in project objectives: the emphasis was no longer on presenting the poor with a cleaner alternative to solid biomass, but on providing a cheaper and more sustainable replacement fuel for kerosene. This section examines the implications of this shift for energy poverty alleviation particularly among the poorest who are least able to access modern energy sources.

It was noted in previous sections how households in the middle-income group have embraced the CleanCook technology as a cleaner burning alternative that is 'more economical than using the kero, or the gas' (Warri Citizen 4). However, as the CleanCook pilot project was designed to span households in various income groups which use fuel sources that correspond to different rungs of the energy ladder, this response cannot be taken to be representative of the cross-section of households involved in the project. The information gathered by Project Gaia during the

baseline study conducted prior to the commencement of the 'full' CleanCook pilot project in 2007 cuts across low, middle and high-income households in rural and urban locations and thus provides a wider data set with which more inclusive analysis can be done. This section now proceeds to use the baseline data - which essentially gives an indication of primary cooking fuel and annual fuel expenditure of households by income level - as a benchmark against which to deduce the likely impact of the proposed Cassakero project on energy poverty alleviation for households within each income group.

Table 6.1 below constitutes a graphical representation of the relationship between the income pyramid and the energy ladder described in Chapter 4. It can be observed from the table that high income households are able to spend more on fuel sources higher up the energy ladder than middle income and low income households can. The same applies for middle income households, relative to their low income counterparts.

Table 6.1: Average annual fuel expenditure by income group

Primary Household Fuel	Average Annual Fuel Expenditure (US \$)		
	Low Income	Middle Income	High Income
Fuelwood	25.09	17.90	64.43
Kerosene	95.77	317.00	681.27
LPG	294.72	431.00	1053.60

Adapted from Bailey et al. (2006) Baseline Data for 150 Homes in the Communities of Asaba, Abraka and Warri, Delta State, Nigeria

On the basis of Table 6.1 alone, it would appear that fuelwood use is comparable between the low income and middle income households in the sample. However, as can be seen from Table 6.2 below, the percentage of

middle income (as well as high income) households that uses fuelwood is negligible compared to the percentage of low income households in that category.

During the pilot phase of the CleanCook project, it was established that a family of up to four people using the CleanCook stove will require 1 litre of ethanol fuel per day, or 365 litres per year (Obueh 2004). At a projected cost of US\$0.38 per litre of ethanol (Bailey et al. 2006), this translates to an average ethanol fuel expenditure of US\$138.70 in one year – much higher than the total annual fuel expenditure for fuelwood users across all income groups, as Figure 6.1 below portrays.

Table 6.2: Percentage use of fuelwood, kerosene and LPG by income group

Primary Household Fuel	Percentage Use of Fuel		
	Low Income (43 homes)	Middle Income (67 homes)	High Income (25 homes) ²¹
Fuelwood	48% (21/43)	9% (6/67)	4% (1/25)
Kerosene	48% (21/43)	72% (48/67)	44% (11/25)
LPG	2% (1/43)	19% (13/67)	52% (13/25)

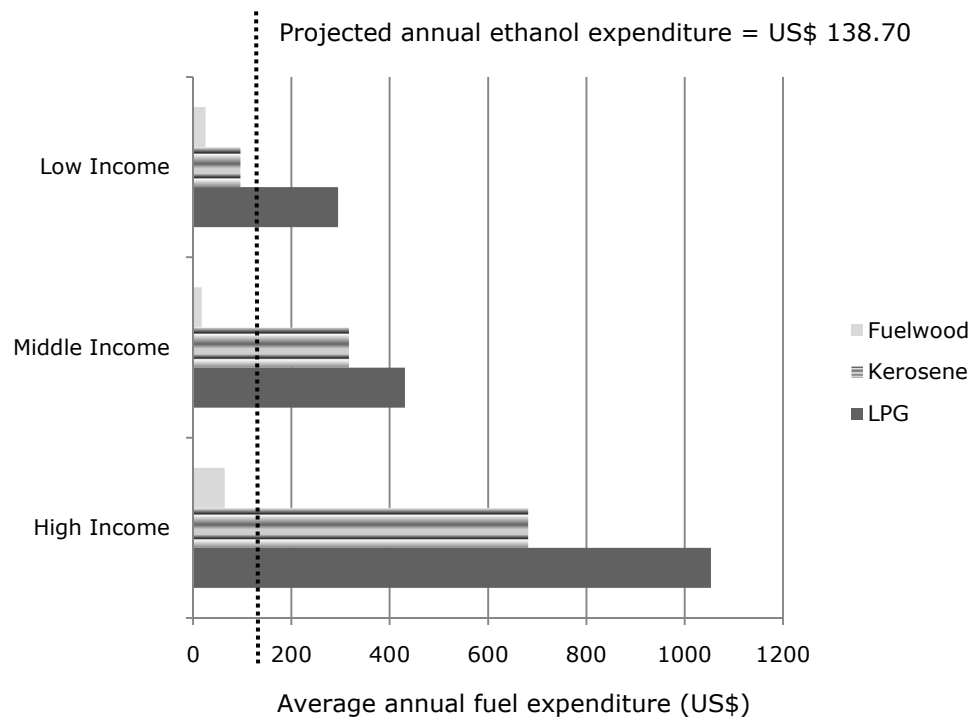
Adapted from Bailey et al. (2006) Baseline Data for 150 Homes in the Communities of Asaba, Abraka and Warri, Delta State, Nigeria

On the other hand, the projected ethanol cost is favourable compared to the current fuel expenditure by kerosene and LPG users, with the exception of kerosene users in the low income group. Low-income kerosene users are therefore also likely to be exempted from the potential

²¹ It should be noted that the official project document used in this analysis only reflects data for 135 homes – a total which contradicts the figure of 150 homes indicated in the title of the document.

benefits of the CleanCook technology, albeit by a smaller margin than is the case with fuelwood-reliant households across all income groups.

Figure 6.1: Fuel type and expenditure by income group



Adapted from Bailey et al. (2006) Baseline Data for 150 Homes in the Communities of Asaba, Abraka and Warri, Delta State, Nigeria

Based on the data presented in Tables 6.1 and 6.2 therefore, it appears that the Cassakero project will lead to reduced fuel expenditure for households currently on the middle and upper rungs of the energy ladder, but is not likely to alleviate energy poverty for fuelwood users at the bottom of the energy ladder – those households originally targeted by the CleanCook technology and amongst whom the greatest poverty-alleviating impact could potentially be achieved.

Further, the observation in Table 6.2 that the percentage of low income households in the sample that uses fuelwood as primary fuel source (48

percent) is disproportionately greater than the percentage of middle-income and high income households (9 percent and 4 percent respectively) using fuelwood means that the impact of the project will likely be least among the group of households occupying the bottom of the energy ladder *and* income pyramid.

It is apparent from our previous discussion of the Cassakero project that the transformative claims made for the proposed nationwide 'rollout' of the project extend beyond the prospects of energy poverty alleviation at household level. The project, with its vision to produce ethanol *sustainably* from cassava, a staple food crop in Nigeria, is expected to contribute more generally to poverty alleviation by creating new jobs and investment opportunities for local populations. The potential for conflict between these far-reaching ambitions and more basic concerns regarding the impact of a cassava-based bioenergy programme on local food prices is one that deserves to be given serious attention. According to the implementers of the project, it is an issue that has been considered and adjudged to be unproblematic:

'Nothing stops. I remember, with biofuel, it is not food vs. fuel. It is food and fuel. Because the production of biofuel leads to more food. You cannot produce biofuel without producing bio-fertiliser which will boost production of agricultural products. You'll not produce biofuel without producing animal feed, which will boost commercial production of meat and poultry. You'll not produce biofuel without putting more money in the hands of farmers and people in the community so that they can afford better food. After all what is food security? Ability to provide the right quantity and quality of food on a sustainable basis so that you can live a healthy and normal life. And that's exactly what this thing does. You put food on the table and money in the pocket. You can't beat that.' (Interview CASL Staff 1)

This positive outlook is set against widespread concern over the threat posed to food security by alternative energy programmes that aim to replace fossil fuels with cheaper and cleaner-burning biofuels from food crops: according to Lane (2010b), such bioenergy systems are attended by a pervasive fear that 'one man's energy is inevitably produced from another man's dinner' (p.14). In a policy research working paper prepared for the World Bank, Mitchell (2008) points out that studies conducted in various fields employing different approaches have converged at the conclusion that biofuels production is a major driver of food prices. The International Monetary Fund estimates for instance that 70 percent of the increase in the price of maize, an internationally traded food commodity, is attributable to an increased demand for biofuels (ibid.). Food price increases are often the result of a sequence of inter-related events, so that it may be difficult to envisage unintended effects at the outset of a bioenergy project. Kraus (2009) cites the example of China, where the production of ethanol from maize led to the allocation of more cropland to maize, which in turn led to a decrease in land available for other food crops. Kraus foresees a situation in which a shortage of supply of those other 'marginalised' crops caused by reduced land allocation triggers an all-round increase in their prices. According to Dong (2007), higher food prices may in the first instance return higher incomes to rural households - as the Cassakero project anticipates - but ultimately, poor net-food purchasing rural (as well as urban) households will be the most adversely affected as their overall expenditure on food will increase. In summary therefore, the undertaking of the Cassakero project to alleviate poverty through a food-based bioethanol programme is one that is likely to be fraught with significant challenges, and it is essential to adopt context-sensitive mitigating strategies in the implementation of such a programme

so that it will not contribute to, as Kraus (2009) describes it, 'fuelling new problems' amongst poor populations.

