GLAB Final Report

Kanchan™ Arsenic Filter (KAF) Implementation and Enhancement

Kathmandu, Nepal

January 2006

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ACKNOWLEDGMENTS

It is rare that business school students get the opportunity to join a project as unique, challenging, and impacting as this engagement was. This experience broadened our perspectives and quickly brought into light the stark realities of unsafe drinking water and the challenges involved with building sustainable solutions in developing countries. As such, the GLAB-Nepal team wishes to thank sincerely the following for allowing us to participate in and contribute to a longer-term solution:

- Our Primary Project Advisors: Tommy Ka Kit Ngai and Susan Murcott.
- Our MIT-Sloan/GLAB Advisors: Professors Rick Locke, Shari Loessberg and our TA Ore Adeyemi
- ENPHO (with special thanks to Bushan, Bippin, Makhan, Rajesh, and Aranita).
- Yann Le Tallec, ever-strong past and present project contributor (PhD Candidate, MIT Sloan)
- Roshan Shrestha CTO, Water and Sanitation, UNDP Asia
- MIT CEE Department Masters of Engineering Program
- Ken Morse and The MIT E-Ship Center
- GEM Plastics of Kathmandu
- Lumanti
- The Rotary Club of Nepal and Dr. Lekha
- Center for Microfinance (CMF)
- Population Services International
- NERUDO
- The Staff at the Hotel Regency (GR, Rishi), Naya Baneshwar
- Majka Serafini, MBA, Stanford Business School - microfinance report

Last, but not least, we are especially grateful for the EPA P3 Award which funded our team's travel to and from Nepal.

BACKGROUND

Safe Drinking Water in Nepal

Water is essential for life, and access to safe drinking water should be a fundamental human right. However, approximately 1.1 billion people in the world lack safe drinking water. (UNICEF 2003) Over the last several decades, international agencies, governmental and non-governmental organizations as well as private citizens in Nepal have drilled tube wells to provide local water sources for rural villages. Unfortunately, in the rural region of Terai (see Figure 1), many tubewells have tested positive for arsenic and pathogen contamination. Drinking water contaminated with arsenic, a poison that occurs naturally in the ground, results in a host of health problems such as cancers, vascular diseases, developmental and skin disorders. To date, more than half a million people in Terai are at risk with such health problems. Additionally, pathogens such as bacteria and viruses in tube well water affects millions of Terai villagers. Pathogens cause a number of problems ranging from diarrhea and intestinal worm to cholera. Children, the elderly, malnourished and sick people are most at risk from drinking contaminated water.

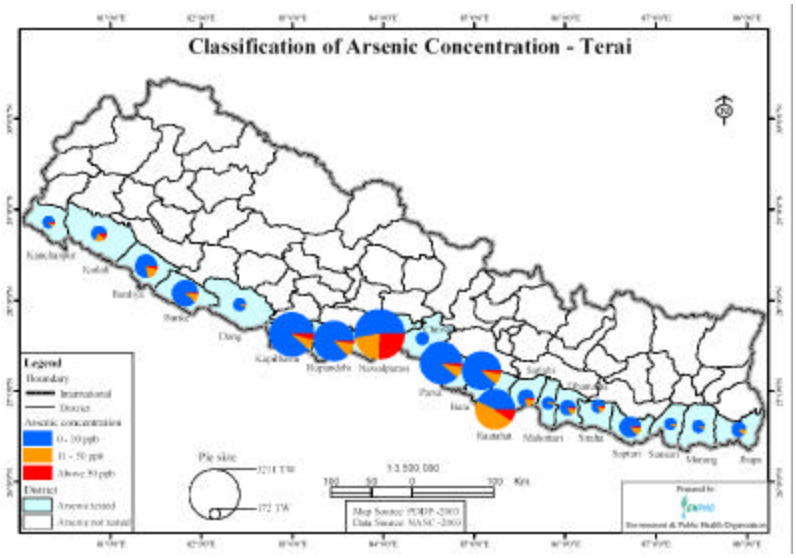

Figure 1: Arsenic Concentrations in the Terai

Despite the growing scale of the drinking water crisis in Terai, many aid projects have failed for a number of reasons. Political instability in Nepal due to its ten-year long civil war has created a dangerous environment with ineffective government institutions and poor economic conditions. Health problems from drinking arsenic contaminated water are just recently being diagnosed so Terai villagers are still largely unaware of the hazards. High illiteracy levels and cultural mindsets make education a challenge. Furthermore, the average annual per capita income is only US$240, and 45% of Nepali people live

below the poverty line; most villagers cannot afford available drinking water interventions. (Murcott 2005)

Environment and Public Health Organization (ENPHO)

Based in Kathmandu, Nepal, the Environment and Public Health Organization (ENPHO) is a non-governmental agency whose mission is to develop and promote appropriate technologies to enable societies to become eco-friendly. ENPHO's Arsenic Mitigation Programme conducts activities such as health surveys, tube well testing, and policy advocacy. In addition, ENPHO promotes mitigation options such as the Kanchan™ Arsenic Filter (KAF). Kanchan is a Nepali word which means "crystal clear." ENPHO, the Massachusetts Institute of Technology, and the Rural Water Supply and Sanitation Support Programme developed the KAF in 2002. The KAF is a household level treatment system that removes both arsenic and pathogens from drinking water. MIT/ENPHO-trained technicians from various NGO's in Nepal have been constructing filters from locally available materials and distributed them at village awareness workshops. Currently in Nepal, there are over 3000 KAFs serving more than 20,000 people.

