

# **The Role of Local Participation in Facilitating Innovation of Appropriate Renewable Energy Technologies in Rural Areas of Developing Countries**

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**ABSTRACT:** This paper examines the indispensable role of local users in designing, operating and maintaining renewable energy projects in developing countries. A case study is examined of a project in rural Africa designed and implemented with high involvement and participation of the end users. Key features of the participation process are identified for the purpose of highlighting elements of the approach that produced best results.

**Keywords:** Participation, Renewable Energy, Developing Countries

## **1. INTRODUCTION**

Technology is understood by the majority of people to be synonymous with the operation of machines and other modern applications. That definition holds true within its limited purview, but it is only a subset of the whole meaning. Technology in its most inclusive sense actually incorporates all the technical and non-technical processes, methods and concepts which inform the design of a final product.

Rural communities of developing countries operate on a small scale, often under peculiar conditions. It follows necessarily that for any form of technology to be of maximum use to people in these communities, it should be designed and scaled to their requirements. Many renewable energy interventions in developing countries have proved to be unsustainable because of the failure of stakeholders to recognise this important requirement, and to work out ways to

develop a good fit between the technology, its purpose and its users.

The analysis of technical change in developing nations reveals the importance of bringing the skills and ideas of technology users into the process of generating new technologies [12]. Agarwal (1980) cited in [3] notes how studies of the diffusion of rural technology in general can be broadly divided between those studies in which the involvement of people in the generation and adoption of the technology is seen as a necessary condition for diffusion and those which see the issue in terms of 'persuading' people to use an externally conceived and developed technical package. The work of Barbour (1992) cited in [20] deliberately rejects the theory of technological determinism which holds that technology is an entity that is able to evolve independently of societal input. He rather advocates down-scaling, decentralisation and local participation to optimise the benefits of technology.

## 2. PARTICIPATION IN DEVELOPMENT: SHADES OF MEANING

Discussion of people's participation in community development has been a recurrent theme in literature since the beginning of the 20th century. The need for popular participation of local community in rural development has, however, been emphasized mostly since the 1970s [18].

The concept of participation is all-encompassing to the extent that it is difficult to give the term any one definition. Its use is so widespread and its scope so broad that it is impossible to encapsulate it within one definitive term [17]. In its most basic form, community participation in a project will involve some combination of the following elements: a focus on making provision for the needs of local people; taking advantage of local people's experience and know-how; and allowing local people to donate labour, financial and material resources towards the project.

Brown [5] defines participation in rural development as the involvement of local people in planning, assessment of local needs, and implementation of programmes in order to develop the necessary self-reliance and self-confidence needed. Cohen and Uphoff [8] extended the definition to include involvement of local people in program design, benefits sharing, and program evaluation.

Whatever definition is adopted, the central idea underlying and animating participation is influence. Through participation, local end users have the opportunity to influence any combination of the key project areas of planning, policy, design, construction, implementation, remuneration and evaluation. Drijver [9] identifies varying degrees of "reach" or influence that local people may wield in community projects. According to Drijver's "functional reach" classification, it is not sufficient that many different sections of the community - individuals, cooperatives,

community organisations, non-government organisations, whole departments within local governments - are involved in participation. 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.

Oakley [17] observes that participation can either be employed as a means or an end. Participation as a means is usually short term and expires with the completion of a particular community project. The emphasis is on completion of the project at hand, rather than development of the capabilities of rural people, as is the case when participation is seen as an end in itself. Participation as an end recognises the importance of rural empowerment, both in the form of increased local technological capacity and greater relevance of users in policy and decision-making processes.

The argument for involving local people in technology implementation is backed by evidence of tangible and non-tangible benefits that have accrued to participating communities. Usually the tangible benefits tend to be of an economic or technological nature, while the non-tangible benefits tend to be more oriented towards social welfare. Tangible benefits include:

1. Enhanced income resulting from application of appropriate technology in rural enterprise;
2. More effective use of project resources, particularly time and capital;
3. More effective delivery of rural development programmes;
4. Increase in local capabilities and user confidence with developed technologies.

In addition to the above, well-implemented participatory approaches would offer the following social benefits to a community:

1. An increased sense of individual significance within individuals,

- facilitating bonding amongst community members;
- 2. Equipment of the community with sufficient decision power and responsibility for efficient management of its resources;
- 3. Increased capacity to collaborate on future community projects, even in the absence of supervision by external organisations.

Top-down approaches to project implementation typically focus mainly on tangible technical objectives, whereas participatory bottom-up approaches would accord due importance to social benefits while not compromising on technical objectives. The latter approach tends to give rise to more socially and technologically appropriate solutions with greater probability of widespread adoption and improved likelihood of long-term sustainability.

### **3. THE ROLE OF PARTICIPATION IN RENEWABLE ENERGY TECHNOLOGY IMPLEMENTATION**

The energy field as a whole has not sufficiently recognized the value of user participation, and has concentrated on insular research and development projects with what Gamser [12] refers to as a 'technical fix approach'. Where this valuable resource has been tapped however, it has been shown that superior adoption and performance of renewable energy technologies has occurred [12]. Participation of local people in design of renewable energy applications is important because the local people are the ones most affected by rural energy problems [3].

Gamser [12] cites the example of a rural renewable energy program begun in 1977 by the United States Agency for International Development (USAID) in which applications were designed for end users in developing countries without attempting to

identify and incorporate their needs. The systems developed in this way generally proved unsuited or inappropriate for specific energy problems. On the other hand, there were other technologies developed within the same program that did prove sustainable over time.