6.4.2 *Impact of a Context-responsive Approach on Energy Poverty in Kenya*

In the account given in Chapter 5 of Practical Action's stove programme in Kenya, the conflicting priorities of the outsider organisation and local citizens were identified. The chapter highlighted a divergence between the primary outcome of smoke alleviation targeted by the stove programme and that of fuel saving prioritised by local biomass users. It was also noted that the Upesi stove, valued locally and mostly adopted for its fuel-saving properties, does not fulfil the smoke alleviation function targeted by Practical Action. This chapter now proceeds to evaluate, in light of Practical Action's stated commitment to providing low-cost smoke alleviation interventions for the poorest households, the extent to which the organisation's objective has been realised amongst thirteen sample households in West Kochieng location.

For the purpose of this discussion, the households in the sample will be broadly divided into two groups. The first group consists of households that have not adopted any of the improved cooking interventions promoted on the smoke alleviation programme (a total of six households), while the second group comprises households that use one or more of those interventions (a total of seven households). The households in the first group featured various combinations of the traditional three-stone fire (typically the primary cooking device), the traditional charcoal *jiko* and the improved charcoal-burning Kenya Ceramic Jiko (KCJ). The traditional *jiko* and the KCJ are used in most West Kochieng kitchens as backup cookers

during the rainy season when dry fuelwood can be more expensive to purchase for the three-stone fire. The period of my fieldwork in West Kochieng coincided with the beginning of the rainy season, and all the kitchens (with the exception of one) still had their charcoal stoves tucked away in corners, sometimes completely out of view.

All the women interviewed in this first group expressed their intention to purchase at least one improved cooking intervention in the future - typically the fuel-saving Upesi stove or the fireless cooker. However, at a minimum cost price of 350 Kshs (approximately £2.79) for the Upesi stove and 600 Kshs (approximately £4.79) for the fireless cooker, acquisition of any of these interventions is something of an event for which the average West Kochieng household has to plan ahead. There are at least two decision points that can be identified here: the point at which a household decides to start saving for an improved cooking intervention and the point at which the decision is made to buy the intervention. Experience has shown that a lot can change between these two points. According to PA-EA Staff 3, there have been instances where a household has decided to start saving for an intervention, but before they get to the point of deciding to buy, they have had to spend the savings on some last minute contingency such as children's school fees or hospital bills. Household needs change over time, and in West Kochieng households which typically have low incomes and limited access to credit, an item such as an improved stove may have to be sacrificed to meet a need that is considered to be more pressing.

Within the second group of households that featured one or more of the improved cooking interventions, all seven kitchens had the Upesi stove

installed, but only three had any of the complementary interventions required for smoke alleviation: two outdoor kitchens featured different variations of eaves spaces cut into the wall above the fireplace, and in another outdoor kitchen, a smoke hood had been installed to channel smoke out of the kitchen. Thus, among the seven households in the sample that have adopted improved cooking interventions, the smoke alleviation objective has been most effectively realised in those three kitchens which have either eaves spaces or a smoke hood installed.

The different experiences of the thirteen sample households reflect the variable impact of Practical Action's intervention in West Kochieng location: there are those households that have not adopted any of the improved cooking technologies due to economic constraints; there is a second group of households that have only adopted the fuel-saving Upesi stove and hence do not experience the smoke alleviation benefits intended by the project; and there are those households in the minority that are able to afford comprehensive solutions which offer fuel saving as well as improved health benefits.

The discussion in Chapter 5 showed how cultural and economic factors combine to restrict the access of households in West Kochieng to improved cooking technologies. One of the interviewees in the location, a woman involved in part-time stove enterprise, confirms this, but seems to view cost as the major barrier to adoption of these technologies by most households:

TS: What reasons have people given for not buying the Upesi and solar cookit?

WKC6: The main thing is space, for some. And like I mentioned earlier the issue of the [outdoor] kitchen, and then money. But money is the major factor. But most of them want to have it.

With the exception of eaves spaces which are amenable to improvisation at no cost to households but which are generally considered to be inappropriate to the cultural architecture and lifestyle in West Kochieng, the fixed Upesi stove (at 350 Kshs) is the least expensive of the improved cooking interventions. The smoke hood is widely accepted in the community as an appropriate complementary technology to the Upesi stove, but at 5,500 Kshs, it is fifteen times as costly as the stove. In West Kochieng, this is the equivalent of about two months' wages, assuming a regular income of 100 Kshs per day. For the majority of households in the location therefore, the smoke hood is out of reach. The LPG stove, which has so far featured little in our discussion due to its rather conspicuous absence in all but one of the households I visited, is technically one of the most effective smoke alleviation interventions introduced by Practical Action. However, with an initial acquisition cost comparable to that of the smoke hood, LPG stoves do not even feature in the range of improved cooking technologies usually considered by West Kochieng households. As such, those interventions that would simultaneously address multiple dimensions of energy poverty in the most effective manner tend to be the most expensive ones, and, even at 'low' cost, cannot be afforded by the poorest households who need them most.

In its 2006 *Fuel for Life* publication, the World Health Organisation (WHO) identified the need for the international community to take a 'quantum leap' with regard to efforts aimed at alleviating energy poverty if the Millennium Development Goal (MDG) to halve global poverty by 2015 must be met. This proposal was put forward on the basis that, though the

objective to improve the access of poor households to modern energy sources is not an MDG in itself, meeting it will contribute significantly to the achievement of each of the eight MDGs. The WHO publication outlines several potential benefits to be gained from alleviating energy poverty in the poorest households, ranging from a reduction in child mortality rates to an increase in household incomes. In this vein, it is possible to make projections regarding some of the potential wider impacts of the Practical Action stove programme on West Kochieng households: even for households that adopt only the Upesi, some of the money saved daily on fuel can be used to provide more food – thus indirectly addressing another, even more basic aspect of poverty for those households, even if smoke is not reduced in their kitchens. However, evidence from the household energy programmes discussed here indicates that many poor households are not able to pay for these improved cooking technologies in the first instance.

It is significant that, whether or not a context-responsive approach was taken in stove programme implementation, income poverty was shown to pose a challenge to the realisation of energy poverty-alleviation goals among local citizens in Nigeria and Kenya. It can however be inferred from the discussion of the CleanCook project in Nigeria that an expert-led approach is less likely to identify the distinctive challenges faced by the poor and respond to them. By not starting with the existing energy resource base of the poor and instead advocating a switch to a 'modern' fuel, the CleanCook project essentially overlooks the realities of poor households at the bottom of the energy ladder, with the likely result that these households will be altogether excluded from the solution. This suggests that, contrary to the notion of the quantum leap proposed in

2006 by the World Health Organisation which targets a 50 percent reduction in the number of people without effective access to modern cooking fuels by 2015, the economic realities of local citizens in poor communities require that they take more incremental steps towards alleviating energy poverty. The propositions of outsider organisations to address the energy problems of the poor by replacing the old with the new, while they may sound attractive, must be informed by these economic realities if they are to have a substantive impact on target populations.

Conclusion

This chapter has undertaken comparative analysis of the different approaches to stove programme implementation taken by Project Gaia/CASL and Practical Action in Nigeria and Kenya respectively. In particular, the chapter has identified the ways and extent to which citizen participation has been enrolled by both outsider organisations in creating local markets for the dissemination of improved stove technologies, and considered the implications of each approach for the objective of energy poverty alleviation amongst target populations.

In the case of the stove programme in Nigeria, the influence of outsider 'experts' and new developments in international development policy combined to engender a shift in notions of appropriate cooking technology from a solution informed by the needs and preferences of local biomass users to one certified to be appropriate on the basis of its performance in industrialised country contexts. The novel cooking technology promises to offer a cheaper and cleaner alternative to local populations, but analysis of interview data and key project documents shows that the poorest

households at the bottom of the energy ladder are the least likely to be impacted by the intervention in the proposed market dissemination phase. The significance of context for the viability of the technology was discussed, and the need to employ a more context-responsive approach towards identifying and addressing gaps between the technological infrastructure required by the external project and its host environment was highlighted.