Project Scope

Since the launch of the KAF program in Nepal, there have been numerous and significant accomplishments. Over 22+ organizations are supporting the sale and installation of the KAF and, as per above, numerous families are benefiting from the technology. However, with these preliminary accomplishments, numerous changes and challenges have also evolved. With a target market numbering in the millions, sales of the KAF are falling far short of their life-saving potential. People are not adopting the product because of a lack of awareness; entrepreneurs are not often able to sell the product because it is too expensive; sales materials talk to engineers instead of villagers. Thus, a core theme of improving "sales" unified our mission and defined our scope. Our mission, formally articulated, was "to increase sales of Kanchan Filters at the household level through improved promotions, streamlined supply chain processes, increased awareness, and appropriate, localized microfinancing options." Each team member took a leadership role focused on one of the following four domains

- Awareness & Education: Catherine Kang
- Sales & Marketing: David Lucchino

- Pricing & Supply Chain: Suzanne Frey
- Microfinance: Daisuke Ueno

METHODOLOGY

The purpose of our literature review was to benchmark best practices and provide frameworks for our recommendations. The literature included research papers on the arsenic problem, safe drinking water programs in Nepal and other parts of the world, and academic articles on behavioral change, global markets, and educational evaluation.

We then benchmarked the practices of other NGO's with the same mission such as Nepal Water for Health (NEWAH), WaterAid, Centre for Affordable Water and Sanitation Technology (CAWST), and Filters for Families. We also examined NGO's with a health education mission such as the Red Cross, UNICEF, Population Services International (PSI) and the local Rotary Club. We interviewed numerous stakeholders during our three-week stay in Kathmandu. We met with ENPHO staff both at their headquarters office and in the field, over 55 KAF technicians and managers from partnering NGO's throughout Nepal, and representatives from several local NGO's. We also interviewed headmasters and teachers at three suburban schools that recently received institutional-sized KAF's through donations from the Ladies Rotary Club.

AWARENESS AND EDUCATION

Many villagers understand the effects of iron in their drinking water because it smells and tastes unpleasant. Some also understand that unsafe water (bacteria) causes diarrhea. Both of these effects happen quickly. However, most of the ill effects of steadily drinking arsenic contaminated water are not evident until multiple years or even several decades later. Many of the tube wells in the Terai region are five or six years old or younger. Consequently, diagnoses of arsenicosis (arsenic poisoning) are still relatively new, and most villagers are ignorant of arsenic, its health hazards, and that is likely contaminating their water supplies.

Awareness of safe drinking issues and education in health, hygiene, and sanitation practices is the foundation for ENPHO's Arsenic Mitigation Programme. For this portion of the G-Lab project, we set the following goals:

Short-Term	Long-Term
• To develop guidelines to structure current activities	• To increase awareness and education of safe drinking water issues in Terai
• To develop measures of effectiveness of current activities	• To change the behavior of Terai villagers with contaminated tube wells

Findings

As with most NGO's, ENPHO's strategy for each of its programs is limited by donor funding. Likewise, some organizational learning is lost at the end of each project, and each new project to some extent starts from scratch. We identified all the awareness and education activities ENPHO has conducted in order to define their current inventory and compare it against benchmarked activities. Previous project evaluation metrics and surveys of KAF technicians and their managers determined that the most effective awareness and education activities target women because they are the primary water gatherers and distributors in household settings. Village workshops, door-to-door visits by women motivators employed by ENPHO and the Nepal Red Cross, and national radio campaigns were the top three of ENPHO's current activities.

Top 3 Awareness & Education Activities

- **Village Workshops**
- **Door-to-Door Visits**
- **National Radio Campaign**

Systematic Program Management

- **Leverages Partnerships**
- **Broad Reaching**
- **Standardized**
- **Measured**

Institutional KAF installations were found to be an effective but underutilized activity. ENPHO has partnered with the local Rotary Club to install donated KAF's in elementary schools in the suburban Kathmandu area. The Rotary Club chose schools with tube wells that served an entire village so that more than students would benefit from the clean water source. ENPHO trained headmasters and school teachers on KAF operation and maintenance, but not on

health, hygiene, and sanitation issues associated with drinking water. This arena has great potential to make large groups of villagers aware of drinking water issues and educated on health, hygiene, and sanitation. Since ENPHO's programmes are donor-funded and project-based, this poses a challenge to having a standardized approach of planning, implementation, and evaluation. ENPHO lacks a systematic approach that leverages partnerships, has a broad reach, and is standardized and measured. This is the first step toward capitalizing on lessons learned and capitalizing organizational learning. Moreover, systematic program management will assure more effectiveness and efficiency in accomplishing ENPHO's mission.

