

Can Urban User Testing Reveal Relevant Insights for Rural BoP Consumer Energy Products?

A Pre-Pilot Study of User Centered Design



The first brief in a series that turns action research into learnable experience for those committed to the Base of the Pyramid.

1: Efforts to increase adoption of improved cookstoves have been in progress since the 1940's.

The Rural Market Insight Group at the Centre for Development Finance (CDF) conducted a six-week product test with a Base-of-the-Pyramid (BoP) household in Chennai, Tamil Nadu. The purpose was to explore whether urban user testing of rural-targeted BoP products yields relevant user insights in early design stages. Surprising results warrant further research of this potentially valuable technique.

BACKGROUND

Relevant usability testing in rural Base-of-the-Pyramid (BoP) markets is important to the successful adoption of improved cookstoves. However, extensive design research in rural areas proves challenging, costly and time-consuming. Designers, researchers and social entrepreneurs for the BoP need a robust, effective and efficient way to obtain user feedback early in the design process, while keeping costs low and design on schedule.

INDIA'S IMPROVED COOKSTOVE MOVEMENT

Since the first national cookstove programme began in 1947, the Government of India (GOI), as well as social entrepreneurs and non-governmental organisations, have devoted much effort and funding to making household cookstoves [chulhas] more efficient. Although energy-efficient cookstoves are recognised as a cross-cutting development tool affecting health, climate change, sustainable livelihoods and women's empowerment, widespread adoption and sustained use remain a challenge. Few designs have shown long-term success. Though data varies, improved cookstove ownership is estimated at

CLEAN BY DESIGN

According to the World Health Organization, Indoor Air Pollution (IAP) from open fires is a leading cause of respiratory disease among women and children in developing countries (2005). Clean cookstoves are designed to improve fuel combustion and reduce IAP.

“The starting point of the current exercise is the user. The solution on offer should, first and foremost, be easy to use and maintain and conform to local cooking habits across the country.”

-National Biomass Cookstoves Initiative



A. Leo double pot stove by Prakti Design

2. Several private companies design improved cookstoves for India's BoP markets for use with a range of fuel sources, including wood, pellets, charcoal and sawdust.



B: -Forced draft single pot Oorja stove by First energy



C: Single pot stove G-3300 by Envirofit



D: Double pot stove by Philips

around 30 million, with only 65% working and in use (Ergeneman 2003). Furthermore, of rural and urban households in India, 75% and 22% respectively still use biomass, such as wood, cow dung and farm waste, as their primary cooking fuel source (National Sample Survey 61st Round 2004-05).

Over time, technology improvements and policy shifts to market-based approaches have opened the cookstove sector to increasing numbers of commercial and non-government stove producers. In addition to being sold by social enterprises, improved cookstoves are subsidized and disseminated through India's centrally-sponsored schemes by the Ministry of New and Renewable Energy (MNRE). India's largest scheme, the National Programme on Improved Chulhas (NPIC), distributed more than 80 styles of cookstoves across the country from 1983 to 2009.

In 2009, GOI launched the next-generation cookstove programme, the National Biomass Cookstoves Initiative, to spread energy-efficient cookstoves to 130 million users of biomass fuels. The initiative adopted a user-centered approach to cookstove promotion. In contrast to previous approaches, MNRE directs, "the starting point of the current exercise is the user. The solution on offer should, first and foremost, be easy to use and maintain and conform to local cooking habits across the country" (2009). With a user-centered approach, the GOI and private players could tailor stove design and functionality, as well as affordability, to increase cookstove uptake in BoP target markets across India.

REACHING THE RURAL BoP USER

However, extensive rural user testing that would provide the necessary design insights is demanding for companies with limited time and budgets, looking to scale up quickly. Companies must locate rural test sites, target households willing to test and provide user feedback, make multiple site visits to collect data and analyse insights, modify prototypes and repeat the process several times in several locations.

Regional diversity and geographical spread also make comprehensive research daunting. India's BoP markets are comprised of approximately 820 million people (71% of the population) spread across more than 630,000 rural villages, many of which lack basic infrastructure like electricity and passable roads and have unique customs and languages. BoP-consumer product companies, designers and researchers need a robust, effective and efficient way to gain initial user insights, while keeping costs low and design on schedule.



IDEA

Through the application of User-Centered Design (UCD) principles, researchers from Rural Market Insight explored whether engaging with urban BoP households who retain rural behaviors and practices results in actionable early-stage design insights for rural-targeted consumer energy products.