Further, the participatory approach taken by Practical Action in Kenya in developing a local market for disseminating its range of locally-developed improved cooking technologies was closely investigated. In contrast to the formal market approach to scaling up favoured by Cassava Agro-Industries Services Limited (CASL) in Nigeria, Practical Action's context-responsive market solution is informed by the peculiarities of the informal market system operated in poor project communities. Practical Action's bottom-up efforts have yielded a degree of success; however, the group enterprise model favoured by the stove programme which uncritically mobilises women as a homogenous unit in project communities limits the scope for achieving equitable participation. The chapter identified the need for an even more reflexive approach that differentiates between individuals in marginalised groups if the goal of participatory development to promote inclusive empowerment is to be realised.

Notwithstanding the measure of social and economic empowerment achieved on the Practical Action stove programme, this study found the dimension of political empowerment to be lacking as a result of dominant power structures in international development relations that do not give room for substantive political expression by local citizens. The practicalities

of working within the rigidly defined frame of the funded project and its implications for the priorities that are ultimately expressed as development goals were discussed. It was shown that, despite Practical Action's claims to start from where local citizens are, seemingly more powerful forms of knowledge that represent external interests actually serve as the point of departure for decision-making in what has become a system of policy transfer that is less immediately recognisable, but potentially more disempowering, than the expert-led technology transfer models that participatory approaches were meant to replace.

The chapter closed by evaluating the performance of the market-based stove programmes implemented in Nigeria and Kenya by CASL and Practical Action with regard to their impact on the alleviation of energy poverty specifically and poverty more broadly. Though the impact of each of these programmes on energy poverty alleviation was found to be limited within the broader context of poverty - regardless of implementation approach taken - CASL's expert-led approach was shown to be less sensitive than Project Gaia's context-responsive approach to the peculiar requirements of the poorest households. Contrary to the generic policy recommendation to 'leapfrog' towards resolution of the household energy poverty situation in the South, the evidence suggests that more measured steps that respond to the realities of poor households within local contexts are likely to engender more sustainable and equitable solutions.

Chapter 7: Conclusion

'There are gross inequalities which continue to grow, and that sometimes we leave in healthy tension. Using the case of improved stoves, I don't know if you've heard of any improved stoves programme that was 100 percent successful. I would say that for two households willing to take up improved stoves, there are six households for whom survival is more key than environmental issues... you'd wonder, India has been the home to a great number of stoves programmes. How come we still have more initiatives going on?' (Interview PA-EA Staff 2)

This study set out to comparatively evaluate approaches taken to the implementation of two improved stove programmes in Nigeria and Kenya. As has been established in the body of the thesis, many such programmes have been developed in response to the household energy challenges faced by nearly 3 billion people living in countries of the global South which have been classified on the international development scene as 'poor' in relation to their degree of economic prosperity and 'developing' in relation to their level of industrial/technological advancement. Improved stove programmes, mostly initiated and implemented by 'outsider' organisations with Northern affiliations, have since the 1970s promoted a range of fuel-efficient stoves and other improved cooking technologies designed to mitigate smoke-related health problems associated with the use of 'dirty' biomass fuels for cooking and heating. However, in spite of the promise they hold to significantly improve cooking and living conditions in energy-poor households, these externally-initiated technological interventions have achieved much lower dissemination rates amongst target populations than originally envisaged by outsider organisations.

My research into improved stove development was prompted by this quandary, which has become a long-standing riddle in stove development practice: given that household energy poverty in developing countries is so severe and that numerous improved cooking interventions have been introduced by development actors to address the issue, why have those interventions achieved low dissemination rates – and subsequently limited impact on energy poverty - in communities where the need is perceived to be greatest?

To guide the investigation, I proposed a hypothesis, namely that stove dissemination rates are likely to be higher with participatory approaches in which improved stove programmes are designed to respond to the priorities of citizens in local contexts. To test this hypothesis, two stove programmes were selected which I proceeded to investigate asking the following questions:

1. How have the objectives of specific externally-initiated stove programmes translated into the realities of local contexts, and what aspects of these contexts have influenced stove uptake by local citizens?
2. Has a context-responsive approach to implementation of specific stove programmes had a discernible impact on stove development processes and outcomes?
3. How does the shift towards market-based stove dissemination relate to the ideal of context-responsiveness expressed by outsider organisations, and what is the impact of this shift on

the objective of energy poverty alleviation stated by particular organisations?

The empirical data gathered from the two stove programmes investigated in Nigeria and Kenya reveal that, despite the rhetorical shift by outsider organisations from expert-led to context-responsive approaches, engagement with the priorities of local citizens is still limited, and the interests and priorities of Northern organisations continue to shape the stove development agenda. The study established Project Gaia's CleanCook project in Nigeria as an expert-led intervention that fails to connect with the bottom of the socio-economic pyramid while seeking to create local market conditions for transferring stove technology. Practical Action's intervention in Kenya has been more responsive to local realities in its efforts to engage marginalised women's groups in participatory stove development; however, success was shown to be limited by the constraints of project funding and assumptions about homogeneity of the poor. In both cases, cultural preferences and socio-economic differences within target populations challenge outsiders' vision of improving stove uptake through a combination of participatory methods and market approaches to dissemination.

In this concluding chapter, the above findings are elaborated, and detailed responses are articulated to each of the research questions outlined earlier. The chapter is divided into five sections. The first section summarises the main discussions and arguments presented in the thesis. The second section directly addresses the research questions and responds to the hypothesis upon which the investigation was premised. The third section highlights the contribution made by the research to ongoing debates in the field of participatory development. The fourth

section points to the potential for future research in the area of stove development, and the fifth section reflects on the implications of the present research for development policy and practice.

7.1. Overview of Chapters

Chapter 1 of this thesis provided context and rationale for the research, articulated the aims of the investigation and laid out the programme for the rest of the thesis. The chapter presented a conceptual backdrop for the research, situating it within the framework of development efforts to alleviate poverty in the South employing the rational technological and economic tools credited with engendering progress in wealthy, industrialised countries of the North. Technology-led stove programmes were identified as being the most widely implemented intervention by outsider development organisations to mitigate the widespread incidence of energy poverty amongst the most vulnerable populations in the South. With reference to the claims for local participation made by outsider organisations in the field of stove development beginning in the 1980s, the chapter proceeded to review pertinent debates in the wider discourse on participatory development. A detailed discussion was given of the concept of citizen participation introduced by Mohan and Hickey (2004) in response to the depoliticisation argument which propounds that the transformative potential of participatory development has been limited in practice by the tendency of outsider organisations to concentrate on technical project details while ignoring the more fundamental structures of power governing participatory spaces.

The chapter went on to examine the basis for focusing the study on Nigeria and Kenya where, as in most other contexts that have played host

to stove development programmes, rates of dissemination of the improved cooking technologies promoted have been very low. Attention was drawn to the limited nature of government participation in both countries in stove development efforts, prompting the intervention of international development actors seeking to tackle the problem of energy poverty particularly among low-income biomass-reliant citizens in each country. The observations which generated my particular interest in investigating the local-global interactions shaping the outcomes of stove programmes in such contexts were discussed, as were the hypothesis and questions that were developed to guide the exploration.

Chapter 2 located stove technologies within a historical trajectory that enables their recognition as products of wider processes of technological, economic and social development in both North and South. The chapter went on to review the history of improved stove development in the South as it has been constituted over the 'development decades', starting from the late 1940s. Advances recorded in the field of stove development, particularly from the 1970s onwards, were seen to be reflective of the changing principles which have governed North-South development relations to date. Stove development efforts were discussed in three distinct phases, emphasising the definitive characteristics of each phase that are most relevant to the analysis undertaken in this study: expert-led; context-responsive; and market-based in the first, second and third phases respectively.

Claims made by several authors in the literature appear to suggest that, despite the move towards context-responsive approaches in stove development practice from the second phase of the 1980s onwards,

outsider organisations retain considerable influence in stove development discourse into the currently-running third phase. It was noted that, although considerable analysis has been undertaken in the literature with respect to stove dissemination from a supply-side perspective, much less has been done to rigorously analyse the issues affecting stove technology uptake from the perspective of local citizens at whom development efforts are directed. The chapter closed with an indication of how this empirical study of improved stove development in Nigeria and Kenya proposed to address this gap in the literature.

Chapter 3 described the qualitative research design employed in the investigation and its execution, primarily using the interview method. The chapter constituted a reflexive account of my interaction with various research settings, paying attention to the influence that my presence in those settings might have had on the process and its outcomes, and delineating the steps taken to mitigate the impact where applicable. Reflexivity entailed recognition of the limits to the main method of interviewing and applying observation and participant observation techniques where the practicalities of field access allowed. This attempt at methodological triangulation (Denzin 1970), however, presented a fresh set of challenges in the field. The participant observation method in particular was shown to afford a greater degree of proximity to the research setting at the risk of blurring the boundaries of my role as a researcher within the setting.