Recommendations

After analyzing which solutions will have the biggest impact on both the short-term and long-term awareness and education goals, we recommended the following five actions:

1. Create a programs evaluation staff.
2. Start conducting four levels of project evaluation.
3. Reach out to microfinance institutions.
4. Increase awareness/and education activities with schools.
5. Modify and standardize village workshop procedures.

Create a programs evaluation staff.

ENPHO is organized into programmes, each focused on a specific aspect of water and the environment. (See Figure 2.) Programme managers report directly to the Executive Director, who reports to an Executive Board and General Assembly. The Deputy Executive Director oversees organizational functions such as finance and human resource management. The Resource Centre provides research support to the programmes. Currently, programme managers are responsible for evaluating each project, and no entity formally assesses the effectiveness of each programme or ENPHO as a whole.

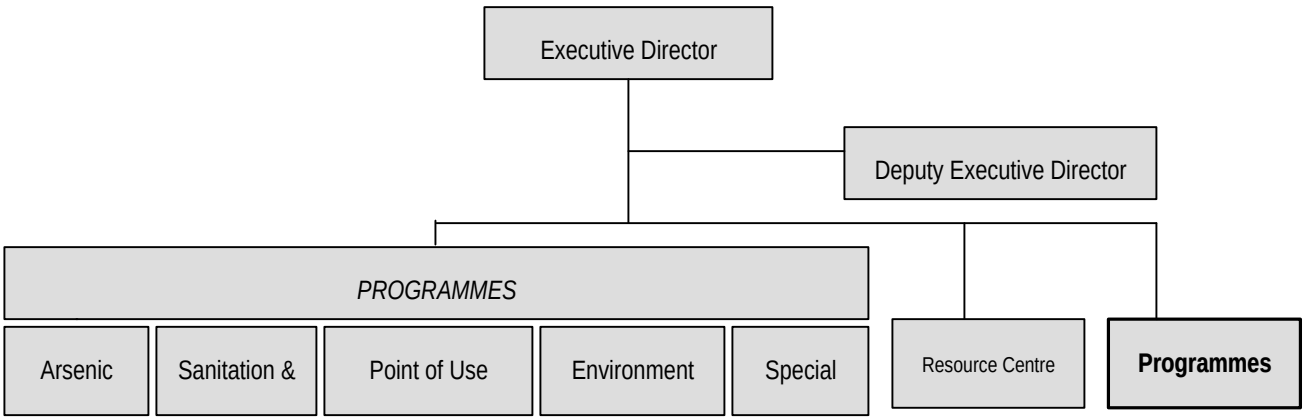

Figure 2: Proposed Organization

As to be expected, programme managers expressed that they are understaffed; additionally, projects timelines are often rushed, and donor funds quickly run dry. Project and programme evaluation frequently suffers as a result. Furthermore, each project is evaluated differently as individual reports to donors. We recommended creating a Programmes Evaluation staff to support all the programmes and the Executive Director with a standardized evaluation system that will also serve as a portal for organizational learning.

Our top priority recommendation was to request a copy of a software database called Project Management Information System (PMIS) from WaterAid Nepal. WaterAid Nepal has customized PMIS to collect data such as number of tube wells tested and water treatment systems distributed, along with filter maintenance records and project budget status. We recommended that ENPHO designate or hire one person to be the database manager as a primary responsibility. WaterAid Nepal agreed to provide the software and familiarization training.

In addition to a database manager, we recommended that ENPHO designate or hire one person to be the Director of Programmes Evaluation. This director's responsibilities would include working with programme managers to design evaluation tools, analyze trends and return on investment, and to make recommendations on project course changes. The director would also manage the programmes evaluation budget and supervise the

database manager. Furthermore, the Programmes Evaluation Director would maintain a meta-view of the programmes and the organization to evaluate effectiveness and justify additional donor funding.

Start conducting the four levels of evaluation.

Kirkpatrick's Four Levels of Evaluation

I: Reactions

II: Learning

III: Transfer

IV: Results

As guidelines on how to customize the PMIS database for ENPHO, we provided them with a summary of Donald Kirkpatrick's four levels of evaluation for training and education. (Winfrey 1999) Level I evaluation measures the immediate reaction to an awareness and education activity, e.g., a village workshop. Level II evaluation measures how much attendees learned from the activity and usually involves pre- and post-testing. Level III evaluation monitors attendees' behavior after the awareness and education activity to determine if they are applying the knowledge they learned. Level III is a challenging level of evaluation, but even more challenging is coming to terms with the results of the Level 4 evaluation. Level IV results include return on investment, i.e., how much money was spent to change how many people's behavior changed for the long-term. Level IV evaluation is particularly important for justifying donor funding.