THE URBAN USER TESTING CONCEPT

User-Centered Design (UCD), originating in technology product development, has become an important pathway to understanding BoP end-users. Research, government and private companies are increasingly applying UCD to products designed for the world's BoP markets in India, China and many African countries.

Underpinned by UCD principles, a hypothesis that urban user testing can uncover design insights for rural BoP products was developed with the following assumptions:

- Urban households are willing and able to test consumer energy products and provide relevant user-feedback
- User insights can be attained on a regular basis
- Select urban households will cook in a manner similar to their rural counterparts
- Urban user product modifications and design feedback will also be similar to rural counterparts
- User insights can quickly be turned into design changes at a low cost

Urban user testing for rural-targeted BoP products takes into account India's rural-to-urban migration patterns. The demographic profile of potential testers of improved cookstoves encompasses the nearly 22% of urban households that burn firewood as their primary cooking fuel, mostly on traditional chulhas. Urban testing can engage BoP households from diverse regions that maintain rural behaviors and conditions, such as cooking primarily with biomass or lacking electricity.

PRODUCT PROFILE

Improved cookstove technologies were chosen for testing because of their affordability, accessibility in both rural and urban markets and their relevance to development efforts in India and the world. The study tested the Leo Double Pot Stove manufactured by Prakti Design, a company based in Tamil Nadu that designs innovative commercial and household biofuel cookstoves. The Leo stove is sold pre-assembled and is designed to require less firewood and produce less smoke than traditional cookstoves.

3: Urban settings offer regional diversity and easier accessibility for researchers to interact with the users on a regular basis.

THE QUALITY OF EXPERIENCE

-ALBEN 1996

The UCD concept is based on questions about user experience with the product:

1. Does the user understand how to use the product?
2. How does the user feel while using the product?
3. Does the product serve its purpose?
4. How well does the product fit into the user's environment?



4. Short, frequent visit to the urban testing households built trust and revealed key BoP user insights over time.

ACTION

In September-October 2009, CDF conducted a six-week study with a BoP household in the urban slums of Chennai, Tamil Nadu. The purpose of the pre-pilot study was to explore whether the concept of urban user testing of rural-targeted BoP products can yield relevant, actionable user insights in the early stages of rural product design.

PRE-PILOT STUDY METHODOLOGY

Through semi-structured interviews in the user’s native Tamil language and direct observation, the study focused on the quality of the user experience. Research tracked user perceptions of the stove’s look and design, and user reaction to smoke and fuel use, as key indicators of user experience. The study also captured intense product modifications made by the participant, as well as feedback on satisfaction and product fit into daily routine.

USER PROFILE

In accordance with rural BoP cookstove user profiles analyzed in “Cooking Practices and Cookstoves Field Insights” (CDF 2009), the selected study participant matched the profile of a BoP biomass cookstove user in rural Tamil Nadu. She used an outdoor, wood-burning single-burner clay chulha to cook vegetarian Tamil food twice a day for her family. For cooking fuel, she collected waste lumber from nearby shops for free. The participant had no prior experience with improved cookstoves. She volunteered for participation in the study and was allowed to keep the test cookstove after the study.

TRACKING URBAN USER BEHAVIOR

During the six-week study, researchers witnessed the participant’s evolution of cooking behaviour and product modification. Direct observation revealed user behaviours that could influence the intended performance of the improved cookstove. The participant used more firewood than was required for the improved cookstove to work efficiently. She regularly allowed firewood to continue burning after cooking and let ash from multiple fires build up inside the stove, which reduced the airflow. After four weeks, the participant stopped cleaning the stove.

Although the Leo was a double-burner stove, the participant preferred to use only the primary burner positioned directly over the fire. Researchers tracked user modifications that eventually changed the Leo from a double-burner into a single-burner stove, which likely yielded less energy-efficiency than was intended. The user placed three stones above the primary burner to raise the pot off of the stove. Then, the secondary exhaust plate was broken off and placed above the primary burner. As a result, flames exited the primary burner, but the secondary burner was rendered un-usable.



5: Plan for Six-week study on Urban User Testing of Rural BoP Products



WEEK 0



WEEK 2



WEEK 3



WEEK 4

5: Evolving BoP user modifications turned the improved cookstove into a single burner, altering its intended purpose.

DISCOVERING USER PERCEPTIONS

'Deep dialogue' interviews revealed key insights into the participant's user perceptions. She reported that igniting the Leo was quick and intuitive, and easy to use. It also attracted her neighbors' attention.