Importantly, the chapter explained the rationale for a series of decisions made through the pre-fieldwork, fieldwork and post-fieldwork phases of the research, in the process highlighting their practical and theoretical

implications. An account was given of the difficulties encountered in negotiating and maintaining access to research sites, most notably my inability to gain access to the Improved Egaga project which necessitated a sudden shift to the CleanCook project in Nigeria. Further, my outsider status in West Kochieng and Kasewe, both traditional communities in Kenya, was shown to place restrictions on my capacity to recruit interviewees independently and increase the propensity for collecting non-representative data from interconnected groups of local citizens. Issues arising from my positionality and my performance of 'identity negotiations' (Jansson 2010, p.19) in both Nigeria and Kenya were discussed, and the likely influence of these on field interactions and knowledge production was highlighted.

An indication was given in the chapter of the restricted scope of the study relative to the scope of both stove programmes under consideration. Warri, the research site in Nigeria, was introduced as one of nine communities in the Niger delta which hosted the CleanCook pilot project in 2007. Official project documents, despite the secondary status accorded such data sources in qualitative research, provided supplementary data that reflected the scope of the project across all nine locations. Similarly, West Kochieng, the primary research site in Kenya, was introduced as one of eight locations in Kadibo division participating in Practical Action's USEPA smoke alleviation project at the time of fieldwork. Kasewe, a secondary site identified for the research in Kenya, was selected mainly on the grounds of ease of accessibility and had no affiliation with the stove programme under study. Data gathered in the location were shown to be qualitatively different from, but complementary to, data obtained from West Kochieng.

Chapter 4, the first of three data chapters, discussed the implementation of the CleanCook project in Nigeria by Project Gaia, a United States-based international non-governmental organisation. Project Gaia's attempts at context-responsiveness were found to be limited in scope, and the CleanCook project was established as an essentially expert-led project with the objective of introducing a 'proven' stove and alcohol fuel technology, previously restricted to niche markets in wealthy industrialised countries, into energy-poor developing countries. It was noted that Project Gaia's definition of the CleanCook as 'appropriate technology' emphasised technological and cost efficiency and relegated other non-technical aspects of the network required to support the project locally. Project Gaia's approach was thus identified as being more consistent with a technology transfer-driven approach which, as with the majority of stove programmes implemented in the expert-led phase of the 1970s, assumes that technology can be transferred from the North and made appropriate to Southern contexts independently of the social framework of particular locations. This assumption was shown to have problematic connotations in the context of Nigeria, where Project Gaia's initial plans to establish methanol fuel production infrastructure in the resource-rich Niger delta were found to conflict with the political climate of the region, and the recourse to cassava-based ethanol production now raises the vital social concern of food security for local citizens.

At inception, the CleanCook project was targeted at the majority of Nigerian households categorised as belonging to the bottom of the energy ladder by virtue of their reliance on solid biomass fuels to meet their cooking energy needs. The existence of a positive relationship between

energy use and income level in the Nigerian context squarely locates this section of the population at the bottom of the socio-economic pyramid, thus underscoring the potential impact of the CleanCook project with its objective to alleviate energy poverty. However, with the introduction of plans for a market-based dissemination model to be coordinated by Cassava Agro-Industries Services Limited (CASL), a local business actor, a significant shift in target was observed from lower-rung biomass users to middle-rung kerosene users. The locally rebranded Cassakero project has, interestingly, remained tied to the assumptions of the parent CleanCook project, wherein technological and economic factors are viewed as the main drivers of successful stove dissemination. This is not so surprising, given that the Cassakero project is grounded in the Pan-African Cassava Initiative policy framework of the New Partnership for Africa's Development, itself an expert-led initiative which stipulates technology-enhanced agricultural productivity led by the private sector as the key to solving the development challenges facing member countries. Within this formula, changes in technological aspects of the project are seen as unproblematic, regardless of the social implications, and even at the expense of the original socio-economic drivers for the project.

The chapter noted further that Project Gaia expects the Nigerian government to provide 'tangible' policy support to facilitate entry of the CleanCook technology into the local market. Such policy support is expected to entail implementation of the Pan-African Cassava Initiative framework at the national level as well the provision of supporting frameworks which are tailored to the requirements of private actors in the local context. The model of maximum private investment and minimum public intervention favoured by the CleanCook/Cassakero project was seen

to be consistent with the principles of a neoliberal framework which puts the main responsibility for development on private actors and advocates a supporting role for the state. Project Gaia considers the existence of a supportive policy framework as being particularly crucial to the success of such a novel intervention as the ethanol-fuelled CleanCook technology in the Nigerian context. The recently enacted national biofuels policy could potentially provide such a framework, but its emphasis on the production of bioethanol for blending with petrol under the government's national E10 programme may undermine its relevance to initiatives like the Cassakero project which are dedicated to producing bioethanol for domestic use.

Chapter 5 discussed the participatory approach taken to stove technology development and dissemination in Kenya by Practical Action, a United Kingdom-based international non-governmental organisation. The chapter situated Practical Action's stove programme, which commenced in the second phase of stove development, in the historical context of stove development efforts begun by civil society and state actors in Kenya in the first phase of the 1970s. It highlighted the proactive contribution of the national government in the early years of stove development through its Kenyan Renewable Energy Development Project (KREDP) implemented by the Ministry of Energy. The KREDP's efforts to respond appropriately to the household energy crisis facing the majority of urban households in the country cooking with highly inefficient charcoal stoves yielded the improved-efficiency Kenya Ceramic Jiko (KCJ) which achieved widespread dissemination. Following the unprecedented success of the KREDP, the Ministry of Energy initiated the Women and Energy project in partnership with the German Agency for Technical Cooperation (GTZ) to promote the uptake of improved wood-burning stoves amongst rural households. The

Women and Energy project ran from 1983 to 1994, after which government initiatives in stove development largely took a backseat to the efforts of international development actors, notably GTZ and Practical Action.

The chapter elaborated on Practical Action's philosophical roots in the intermediate technology principles propounded by Ernst Schumacher in the early 1970s, against the backdrop of the then dominant thinking amongst protagonists of the development project, which revolved around technology transfer principles. In place of the large-scale industrial model favoured by the North, Schumacher advocated decentralised production of appropriate technologies in small-scale industries which are easier to replicate in poor rural locations where the shortage of capital can be compensated for by putting the teeming population to work in large numbers of such industries. The chapter went on to describe Practical Action's work with local women's groups in Kenya employing two main participatory methodologies - Participatory Technology Development and Participatory Market System Development - to develop a range of appropriate cooking technologies as well as create market networks that respond to the requirements of the cash-poor populations in project communities.

It was noted that Practical Action's conception of appropriate technology, based as it is on Schumacher's ideals, appears to demonstrate greater sensitivity to the significance of non-technical networks than Project Gaia's interpretation of the same concept. In contrast to the narrow technical fix approach administered by Project Gaia and CASL in Nigeria, Practical Action articulates greater awareness of the contingency of the diverse

local contexts in which it operates. The latter's strategy, while also premised on the use of technology and the market as tools for the empowerment of marginalised groups of people in poor communities, claims to privilege a bottom-up approach which does not give primacy to those tools but starts from the realities of local people. These claims to context-responsiveness were evaluated against empirical data gathered on the USEPA smoke alleviation project that was ongoing at the time of fieldwork in West Kochieng, a poor peri-urban community in western Kenya. Practical Action was shown to be working based on the assumption that smoke alleviation, identified in Chapter 2 as the overriding concern of outsider organisations in the third phase of stove development, can be passed on to local citizens in poor communities through sustained awareness-raising efforts. However, the data from West Kochieng suggest that the notion of a transfer of priorities from outsider organisations to local citizens may be a problematic one, as citizens' lived realities dictate a different set of priorities than those prescribed by outsiders.

Chapter 6 undertook comparative analysis of the expert-led and context-responsive approaches to market-based stove development taken by Project Gaia/CASL and Practical Action respectively in Nigeria and Kenya. An evaluation of the impact of these contrasting approaches with respect to the common objective of energy poverty alleviation revealed a greater tendency for an expert-led implementation approach to exclude the poorest from technological and market solutions directed at them.