In addition to awareness and education, the PMIS database can be customized to evaluate other project areas as well. We identified six project areas for the arsenic mitigation programme to evaluate:

1. Awareness and Education,
2. Marketing,
3. Microfinance,
4. Sales,
5. Supply and Construction, and
6. Monitoring and Evaluation.

Recommended evaluation methods include surveys, evaluations of project monitors, and project reports. In

order to supplement meager numbers of project staff, we suggested that ENPHO leverage its networks to enlist monitors who would visit households and institutions with the KAF. ENPHO would need to provide standardized training for monitors on how to check the filter for proper use and functioning and how to gather other evaluation data accurately. Monitors would require job aids such as household visit checklists, and they would need a set schedule for monitoring visits. We also recommended that they be paid a lesser salary (than they are today), but incorporate bonuses for every household visited as stronger incentive. The database manager would ensure monitoring data is properly entered into PMIS, and the Programmes Evaluation Director would work with programme managers to analyze trends, evaluate costs and budgets, and report on effectiveness.

Figure 3:Taking water samples at a Nepali elementary school.

Reach out to microfinance institutions.

We recommend that ENPHO focus more attention on partnerships with microfinance institutions and microfinancing NGO's (see section on Microfinance for more detail; it is also important to note that our recommendations build upon microfinance work conducted previously for ENPHO). These community organizations are rich with opportunity not only to educate people about safe drinking water, but also to promote the commercial sustainability of the Kanchan™ filter. We encourage local NGO's to visit local savings groups and cooperatives with printed materials about safe drinking water and the KAF. They should suggest holding a workshop for all members and their families and friends. NGO's could sell or donate a KAF for savings groups' and cooperatives' office use. Members could taste the water and read the educational and promotional materials when they come to the office to make deposits or withdrawals. This agreement would accomplish both education and marketing. If possible, this model could be taken one step further, and microfinance institutions could become a sales channel and receive commission. ENPHO's goal is to create a self-sustaining market for the KAF, one in which ENPHO is not the marketer or salesperson anymore. Microfinance institutions are one great possibility.

Increase awareness and education activities with schools.

Schools are another institution where ENPHO can achieve a broad reach. Based on the good results of KAF

installations in suburban Kathmandu schools, we recommended that ENPHO install KAF's in selected elementary schools in Terai. ENPHO should use its networks to identify schools with strong leadership, an available water source, a commitment to a health, hygiene, and sanitation curriculum, and a willingness to maintain the filter. Schools that are also the primary water source for a village are even better. ENPHO and its partner NGO's should conduct an awareness and education workshop for students, teachers, and families and introduce them to the KAF. Schools would have to sign a contract committing to maintaining and operating the filter correctly and to include drinking water issues in their curriculum. Monitoring and evaluation is crucial for this to succeed. If schools are not abiding by the terms of the contract after one year of monitoring visits, the KAF should be removed.

Modify and standardize village workshop procedures.

Based on benchmarking best practices of other NGO's, we recommended that ENPHO ensure that every village workshop include health, hygiene, and sanitation education. Also, street dramas and puppet shows are very popular and effective for families. Additionally, providing water testing services and basic health screenings during the workshops is a powerful way to reinforce the message of safe drinking water. ENPHO has excellent awareness and educational materials on the KAF from other NGO's (for example, Filters for Families) which can easily be modified for ENPHO's use. Finally, involving village leaders and students in delivering the message will also reemphasize the message.

SALES AND MARKETING

Short-Term	Long-Term
• Align the marketing message more strongly with the point of sale • Apply the communication brief to all ENPHO marketing materials • Develop a "women focused" advertising flier	• Strengthen the sales channel for the KAF • Evolve partnership with PSI • Establish an ENPHO "communication steward"

Background

For the teams sales and marketing strategy to gain the necessary traction we realized that our core target audience, rural women in Nepal, needed to understand better the danger of arsenic in their water supplies and the benefits of a KAF solution. All marketing and sales efforts directed at this audience needed to create or support a "culture of awareness and understanding" regarding arsenic and the health benefits of KAF adoption.

The first step required was to deepen awareness of the arsenic dangers associated with their tubewell water sources. The second step required was to emphasize the health benefits gained by adopting the KAF for both the individual women and their families' lives. This two step process is fundamental to the successful sales and marketing effort for the KAF. Because many health and financial decisions are driven by women in rural Nepal, we believed that most sales and marketing efforts should specifically focus on rural women.