Program evaluation identified a number of reasons for the success of the latter group of technologies. Eighty percent of those reasons were directly linked to compatibility of the technologies with local capabilities and participation of end users in system adaptation and construction. A very important lesson emerged: clever, high-tech innovations that do not factor in local requirements and capabilities are less likely to be sustainable, regardless of their technical excellence. Experience has shown that these innovations are normally not widely adopted by local people, and even where they are, they are not used for very long before being abandoned for more appropriate, albeit less sophisticated, means [3].

### **4. CASE STUDY: THE ITDG-KENYA BIOMASS SMOKE PROJECT**

About 2.4 billion people in developing countries worldwide rely on biomass fuels—such as wood, dung and agricultural residues—as their main source of energy [15]. This is typical of the situation in the rural areas of Africa, where low incomes and lack of accessibility prohibit the use of modern alternatives [15]. In search of cheap energy, rural dwellers, particularly women and children, expend time and energy gathering mostly wood and animal dung to be used for cooking over open fires. This system may not require financial input by the users, but it comes with a price both to their environment and to their health.

A wide variety of improved cookstoves has been developed and disseminated throughout Asia, Africa, and Latin America

[10], to engender safer and more efficient use of biomass. Remarkably, local participation is becoming a key ingredient in the development of these alternatives. Looking back at the history of the domestic cookstove, it would appear that perhaps no technology has been developed more participatively [19].

The Intermediate Technology Development Group (ITDG)\*, a non-government organisation, worked in a participative project with fifty households in two Kenyan communities between 1998 and 2001 to develop and implement solutions to pollution problems caused by inefficient use of biomass in their kitchens. Even though the two communities (Kaijado and West Kenya) are both Kenyan villages, they have different socio-cultural practices and preferences. Consequently, ITDG worked with them separately to identify the requirements of each community and devise solutions accordingly. Three main interventions were developed: improved combustion through improved stoves; smoke extraction through smoke hoods and ventilation through windows and eaves spaces.

Right at the start of the project, participation as an end was stated as the core objective. Indigenous knowledge was highly valued throughout the project, and the communities' views and opinions were listened to at all stages of the work [4]. Both men and women participated in technology development and appraisal, deciding on the options that suited them best [4]. For instance, ITDG had initially considered tackling the issue of smoke extraction by installing chimney stoves. However, consultation with local groups revealed that there was a strong aversion in the community towards chimney stoves due to

the colossal failure of a government-implemented chimney stove project years earlier. The idea of smoke hoods, on the other hand, was welcome because a similar project had been successfully implemented in the region previously.

Some key elements of participation that were crucial to the viability of this project are outlined below:

- Prior to commencement, ITDG staff met with women's groups in both communities to inform them of the project's aims and objectives, thereby earning the trust of the people.
- Focus group meetings were held to provide a platform for the communities' opinions and needs to be expressed. In this way, ITDG was able to harness local knowledge.
- Education was a very important part of the programme. ITDG informed the community about the risks of traditional biomass smoke, and the benefits they stood to gain from the interventions they were trying to develop.
- The range of stakeholder involvement was quite wide - women's groups, local government ministries, technical training institutes and the informal manufacturing sector. This greatly increased the chances for sustainability of the innovations long after ITDG officially concluded the project.
- After installation, ongoing community participation allowed the communities to share their experiences and suggest how best the various technologies could be made appropriate for their households [4].
- Exchange visits proved to be an important practice for dissemination. Members of the communities who had installed stoves and smoke hoods allowed others who hadn't to

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\*ITDG, an organisation that aims to demonstrate and advocate the sustainable use of technology to reduce poverty in developing countries, is now known as *Practical Action*. ITDG is used in this report because it is the name under which the organisation implemented the Kenyan biomass smoke project.

visit their kitchens. Seeing the installations work, erstwhile skeptical members of the community became willing to try them in their own kitchens.

The success of the ITDG-Kenya biomass smoke project derives from a number of factors: the focus here has been on the way that a wide range of participatory methods were combined with technical monitoring [16]. This allowed the project to identify interventions that are both appropriate and effective in reducing biomass smoke pollution [16], as well as support their implementation.

## 5. CONCLUSION

Energy policy tends to be dominated by the attitude that, if science can provide the fuel and engineering the means to use it, man's physical, economic and social problems will be solved [12]. The reality is that effective policy formulation and implementation can only be undertaken on an informed basis [3]. The first-hand experience and knowledge of people in local communities make them the most authentic source of information about their own needs and preferences. Furthermore, users inherently possess a commitment to successful technology because of the benefits they stand to gain from it, and participation only increases that commitment.

While participation is not the only requirement for successful implementation of renewable energy technologies, it is a very important one. The range of potential users of any given intervention is wide and diverse, and not all users will have a useful contribution to make. Nevertheless, end users remain a rich source of ideas for development, and their contribution can greatly multiply the dividends offered by a renewable energy project to the community.

## ACKNOWLEDGEMENT

The author wishes to acknowledge the contribution of the following: Dr. Sujatha Raman and Dr. Ian Forbes of the Institute for Science and Society, University of Nottingham; and Dr. Michael Clifford of the School of Mechanical, Materials and Manufacturing Engineering, University of Nottingham.

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