The chapter examined the implementation history of the Centre for Household Energy and the Environment (CEHEEN), a local non-governmental organisation which has worked in the field of stove

development in Nigeria since 1997. It was noted that the arrival of Project Gaia on the scene - and its subsequent alliance with CEHEEN - precipitated a significant shift in the orientation of the latter organisation with regard to the normative role of participation in identifying appropriate solutions for energy-poor populations in Nigeria. The subsequent subscription of the local organisation to the expert-led implementation approach introduced by Project Gaia is an indication of how powerful outsider actors can influence the content and process of project implementation even at the level of local implementing organisations. The chapter also analysed the implementation and outcomes of Practical Action's Participatory Market System Development methodology in West Kochieng location. The results of the analysis point to the need for outsider organisations adopting participatory approaches to be even more responsive in engaging marginalised groups of people in ways which will not reinforce existing structures of power in traditional societies such as West Kochieng. A different set of power relations was observed at the confluence of donor organisations, the implementing organisation, and local citizens in participatory spaces. A hierarchical system was seen to operate in the donor-recipient-beneficiary complex in which the interests emerging out of 'participatory' development processes reflect a privileging of the priorities of powerful outsider organisations. The conclusion was thus reached that, while the participatory methodologies employed by Practical Action in stove development may be 'technology neutral' as maintained by Bates (2005), they are not politically neutral.

7.2. Answering the Research Questions

This section directly addresses the three research questions outlined at the beginning of the chapter. The first question is as follows:

How have the objectives of specific externally-initiated stove programmes translated into the realities of local contexts, and what aspects of these contexts have influenced stove uptake by local citizens?

This question prompts a review of the objectives of Project Gaia and Practical Action in implementing their stove programmes in Nigeria and Kenya respectively, and a measurement of those objectives against the outcomes recorded in both instances. In each case, the outcome of the external intervention was found to diverge from the objectives of the implementing organisation in significant ways due to social, political, cultural and economic factors identified in the local context.

In Nigeria, Project Gaia proffered the CleanCook technology as a permanent solution to the problem of environmental degradation peculiar to the oil-rich Niger delta region of the country where, as discussed in Chapter 4, the unregulated oil-drilling activities of multinational companies over the long term has registered a net negative impact on the ecological and economic dimensions of local citizens' lived experiences. For Project Gaia, the Niger delta seemed to be the obvious place to locate the pilot of the CleanCook project: using the gas-to-methanol conversion technology at its disposal, the project had the potential to simultaneously address environmental pollution resulting from gas flaring in the delta and improve energy access for poor biomass-reliant households within the region and across the country. In spite of the promising prospects of the technology, however, Project Gaia did not succeed in its attempts to establish infrastructure for centralised methanol production in the complex socio-political context of the Niger delta, where citizens view past alliances with outsider organisations as being to their disadvantage. Unable to realise the

original gas-to-methanol conversion plan, the organisation has embraced an alternative plan for decentralised cassava-to-ethanol production across the country. The import of this switch from methanol production – which was originally a key driver in Project Gaia’s decision to set up the project in the Niger delta - is that the environmental conservation objective of the project has not been realised.

Further, Project Gaia’s overarching objective to empower solid biomass users at the bottom of the energy ladder to ‘depart completely from tradition’ by presenting the CleanCook technology to them as a modern alternative will likely prove less than straightforward to achieve. The analysis in Chapter 4 revealed how the CleanCook solution has interacted with the socio-economic and energy use context in Nigeria to emerge primarily as a potential substitute for kerosene. According to the World Health Organisation’s energy ladder categorisation (WHO 2006), kerosene, LPG and electricity belong on the middle and upper rungs of the energy ladder along with ethanol and methanol, the principal fuels used in the CleanCook stove. Given the positive relationship established between energy use and income level in Nigeria, it is perhaps not surprising that middle- and high-income households with access to those middle- and upper-rung fuels are the ones who are positioned to benefit the most from the comparable ethanol-fuelled technology. The apparent inability of the implementers of the CleanCook/Cassakero project to significantly alter the constitution of the energy ladder by moving biomass users up the rungs points to the limitations inherent in externally-conceived development strategies which attempt to ‘fix’ individual aspects of local citizens’ behaviour in isolation from the wider context within which those behaviours are to be understood.

In Kenya, Practical Action's objective to improve energy access amongst biomass-reliant populations seems to have been realised to a greater degree, as some of its improved cooking interventions have been accessed by households occupying the bottom rungs of the energy ladder. This relative degree of success however comes with a qualification: the most popular improved cooking technologies in West Kochieng – the Upesi stove and the fireless cooker - mainly accomplish the objective of fuel efficiency and do less to meet the organisation's core objective of smoke alleviation. This shortcoming is partly accounted for by citizens' economic realities - high levels of poverty in the location mean that households have different priorities competing for scarce resources, and fuel saving is valued principally because it translates into cost savings. As has been noted, the interventions which are most effective in alleviating smoke are also the most expensive. The LPG stove in particular is capable of achieving near-zero smoke emission levels, but it is out of economic reach for the majority of West Kochieng households. Considering that LPG – like the CleanCook's ethanol fuel - ranks near the top of the WHO energy ladder, it is possible to appreciate the complexity of getting households in West Kochieng to leap up the rungs of the ladder within the framework of a single intervention. Cultural codes which govern living and cooking arrangements in West Kochieng were shown to further complicate the economic factors influencing citizens' decisions to adopt the improved cooking technologies introduced to them.

The second research question applies specifically to Practical Action's participatory smoke alleviation programme in Kenya:

Has a context-responsive approach to implementation of specific stove programmes had a discernible impact on stove development processes and outcomes?

In West Kochieng where economic and cultural factors have been shown to pose a challenge to realisation of Practical Action's smoke alleviation objective, the evidence suggests that the context-responsive approach employed has facilitated negotiation of certain aspects of the complex terrain by the outsider organisation, though to a limited degree.

It has been noted that the cost of improved cooking interventions poses a significant challenge to their uptake by West Kochieng citizens. The more expensive interventions – particularly the smoke hood and the LPG stove – rely to a large extent on the employment of 'sophisticated' materials and skills which are mostly obtainable in urban centres outside of the location. The less expensive Upesi stove and fireless cooker on the other hand were developed with local women's groups through participatory processes and continue to be installed or assembled locally in a few of those groups. The technologies in this latter group fit more closely with the definition of 'low-cost' in the context of low-income West Kochieng households and have recorded higher rates of acceptance in spite of generally low rates of dissemination across the interventions. As such, they demonstrate greater potential to be sustained by locally-available skills, materials and resources beyond the termination of the project.

However, where the main reasons for not adopting particular interventions are cultural rather than economic, a context-responsive approach does not appear to have made a significant impact on citizens' readiness to accept and adopt those interventions. For instance, despite having been

introduced in the participatory Smoke, Health and Household Energy project implemented by Practical Action between 2001 and 2005 (Bates 2007), eaves spaces have been shown to be unpopular with citizens in West Kochieng due to their inappropriateness to the culture and lifestyle in the location. Perhaps the most pertinent aspect of culture in the context of this study relates to the use of space in West Kochieng. Unlike in industrialised countries and 'modern sectors' of developing countries where the architecture of domestic residences is based on the principle of subdividing a single housing unit into different functional spaces, the kitchen in West Kochieng is a separate 'outdoor' structure which, ideally, is detached from the main living quarters in a homestead. Understanding this fundamental distinction is key to appreciating the status of the outdoor kitchen as a prerequisite to the success of the kitchen improvement programmes introduced by Practical Action which usually require households to make permanent alterations to cooking spaces. It is perhaps noteworthy that all of the households within the interview sample which had adopted the fixed Upesi stove had them installed in outdoor kitchens. However, the acquisition of an outdoor kitchen is a cultural requirement which in itself has been shown to present an economic challenge for many households in the location.

What, therefore, are the implications of these findings for the hypothesis that higher stove dissemination rates are more likely to be achieved on participatory projects designed to respond to local citizens' priorities? It is not possible, on the basis of the qualitative study carried out here, to offer a response to this hypothesis in quantitative terms. Further, the findings are based on the study of two cases in specific contexts and are therefore not generalisable across stove programmes in diverse contexts. It can

however be inferred from the findings that the participatory approach employed by Practical Action in West Kochieng – particularly its Participatory Market System Development component - enabled closer engagement with the economic realities of the context and facilitated the uptake of some improved cooking technologies by poor biomass-reliant households with peculiar marketing needs. The Cassakero project in Nigeria, with its more conventional market networks, may be able to achieve higher rates of dissemination over a wider geographical area, but the technology is least likely to be accessible by the energy-poor, low-income populations amongst whom it could potentially make the most impact. As such, the important indicator to be measured here is not the number of cooking technologies disseminated on particular projects, but the socio-economic constitution of the populations amongst which the spread of those technologies is being achieved.

This response leads on to the final research question:

How does the shift towards market-based stove dissemination relate to the ideal of context-responsiveness expressed by outsider organisations, and what is the impact of this shift on the objective of energy poverty alleviation stated by particular organisations?

Chapter 2 of this thesis expanded on the debates since the second, context-responsive phase of stove development regarding whether subsidy-based or market-based dissemination strategies would be most appropriate for deploying improved stove technologies among poor populations in target communities. The chapter noted that a near-consensus has been achieved within the donor community in the

currently-running third phase on the desirability of adopting market strategies over dissemination approaches which incorporate subsidy elements, on the basis that the former route is more financially sustainable over the long term and is potentially more value-adding than the latter.