Findings

Not surprisingly, our findings matched the background research we'd conducted. Most rural villagers lacked a depth of understanding on the exact causes and the severity of "unsafe water" (if for no other reason than arsenic is odorless and tasteless). Starting to bridge this "knowledge gap" in the marketing collateral became the focus of our strategy. It was heartening for us to discover that, in the past, once better bridges had been built between the entrepreneurs, health counselors, the educational materials/vehicles, and the villagers, adoption of the KAF tended to shoot up significantly.

As stated above, we did find that women were a particularly important linchpin in the acceptance and adoption of the KAF within homes and villages. Not only did women perform traditional duties of fetching and carrying water as part of their daily routine, they were also responsible for any complications related to drinking unsafe water (i.e., taking care of family members with poor health due to polluted water). Thus targeting women and giving them the proper training and education on the fundamentals of correct use, operation and maintenance of the KAF was critical to positioning effectively our sales and marketing efforts. We needed to help facilitate a grassroots messaging initiative that would, in turn, spawn a positive word-of-mouth campaign.

Recommendations

Our recommendations to ENPHO were/are as follows:

- Strengthen the local private sector's ability to sell and finance KAFs. The current sales process is highly fragmented and relies upon inconsistent and limited outside project funding to "push" the KAF into the market. Though this established system still has a role, a new primary system should be developed to help with the efficiency of KAF sales. A particular emphasis should be placed on streamlining the current sales process by pushing and incentivizing involvement of local savings and credit co-ops. The desired outcome is improve sales efficiency, encourage true entrepreneurship (skills development), and to develop longer-term village commitments to clean and safe water via the KAF. See "current" sales process and "recommended" sales process charts in the Appendix.

- Align the advertising messages with sales opportunities for the KAF. After the awareness and marketing sessions are completed (at the village level) and during the order information collection process, the village motivator or salesman should emphasize the "experiential and interactive" nature of the KAF. For example, having at least one working KAF unit for villagers to see and to taste water from is critical. This will increase people's immediate desire to buy a KAF. Additionally, if logistically possible, have a modest supply of functional filters for immediate purchase and installation.

- Apply the "communication brief" format to all ENPHO materials (see attached example for "Women Villagers"). This will ensure that all ENPHO documents produced speak to the right target audience as effectively as possible. Global firms like Coke, Unilever and MasterCard use the "communication brief" for every piece of material. This discipline ensures a consistent and accurate message. Continue applying a consistent design and layout for all communication materials. This is critical as ENPHO is evolving into a leading international NGO and its communications should reflect an appropriate level of sophistication. The 2005 ENPHO annual report is an excellent example of a well branded and packaged document.

- Immediately develop an "advertising" flier for whom the target audience is village woman responsible for their household. Use fewer words and more pictures for this mostly illiterate audience. Research and discussions with ENPHO staff and NGO representatives consistently showed that village women play a critical role when a home buying and using a filter.

- Expand the ENPHO photo library to include more images of people interacting and benefiting from the KAF. Use more photos that features woman and children and entire families. These images should highlight water pouring from the filter and into the cups or containers of children or women are very good. Less images of women "working" on the filter and more that feature the "benefits" (i.e., health, wellness and family happiness) of the KAF. We took several stock photos for ENPHO to use in materials while we were there. One of these photos has replaced an older photo which showed a woman laboring over the filter. The new photo shows a woman sharing clean water with her child.

- Continue to evolve ENPHO's partnership with PSI. ENPHO is a nonprofit organization focused on problem resolution through superior technical engineering and experience. PSI is a nonprofit organization that addresses and solves various community issues through superior social marketing savvy. Both organizations can learn a lot from each other's core competencies. ENPHO should develop a working understanding the of PSI's Behavior Change Framework "Bubbles". This knowledge will add to the sophistication and marketing savvy of ENPHO and allow for a stronger longer-term partnership between the two organizations. (See Appendix: PSI "Bubbles" example.) Initial common ground could also be developed between ENPHO and PSI through participation in a PSI field survey. PSI was receptive to ENPHO's request to include a number of KAF-related research questions in PSI's next field survey.

- Establish one person as ENPHO's "communication steward" for all print, radio and web. The primary responsibility of this individual is to ensure consistent messaging across various ENPHO produced materials and to maintain ENPHO's brand integrity.

- Develop a unique logo/tagline for the Kanchan Filter and apply it to all relevant materials. This will help to establish an ENPHO driven “micro-brand” for the KAF and allow the organization to maintain some degree of non-exclusive credit.

PRICING AND SUPPLY CHAIN

For this portion of the GLAB project, we set the following goals:

Short-Term	Long-Term
• To streamline supply acquisition and improve time to market for current filter design; explore the possibility of reducing distribution/acquisition costs for current filter.	• Explore feasibility of new KAF model with manufacturers; get quotes as/where possible and explore distribution model impacts/suggestions.

Background

"Never pay retail." Long-echoed by savvy purchasers across the ages, this adage hints at the burdensome impacts of double marginalization and the profit taking behaviors of every player in a given product supply system.