The user reasoned that the improved cookstove needed more firewood because it was taller than the traditional chulha, and a bigger fire was needed to reach the pot. While BoP users commonly leave ash in traditional chulhas, an improved cookstove requires ash be removed after every use. The participant faced difficulty keeping the stove clean after each use and eventually discontinued cleaning the Leo. These behaviors could potentially lead to discontinued use of the improved cookstove.

INSIGHT

Short, frequent visits with an actively engaged urban BoP household uncovered valuable insights into user behavior, perceptions and product design. This urban user testing yielded similar insights to the extensive rural user testing already conducted on these rural BoP-targeted cookstoves.

LEARNABLE DESIGN INSIGHT FROM URBAN TESTING

Brief yet frequent interactions allowed the researchers to establish trust with the participant over time. The participant was actively engaged and volunteered useful feedback. Prakti Design confirmed that this study provided relevant user insights for the rural BoP-targeted cookstove. Urban testing was the first test to capture the use of three stones to lift a pot above the primary burner. The following results were similar to Prakti's own extensive rural field research:

- Excess fuel placed in the stove, which blocks airflow and causes inefficient fuel combustion
- Ash build-up and disinclination of BoP users to clean the stove
- User modification of double-burner stoves to single-burner, including breaking the pins off the secondary burner to place over the primary burner

The test results highlighted a need for user education about proper stove use, including necessary fuel amounts and the importance of consistent ash removal. The study drew out customer preferences for burners and raised questions of how to design for user modification.

IMPLICATIONS

While it will always be necessary to conduct BoP product testing with a rural target audience, urban testing can alleviate financial and logistical challenges.

Urban BoP Product User Insights

- More firewood used than needed
- Leftover ash built up and reduced airflow
- Firewood allowed to burn after cooking
- Regular cleaning slowed, then stopped
- Only one burner preferred
- User modifications altered improved cookstove's energy-efficient purpose



6: BoP tester's perceptions: The improved cookstove produced steady heat and was easier to ignite, but needed more fuel than her old chulha

es that researchers face when conducting early-stage usability and design testing on BoP consumer energy products. Urban spaces offer high densities of BoP-product users, many of whom retain rural behaviours. Close proximity to potential testers allows for low-cost, high-contact interaction with testers and continuous tracking of user behaviours that would go unnoticed with less contact.

POTENTIAL FOR LASTING IMPACT

Encouraging results of this pre-pilot study provide strong qualitative evidence to warrant further research into urban testing for rural-targeted BoP products. The new user-centered approaches of government schemes, such as the National Biomass Cookstove Initiative, could spur more research that puts the user at the centre of the design process of improved cookstoves and other consumer products for the BoP.

This study was conducted by Selvan Thandapani and Richard Woodbridge, researchers with CDF's Rural Market Insight team. A special thanks to Prakti Design (www.praktidesign.com) for their willingness to work with CDF researchers and for their commitment to sharing knowledge.

ADDITIONAL RESOURCES

GOI Ministry of New and Renewable Energy
www.mnre.gov.in

Center for Development Finance -IFMR
www.ifmr-cdf.in

Household Energy Network
www.hedon.info

Indian Institute of Technology
-National Biomass Cookstoves Initiative Project Objectives
www.web.iitd.ac.in/~nbci/Objectives.html

For more learnable action research by the Rural Market Insight, check out more in the design series:

- Can Urban User Testing Inform Prototyping of Rural BoP Products?
- Can Urban User Testing Labs Evaluate Rural Solar Lighting Solutions?

WORKS CITED

- Alben, Lauralee. (1996). Quality of Experience. Retrieved from www.albendesign.com
- Ministry of New and Renewable Energy. A New Initiative on Improved Biomass Cookstoves. (2009, December). www.mnre.gov.in
- Bairiganjan, Sreyamsa; Dhoble, Revati. (2009, November). Cooking Practices and Cookstoves Field Insights: A Pilot Study of User Experience with Traditional and Improved Cookstoves. Chennai: Centre for Development Finance-IFMR. Retrieved from <http://ifmr-cdf.in>
- Ergeneman, A. (2003). Dissemination of improved cook stoves in rural areas of the developing world: Recommendations for the Eritrea Dissemination of Improved Stoves Program. Berkley: Goldman School of Public Policy, University of California.
- World Health Organization. Indoor Air Pollution and Health. (2005, June). www.who.int