Project Gaia's CleanCook project and Practical Action's smoke alleviation programme, both operating in the third phase of stove development, have been seen to employ market-based approaches to dissemination. However, Project Gaia has favoured a mainly expert-led route to market dissemination in Nigeria, while Practical Action, in applying its Participatory Market System Development methodology, has attempted to be context-responsive in developing its market strategy in Kenya. Comparison of the projected and actual outcomes of both approaches has shown that, whether expert-led or context-responsive, market-based stove dissemination strategies put the poorest and neediest populations at risk of not being able to pay for improved cooking interventions. However, as noted previously, Practical Action's context-responsive approach resulted in a greater likelihood of its interventions - particularly the Upesi stove and fireless cooker which are both low-cost and culturally appropriate - being directed towards local citizens on the lowest rungs of the energy ladder.

As discussed in Chapter 6, the context-responsive approach taken by Practical Action required the organisation to operate within the provisions of the 'economy of affection' in West Kochieng in working to develop a market system for its interventions. The provisions within the location for certain 'market' functions such as advertising and credit arrangements were seen to deviate from the rational, profit-maximising norms of formal

markets. Those informal provisions have however been critical to sustaining the local market for appropriate cooking technologies. Notwithstanding the potential for impact demonstrated by Practical Action's context-responsive approach to market dissemination, it appears to be incompatible with mainstream visions of 'scaling up' which emphasise universal reach and access of, sometimes, 'efficient' stove technologies which are developed out of context and which therefore may not be economically or culturally appropriate²². With respect to alleviating energy poverty amongst biomass-reliant households therefore, the outcomes of the contrasting approaches to market-based stove dissemination taken by Practical Action and Project Gaia suggest the inevitability of a trade-off between scale and impact on stove programmes specifically directed at energy-poor citizens: a context-responsive approach is likely to yield small scale but precise impact, while an expert-led approach is likely to yield relatively large scale but less precise impact.

On this note, it would appear that Westhoff's (1995) assertion that the context-responsive approaches espoused by outsider organisations in the second phase of stove development have facilitated the identification of more appropriate technologies and dissemination models has been borne out to an extent in the case of Practical Action. An important caveat which has been established in the course of this study, however, is that the ultimate success of a stove programme cannot be measured in terms of the appropriateness of the technology or rates of dissemination, but – in

²² A pertinent example is the Government of India's recently launched National Biomass Cookstove Initiative which hopes to record significant improvements over the subsidy-based National Programme on Improved Chulha described in Chapter 2 which ran from 1985 to 2002. To this end, the initiative has announced a global competition inviting technical experts located in laboratories around the world to submit 'next-generation' improved stove designs to be considered for dissemination to millions of poor Indian households via market channels (Sagar 2010).

keeping with alternative views of development which support subjective interpretations of the ideal - in terms of the degree to which it reflects and enhances the priorities of local citizens. In this regard, Practical Action has been shown to employ a context-responsive approach less for the freedom it affords local citizens to input their priorities into decision-making processes on the global development scene than for the potential it holds to facilitate the realisation of preset project priorities. The objective of the participatory route taken by the organisation, according to a member of staff, is to ensure that 'what they really need is found at the end of a road that we build in their minds' (PA-EA Staff 2). Practical Action's performances of participatory development therefore constitute a case in which, according to Eversole (2003), citizens are only allowed to determine the shape of the paving stones, and not where the path is going. As such, despite the organisation's espousal of bottom-up, participatory principles from the second phase of stove development onwards, top-down principles still operate in which project priorities rather than citizen priorities constitute the starting point in agenda-setting processes.

The next section looks at the conclusions which can be drawn from the findings of this study in relation to the broader debates on citizen participation in the development literature.

7.3. Contribution to Debates in Participatory Development

The above observations made regarding Practical Action's practice of participatory development appear to provide support for the depoliticisation argument in the participation literature reviewed in Chapter 1 which highlights the tendency of outsider organisations to

emphasise issues of methodology while ignoring the structures of power which invariably pervade participatory spaces. Responding to the depoliticisation critique, Mohan and Hickey (2004) have suggested that participation be recast within a framework of citizenship which has its roots in the central tenets of critical modernism namely democracy, progress, and emancipation. Such a reconstitution, Mohan and Hickey argue, is capable of salvaging the practice of participation and arresting its tyrannical tendencies. They acknowledge that the rationalities of outsider organisations are often in contention with those of local citizens, but argue that these can be brought into dialogue in development interactions. However, counterarguments put forward by other authors in the literature, notably Cleaver (2004) and Henry (2004), suggest that the Western democratic values underlying Mohan and Hickey's critical modernism approach cannot be assumed to hold in the non-Western societies in which development agencies often operate. This section now discusses the insight contributed by this study to the debate around the possibilities of reconciling the contending rationalities of local citizens and outsider organisations.

Practical Action's stove programme in West Kochieng fundamentally seeks to elevate the social and economic status of women in a community where they are culturally assigned a subordinate status relative to their male counterparts. The secondary status of female citizens often places restrictions on their freedom to take advantage of opportunities and to make choices – both of which are key to realising the goal of empowerment. By working to empower these citizens, Practical Action essentially seeks to advance the democratic values of progress and emancipation that Mohan and Hickey propagate. The participatory

approach employed by the organisation provides a platform on which it can sometimes be seen to encourage the expression of community values while seeking to simultaneously establish outsider norms. An example of this is seen in the way that the organisation leaves matters of selection to members of women's groups when recruiting for stove training programmes. This method of selection at once grants agency to the women and demonstrates outsiders' respect for their choices. However, in seeking to promote the agenda of free agency which Sen (1999) has identified to be a prerequisite to achieving substantive development, Practical Action's strategy inadvertently creates room for hierarchical structures ordered by differences in members' social status to work within those groups, with the result that participation is maximised for certain group members and restricted for others. Similarly, the organisation's attempts to extend the opportunity for equal participation across women's groups in the location has achieved limited success, as the system by which group participation in externally-initiated projects is negotiated within the community tends to favour pioneer groups over others. These observations indicate a degree of imperviousness of traditional structures to external intervention. Practical Action's deliberate employment of a strategy which focuses exclusively on local women's groups can be seen as a subtle attempt to influence inequitable socio-cultural norms in project communities. It is instructive that the organisation's efforts to secure better opportunities for women have, in the case of West Kochieng, been limited by aspects of the internal social structures they set out to change.

Debates highlighting the tension between societal structures and individuals' agency, particularly within such traditional societies as West Kochieng, are not new with regard to its manifestation at the level of the

community (see for example Apter and Garnsey 1994, Agarwal 2001). This study has however shed light on the possibility of such tensions existing at a more fundamental level than is commonly recognised. The findings from West Kochieng show that repressive power structures can operate not only at the level of the community, but also at the level of so-called marginalised groups where even slight variations in such social indicators as income level and education of members may be sufficient to establish a hierarchical system which ultimately serves to restrict the reach of external interventions.

It is interesting to observe that community groups such as the women's groups in West Kochieng where members seek support in the absence of such support from the wider community can serve as platforms for further repression of their agency. This points to the complexity of the socio-cultural and institutional structures in such communities. Practical Action's work in West Kochieng represents a case of an outsider organisation attempting to influence an aspect of those structures at community level but encountering another layer of resistance at group level. In this case, the rationalities of local citizens and outsider organisations are clearly in contention, and there is the need for continuous negotiation between them. As such, while it may be possible, as Mohan and Hickey suggest, to bring contending rationalities together in dialogic processes in development relations, it cannot be assumed that a common frame of reference will emerge for action. Indeed, Mohan and Hickey's notion of a dialogic process presumes that the hierarchical structure of development gives local citizens space to bring their own rationalities to the table. Even in participatory development scenarios, when local citizens express rationalities which differ from those of outsider organisations – as is the

case with citizens in Kenya who do not view kitchen smoke as a problem in spite of Practical Action's 'awareness-raising' agenda – those divergent rationalities are sometimes ignored. Paying attention to the rationalities of local citizens - whether or not they conform to those of outsiders - rather than seeking to forge consensus scenarios which in reality promote the agenda of outsiders, will be a legitimate step in the direction of substantive empowerment.

7.4. Possibilities for Future Research

At the time of writing this thesis, the commercial phase of the CleanCook project in Nigeria – the Cassakero programme - is yet to be launched. As previously indicated, the observations and inferences made in this study of the project are based on data pertaining to the pilot phase which ran between 2003 and 2007. There is thus considerable scope for future research on the project when implementation commences. In particular, it would be useful to analyse the distribution of uptake of the CleanCook technology amongst low, middle and high income households in multiple locations and determine how actual distribution patterns relate to the projections made in this study. Further, it would be instructive to ascertain the impact of the project on energy use patterns and household economics, particularly within the group constituted by low-income households which primarily cook with kerosene for whom the projected impact is most uncertain.