Initially out of necessity, KAF entrepreneurs were relegated to purchase filter components at retail outlets … paying retail prices … and often suffering from limited retail supplies. The rural location of each entrepreneur's territory, combined with limited transportation capabilities, led to several distinct sales, delivery, and pricing challenges in the KAF business model – most of which have remained unaddressed because of inertia and a lack of coordination across the entrepreneurial base.

As part of the supply chain analysis and deliverable, our team evaluated the current supply chain design and pricing structure. In addition, we surveyed the entrepreneurs for their feedback on current challenges and future suggestions. We also worked with the key local plastic manufacturer (GEM Plastics) on a revised pricing and distribution strategy. Lastly, we evaluated the development, distribution, and costing feasibility for a radical new design for the KAF. These activities are outlined in the following sections.

Findings And Recommendations

Components & Costs

Every KAF is assembled from a number of physical components; these components are as follows:

- Plastic container, basin, lid
- PVC piping system
- Sand and gravel
- Iron nails
- Bricks
- Chlorine solution
- Tools, bags
- Printed manual

As stated above, today each entrepreneur must pursue and purchase each of the components listed above in a fairly scattered and expensive fashion. Not only is this process time-consuming, inefficient, and often futile (i.e. part stockouts are common), each entrepreneur is paying retail prices for the filter components which only increases the final cost for each filter.

Thus, today's model is burdened with unnecessary costs and an inefficient supply chain. We quickly realized that the model does not benefit from the power of collective bargaining that could be had if the demands of each of the 20+ affiliated NGO/Entrepreneurs could be pooled. If pricing and orders were negotiated directly between ENPHO and the suppliers of the main filter components (bucket, basin, PVC piping, iron nails), this could help to alleviate several pressures at once.

Centralized Distribution & Volume-Based Pricing (Manufacturer-Direct)

We evaluated the overall cost structure of the filter to generate the following breakdown (see below); as you will note, roughly 50% of the total "costs" of the filter today come from the plastic container/basin/lid plus the piping system … which roughly equates to the subsidy amount provided by ENPHO today (750 NRS = 50% of total KAF cost). The third most expensive component, the iron nails, had little-to-no price flexibility because iron prices are fixed worldwide (nails in Nepal cost the same as nails in the US). The remaining costs mostly came from "soft" expenses (labor, transport, etc.) – expenses which, under most circumstances, are paid in arrears.

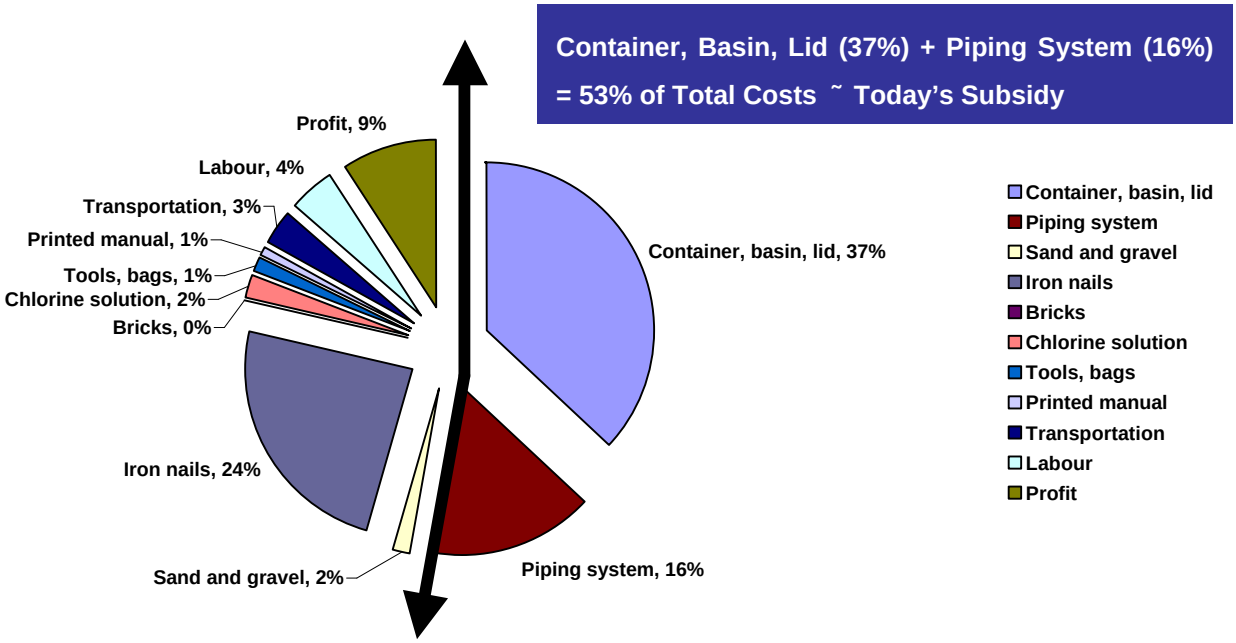

Figure 4: KAF Cost Breakdown

Given that the plastics represented the single largest cost involved with the KAF and that we believed we could centralize the supply chain process (thus creating the opportunity for volume-based pricing), our team met with GEM plastics in Kathmandu to negotiate a revised pricing and distribution strategy. The results were as follows…

Figure 5: GEM Plastics Factory

1. GEM agreed to provide reduced pricing on the container, basin, and lid. (Provided ENPHO or a related partner ordered at least 1000 pieces).
2. GEM also agreed to provide transportation for these pieces to any location in Nepal for 3 RS/filter. (Delivery time 10 days or less).
3. GEM also agreed to bundle piping into each delivery provided ENPHO arranged for the purchase/delivery

of piping pieces to GEM. (NOTE: Although they agreed to this during our meeting with them, afterwards, GEM realized that this cannot be done due to some administrative, insurance, and transportation procedures. ENPHO has since arranged for Bujal's hardware in Birgunj to purchase the deliver the piping pieces to all the KAF technicians. This was a secondary option during our team's time in Nepal, but not the first choice/recommendation.).

The following table outlines how the KAF component costs breakdown and the new specific pricing we received from GEM:

Items	Cost Contribution	NRs	USD	REVISED	DIFF	% Change
Container, basin, lid	37%	540	7.40	452	88	16%
Piping system	16%	230	3.15	205	25	11%
Sand and gravel	2%	25	0.34	25	0	0%
Iron nails	24%	350	4.79	350	0	0%
Bricks	0%	1	0.01	1	0	0%
Chlorine solution	2%	34	0.47	34	0	0%
Tools, bags	1%	20	0.27	20	0	0%
Printed manual	1%	10	0.14	10	0	0%
Transportation	3%	50	0.68	50	0	0%
Labour	4%	65	0.89	65	0	0%
Profit	9%	133	1.82	133	0	0%
Total Cost		**1458**	**19.97**	**1345**	**113**	**8%**
Plastics Only Breakout						
Drum	250					
Basin	65					
Lid	85					
TOTAL	400					
TOTAL WITH 13% TAX	452					

Table 1: KAF Cost Contribution Ratios

NOTE: ENPHO has since purchased 1500 sets from Gem. A 13% Value Added Tax must be added since ENPHO is subject to local taxing laws (this is added in the table above, although we were not sure originally whether this would be necessary). While the team did discuss having another party (like the Red Cross, an INGO) order these pieces, we were not informed of the legalities of this approach and made it clear that ENPHO needed to make the final right decision here to be compliant with local taxation laws.

Components in lieu of Cash Subsidies

Given that the cost of each filter is subsidized by ENPHO (in cash) today at 50% of the costs, it made it easy to suggest that ENPHO replace cash subsidies with parts (i.e. ENPHO should become the distributor of these parts and purchase the components directly from the suppliers). ENPHO can then 1) place much larger orders at one time with the suppliers and benefit from volume purchase agreements. If ENPHO replaces cash subsidies with parts, this also enables ENPHO to extend the life of its subsidy fund: today ENPHO provides 750 RS to the NGOs for each filter; however, if ENPHO replaces this with parts and orders parts in bulk, the reduced price of the components will allow ENPHO to extend the life of its subsidy fund by (we estimate) at least 25%.

	Number of Filters	Subsidy Spend	Total Spend
Original Subsidy Plan	2200	750	1650000
Revised Plan	2750	600	1650000
Number of additional filters that can be subsidized	550		
% Change (INCREASE)	25%		

Table 2: Impacts to Subsidies

Note: Given updated information/constraints from GEM, ENPHO has since opted to have Bujal Trading handle piping moving forward; however, our team still strongly recommends that the piping is purchased by in bulk by ENPHO (as part of the subsidy fund) and bundled with the delivery of the buckets. We encourage ENPHO to continue negotiations with GEM in this regard.

Feedback from the Entrepreneurs

Training occurred during the last week of our engagement, so all of the activities listed above were conducted in advance based on research and feedback received from ENPHO and our project advisor. However, during training, we did formally survey the entrepreneurs to ensure that 1) we were addressing the key challenges and 2) to begin to build adoption for a new supply chain and subsidy model.

Formal feedback from the entrepreneurs reflected the following challenges:

- It is difficult to get parts – especially for larger sales
- Promises on delivery timeframes have been broken
- Some costs are too high

- Capital to get started to buy parts is sparse; makes it hard to sell/deliver

As such, our final recommendations and activities addressed each of the entrepreneurs' challenges as follows:

- **RE: HARD TO GET PARTS:**
    - Place a bulk order with GEM for at least 1000 filters (if not more)
    - Place a bulk order for piping to match (unassembled)[1]
    - Institute a centralized ordering system for these parts to support the certified NGO partners
    - Hire or train a staff person in KTM to oversee order receipt and delivery via GEM to any of the villages/NGOs in districts covered by ENPHO.