As noted in Chapter 3, the data gathered from West Kochieng and Kasewe in Kenya were quite diverse in nature. In selecting the interviews which were most relevant to my analytical themes, a few other promising themes were inevitably omitted which can be developed in future

analyses. For instance, the focus group interview I held with members of the Keyo women's group, a prominent stove producer group which started out as an external intervention in the 1980s and has since maintained commercial operations on a significantly greater scale than similar groups in the region, generated interest in the dynamics of locally-based group stove enterprises which have run relatively successful market-based operations in largely subsistence areas. Analysis of the data gathered from those interviews would aid understanding of the set of circumstances which have combined within the specific context to facilitate such an outcome. The findings of such a study could be instructive for policy makers and project funders in the currently-running third phase of stove development in which blanket market dissemination strategies are increasingly being prescribed as the route to successful scaling up.

Overall, the scope for research into stove development in this current phase is substantial, especially in light of the renewed vigour in funding and policy circles to drive large-scale dissemination of improved stoves via market platforms. In September 2010, United States Secretary of State Hillary Clinton announced a new public-private partnership to 'save lives, improve livelihoods, empower women and combat climate change' by promoting clean cookstoves in developing countries – a development which, according to Yee (2010), has elevated the improved stove agenda 'from a public health backwater to a high place'. Termed the Global Alliance for Clean Cookstoves, this high-profile partnership between Northern government departments, businesses and non-governmental organisations aims to oversee the provision of improved stoves to 100 million households across Africa, Asia and Latin America by 2020. The goal of the Alliance is the establishment of a network of production and

marketing centres which will constitute a 'thriving global industry' (United Nations Foundation website) for improved stoves. The premise of this market-driven initiative, Smith (2010) asserts, is that the private sector presents a 'well-tested' platform on which improved cooking technologies can be developed and disseminated in a sustainable way. As the programme unfolds, it will be interesting to analyse the implementation and outcomes of what appears to constitute another expert-led 'global' prescription for resolving the energy challenges of households in different local contexts around the world.

7.5. Final Reflections on Energy Poverty and Development Policy

'So, there are lots... I think there are a lot of challenges in development. And it all explains why - I don't know if it is just for this region - for this region, poverty has persisted. You think you're reducing poverty, and more and more, people are getting poorer and poorer.' (Interview PA-EA Staff 3)

'And I would say that that is not resolved because poverty is still growing, and it's taking up different shapes, flavours and colours. Poverty is growing, it's increasing, and that alone tells me that global agendas and local realities are widening. Are they still clearing the Amazon forest? They're clearing it because they need the land to feed their cows, so they can get beef to send to the USA and get money.' (Interview PA-EA Staff 2)

It is difficult to overstate the relevance of this study for stove development practice in particular and development practice in general. In 1987, the World Commission on Environment and Development was commissioned by the United Nations to formulate 'a global agenda for change' proposing long-term environmental strategies for achieving sustainable development (WCED 1987). In the ensuing report, energy was one of the priority areas identified as requiring urgent attention with respect to sustainable development not only in poor developing countries of the South, but also

in rich developed countries of the North. However, for those populations in the South which rely almost exclusively on solid biomass fuels for energy, the challenge is not only one of building sustainable futures but also, and in many cases primarily, one of ensuring immediate survival.

Warwick and Doig (2004) note that with the exceptions of India, South Africa and China, the macro-energy policies of most nations in the developing country category do not include any mention of biomass, the most important fuel source for their citizens. This is an indication of the generally low levels of attention paid by national governments to the energy poverty issues being tackled by other actors on the international development scene. The Nigerian energy policy recognises biomass as the primary energy source for the majority of its citizens and outlines a number of pro-poor policy responses to the issue, including the need to develop improved stoves and alternative energy technologies as well as train local citizens in their manufacture and use (ECN 2003). However, as was noted in Chapter 1, the Nigerian government has taken few concrete steps to translate these policies into actual programmes that can improve household energy access for the poor. For example, Ohimain's (2010) survey of emerging ethanol projects in Nigeria cited in Chapter 4 indicates that the government's efforts to establish public-private partnerships for bioethanol production have largely bypassed the household energy sector, despite the sector's accounting for 80 percent of total energy consumption in the country (IEA 2008). Similarly, the Kenyan energy policy enacted in 2004 articulates the objective of increasing the uptake of improved stoves by biomass-reliant households, potentially reaching up to 10 percent of the rural population by 2020 (UNEP 2006), up from 4 percent in 2002 (Ingwe 2007). The involvement of the Kenyan government in stove

development activity however seems limited relative to its policy goal, with its most coordinated stove activity at present being a narrow component of an agricultural development programme initiated by the German Agency for Technical Cooperation within the framework of the Kenyan-German Development Partnership (Luke 2006).

Civil society institutions at the local and international level have risen to address energy poverty in the South on a more significant scale. However, as the above excerpts from interviews held with Practical Action staff suggest, those efforts have yielded less than commensurate results with regard to alleviating energy poverty specifically, and poverty more generally. According to Kandachar and Halme (2008), it is in view of the perceived failures of the public sector and civil society in tackling the problem of poverty that the private sector is increasingly being presented as a more effective route to poverty alleviation and sustainable development. This has definitely been the case in the field of stove development where, in addition to the increasing predilection towards market-based dissemination, definitions of the problem to be addressed and of appropriate technological solutions continue to shift to align with global development trends.

As discussed in Chapter 2, the problems associated with solid biomass use in poor households have ranged from deforestation in the 1970s, to smoke-related health hazards in the 1990s, to global warming and climate change more recently. The trends identified in the literature indicated that outsider organisations, in responding to those 'problems', tended to prioritise their concerns over those of local citizens. Smoke alleviation was identified as a concern of the earliest stove development efforts by local

grassroots organisations in Asia in the 1950s. However, as highlighted in the chapter, stove development did not gain substantial international recognition and support until the 1970s and 1980s when improved stoves were thought to be an immediate solution to outsiders' concern over deforestation in the South. As such, only when the realities of local citizens seemingly coincided with an issue of interest to outsider organisations did stoves get onto the international development agenda. When, in the second phase, domestic fuelwood use was found to be unconnected to rapid deforestation rates, outsider interest in promoting improved stoves waned. Crewe (1997) asserts that by withholding support during this period, several international organisations missed out on the opportunity to discover the value that local citizens attached to improved stove use in the absence of a global agenda. Even upon 'discovery' of the problem of indoor air pollution in the third phase, significant international support was not obtained until international non-governmental organisations campaigned to raise the profile of the issue on the global scene. At the turn of the millennium, the issue finally got onto the international development agenda, but as Bailis et al. (2009) point out, the growing insistence by donor organisations on neoliberal approaches to dissemination counteracts the objective of the phase to deliver a social good – improved health - to poor citizens in the South.

This study has established that the problems and solutions prescribed by stove development organisations across the phases do not always align with citizens' priorities, and decisions to adopt externally-initiated interventions are usually made on the basis of these local priorities rather than those of outsiders. In the case of West Kochieng, an insistence by Practical Action on framing its interventions in terms of smoke alleviation

has been shown to be less significant in determining stove uptake than citizens' prioritisation of fuel efficiency. Indeed, recent studies (see for example Masera et al. 2005, Garcia-Frapolli et al. 2010) show fuel efficiency to be a high-ranking priority of citizens in rural and peri-urban communities where biomass fuels are becoming increasingly scarce and have to be purchased - a consideration which appears to have outlasted experts' appreciation of its importance in the first phase of the 1970s. This reinforces the observation that stove development organisations may benefit from paying attention to the outcomes most valued by citizens in various local contexts and redirecting their campaigns to more closely reflect those priorities.

It must be noted that a change of campaign direction to reflect citizens' priorities may not necessarily work to advance outsiders' agenda. As has been observed with Practical Action's range of improved cooking interventions for example, technologies promoted for their fuel-saving properties may not necessarily alleviate smoke, and vice-versa. This seems to suggest the inevitability of a trade-off between the priorities of local citizens and outsider organisations. While this may be the case, incorporating citizen perspectives into externally-initiated programmes can potentially enhance the legitimacy of the development process and deliver progressively better outcomes in the long term. This points to another significant aspect of such programmes: that of their short-term nature, which is usually a consequence of strict donor funding schedules. It is often the case that ambitious targets are crammed into relatively short time frames - as with the target of the Global Alliance for Clean Cookstoves which was highlighted previously to disseminate 100 million stoves across several continents within a 10-year period. The findings of

this study suggest that a review of such time-bound, target-based performance models by outsider organisations would be productive. Long-term development commitments are required which, rather than measure progress by the numbers, aim for an understanding of what is most important to local citizens and work with them in that direction. This is a significant note for policy makers and development practitioners as yet another global rationale for promoting improved stoves – that of climate change - gathers momentum in debates amongst members of the international community.

In April 2010, another global target, namely to deliver universal access to modern energy services by 2030, was announced by the United Nations Secretary-General's Advisory Group on Energy and Climate Change (AGECC). To meet the target, the International Energy Agency envisages 445 million people switching from biomass stoves to LPG stoves by 2015 and another 730 million by 2030 (OECD/IEA 2010). The target, developed on the premise that 'eliminating energy poverty is of paramount importance in eradicating poverty' (AGECC 2010, p.3), has been described by the AGECC as 'ambitious but achievable' - achievable based on the availability of a combination of modern technology, emerging business models, and increased donor funding in the area of energy development. The focus of the programme is thus on maximising efficient technology and market platforms to alleviate energy poverty amongst the 'poorest of the poor' (AGECC 2010, p.9). One of the platforms that have been set up to help the poor make this transition from traditional to modern fuels is that of microfinance. Practical Action's experience with local citizens on similar microfinance schemes in West Kochieng location however indicates that while poor people value access to credit, they usually prefer to take

loans for income generation purposes which may not be related to stove acquisition or enterprise. This is understandable in the light of the economic realities they face: with loans that generate additional income, they can potentially gain access to such basic services as improved nutrition and better education and thus address the wider context of poverty. These observations made with regard to credit appropriation by the poor appear to signify the converse of the AGECC's premise: that eliminating poverty is equally a prerequisite to alleviating energy poverty.

In conclusion therefore, the efforts of outsider organisations to alleviate energy poverty will benefit from a consideration of the wider context in which local citizens live, one in which issues of low incomes, food insecurity and energy poverty are all interconnected pieces of a holistic picture. A major step towards understanding the complexities of local contexts is to open up routes to genuine forms of citizen engagement in which poor people are empowered to influence the direction, content and implementation of solutions which align with their priorities and optimise their existing resources. This study has shown that even where participatory principles have been espoused, stove development practice is still largely shaped by the philosophies and priorities of outsider organisations with regard to the pertinent issues affecting citizens and appropriate pathways to their resolution. A move is required towards practices of participation which are aimed at responding to the totality of citizens' experiences, irrespective of their relationship to outsiders' expectations.

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Appendix 1: Interview Guide by Actor Group

Local citizens

Stove use

1. Did you experience any problems cooking with the traditional stove?
2. Who made the decision to adopt the improved stove, and why?
3. What advantages/disadvantages have you derived from using the improved stove?

Non-use of improved stoves

1. Do you think there are any advantages/disadvantages to cooking with your traditional stove?
2. Would you replace your cooking stove with a more efficient one that uses less wood and emits less smoke? Why?
3. Would it make any difference if you knew that the efficient stove would likely reduce the risk of disease to your family, conserve natural resources and preserve the environment?
4. What factors that would encourage you to switch to an improved stove?

Citizen priorities

1. What characteristics of a cooking stove do you value the most? Why?
2. What do you see as your most pressing need with relation to household energy use?
3. How do you think the above need can be met? Who do you think is responsible for meeting the need?

4. Are there any changes you would like to see in relation to the way you use energy for cooking? Who do you think is responsible for making these changes happen?
5. Can you name three things (preferably in order of importance) that you consider to be most important in relation to the way you use energy?
6. Can you name three things (preferably in order of importance) that you consider to be most important in relation to your household and community?

Membership and identity

1. Do you belong to any social/political group in the community? What significance do you attach to your membership of the group?

Local participation, representation and legitimacy

1. Would you be interested to take part in a community forum to discuss how the use of energy for cooking affects your life? Why?
2. Who do you think should be present / represented at such a forum? Why?
3. If you were asked to make a contribution to such a forum, what would it be?

Decision-making

1. What is the usual procedure followed when a (major) decision needs to be made in the home?
2. Does this procedure vary with the nature of the decision (e.g. household / social / economic / political)?

3. Are there any specific types of decisions that are traditionally regarded as being out of the jurisdiction of women in the community?

Agency vs. structure

1. Do you see any obstacles to your participation/involvement in domestic/community affairs?
2. Does being a man/woman automatically include or exclude you from certain community forums? How do you feel about this?
3. Would you like the chance to play a more significant role in domestic/community-level decision-making? Why?
4. What do you think would enable you play a greater role in domestic/community affairs?

Stove producer groups

1. What sorts of community-level activities does the group have access to? How does this differ from the access they gain as individuals?
2. What benefits have the women derived from their participation in stove projects, and how do these relate to the wider objectives of the group?
3. Can the group/individuals identify any disadvantages to their participation in stove projects?
4. Is there any input the women think they could have made to the stove project at the time of implementation but didn't? Why?
5. Were the women comfortable with the level of participation they had on the stove projects? Why?

6. What were the women expecting to get out of participating in stove projects? Were their expectations met?

Project organisation staff

Projects

1. What are the procedures involved in initiating/commissioning a typical improved stove project, who are the actors involved and what are their respective responsibilities?
2. How well do stove project outcomes tally with implementing actors' projections, aims, objectives, and expectations?
3. Are you able to identify any local factors that have encouraged/hindered the achievement of stove project objectives?

Processes

1. What is the organisation's basis for employing current modes of local participation in stove projects?
2. What are the reasons for using women groups as the unit of technical participation in stove projects? What advantages and disadvantages can you identify to this strategy?
3. How do you think your current implementation approaches impact on people's sense of responsibility for the project?
4. In the decades that your organisation has promoted improved stoves, what kinds of means have you employed in educating local stove users on the benefits of switching? How effective do you think these have been?
5. Under what circumstances would the organisation engage the same women groups (or other groups) in deliberations over what

solutions are contextually and culturally appropriate for them in the first place?

6. Do you foresee any advantages/disadvantages to this type of engagement?

Policy

1. Do you think there is a role for local users to play in development policy-making with regard to the issue of sustainable energy use?
2. What do you think the implications would be of approaching rural household energy development from a political, rather than a technical angle?
3. What implications do you think the recent linkage of rural household energy practices to climate change will have for energy development policy?

Partner organisation staff

1. Brief history of the organisation, its origins, its relationships with donors
2. What prompted your involvement in this location?
3. Elaborate on the objectives and implementation of your main projects in the location
4. In the case of technology-led projects, where and how was the technology developed? What has been your experience with acceptance and uptake of the technology by local citizens?
5. What role do you envisage for education/awareness/sensitisation of local citizens with respect to your intervention?
6. How have you negotiated access to target groups in local communities?

7. How do you deal with any conflicts of interest that arise between the organisation and local communities?
8. In seeking to promote your intervention, have you found it necessary to form partnerships with other organisations, local or international? Why?
9. Does the organisation collaborate with local/national government departments or representatives on any aspects of its projects?

Policy makers

Institutional structures

1. Could you provide a brief description of your organisational structure?
2. Who are the state's major collaborators (local and foreign) in matters of national energy development? How are conflicts of interest between parties handled?
3. How have national energy policies developed in line with the global sustainability agenda?

Institutional priorities

1. What have been the energy priority areas for government over the last ten years? Why?
2. Traditional biomass accounts for about 70 percent of total energy use in the country. What specific plans does the state have to cater for this (mostly rural) population with regard to household energy availability and use?
3. Does the state currently hold any stake in improved stove programmes run by development institutions? Why?

Institutional strategies

1. What is the usual procedure for drawing up national energy policies?
2. Do you think there's a role for 'participatory household energy governance' at the local level? How well do you think your current organisational structure would support this?
3. In what ways does your organisation facilitate the integration of energy into rural development as a whole?
4. Does the commercial non-viability of biomass have any effect on the kinds of policies made to regulate its use?

Project community authorities

1. Describe the administrative structure of the local government
2. What responsibilities does the local government have to local citizens?
3. What role has the local government historically played on community development projects initiated by outsider organisations?
4. What is the nature and extent of the local government's involvement in the improved stove project under consideration?
5. How does the local government work with women's groups and other self-help groups in the community?

**Appendix 2: Constitution of Interview Sample in West
Kochieng**

West Kochieng Citizen	Selection Criteria				
	Member of stove producer group involved in stove enterprise	Non-member of stove producer group involved in stove enterprise	Cooks over three-stone fire	Installed standard Upesi stove	Installed other improved cooking intervention (specified)
1	√	x	x	√	√ (Eaves spaces, Fireless cooker)
2	x	x	√	x	x
3	x	x	x	√	√ (Eaves spaces)
4	x	x	x	√	x
5	√	x	x	√	√ (Fireless cooker)
6	x	√	√	x	x
7	x	x	√	x	x
8	√	x	x	√	x
9	x	x	√	x	x
10	√	x	x	√	√ (Smoke hood, LPG)
11	x	x	x	√	x
12	x	x	x	x	√ (KCJ)
13	x	x	√	x	x

√ = Yes

x = No