NOTE: Two Distribution Options were presented to the entrepreneurs:

- **OPTION 1: CENTRALIZED INVENTORY:** All buckets and pipes held in Kathmandu; orders would be placed into ENPHO who would ensure dispatch of parts to the final destination via partnership with GEM.
    - **Pros:** Stockouts of inventory greatly reduced; large orders easier to handle, reduced transport costs, volume discounts/overall cost reductions, fairly predictable delivery schedules, greater knowledge of overall sales
    - **Cons:** ENPHO needs to train someone to oversee orders and this person will have to be vigilant with orders
- **OPTION 2: DISTRIBUTED INVENTORY**: A fixed amount of buckets/pipes would be distributed to a centralized location in each region (for example, 200 filters to each of the 5 regions; likely stored at the main Red Cross facility in each district). Each entrepreneur would then be responsible for retrieving inventory from this location.

[1] One school of thought suggests that it is recommended that the piping is not pre-assembled because the entrepreneurial contract states that each entrepreneur is responsible for quality; as such, entrepreneurs have a concern that they cannot commit to KAF quality if someone else assembled the piping (and ENPHO should be sure that entrepreneurs are responsible for quality); a second argument suggests that piping construction should be normalized and therefore centralized to protect quality. It is not clear whether current quality challenges are due to how the piping is *connected* to the basins or whether they are due to how the pipes are constructed stand-alone. ENPHO should determine exactly what their quality challenges in the field are and make a decision regarding pipe construction accordingly.

- **Pros:** Inventory closer to the entrepreneurs at any given time.
- **Cons**: No insight into sales flow, larger orders might happen in one district that exceed held inventory, increased transport costs

The NGO/Entrepreneurs voted for option 1 versus option 2 at 26 votes to 9. Abstentions were not counted.

It is important to note that substitution of parts in lieu of cash subsidies was NOT discussed with the entrepreneurs. Likewise, cost reductions due to volume purchasing were NOT clearly shared. It is in ENPHO's better interests to keep the pricing arrangements between GEM and ENPHO closely held. This enables ENPHO more flexibility. If the entrepreneurs were to discover ENPHO has received preferential pricing, they may continue to ask for a full subsidy of 750 RS in order to buffer labor, nail, or other costs.

- **RE: HARD TO FIND CAPITAL TO FINANCE PURCHASING PARTS:**
  - Use bulk bucket/piping purchases to replace subsidies – reduces burden/need for cash for the larger items; should expedite delivery; reduces likelihood of abusing the subsidy
- **RE: SOME COSTS ARE TOO HIGH**
  - The buckets and piping represent the most expensive pieces of the filter; if ENPHO buys these pieces, the entrepreneurs are shielded from many price hikes (as is ENPHO if they purchase in bulk)
- **RE: PROMISES ON DELIVERY TIMEFRAMES ARE BROKEN**
  - Centralized distribution should help with predictability and tracking; fewer "joints" in the delivery process
  - Use GEM to distribute to district central locations (lower cost, higher predictability
- **OTHER**
  - The extended "subsidy" fund amount (25%) could be directed toward multiple initiatives (not just for subsidy); suggestions (in order of preference):
    - Use to pay for formal follow-up/maintenance of filters
    - Use to fund a true entrepreneurial engine behind the filter (start-up money to support small entrepreneurs not connected to NGOs in the Terai region).

        - Use to pay for increased commissions to organizations
        - Use to pay for increased awareness programs/promotions
    - Advise restructuring of salaries for NGO "sales people" – higher commission, lower salaries; motivate sales people to work the system on all fronts more assertively; motivate NGOs to invest profits in promotional materials, awareness/education ,and microfinance training
    - Motivate NGOs that they have much greater flexibility on pricing and profits under this new model

Summary: Short-Term Accomplishments

1. Negotiated new pricing and distribution partnership with CEO of GEM Plastics. (30% reduction on plastics; savings of 159 Rs (approx. USD $2.20)
2. Negotiated transportation and pipe delivery partnerships with GEM as well (transport cost of 3 Rs/basin anywhere in Nepal (provided order of 10); can also bundle pipe pieces. Note: as per above, GEM has since indicated that they will not be able do this. As such, ENPHO will use Bujal's hardware of Birgunj.
3. Evaluated three alternative supply chain models for guarantee of supply as well as cost reduction/price stability.
4. Evaluated possible commissions and/or maintenance structures with subsidy "savings" from pricing negotiations
5. Drafted and conducted formal 2-page survey of 20+ NGO "entrepreneurs" (55 individuals).
6. Trained and solicited votes from NGO/Entrepreneurs on pricing and supply chain options/benefits
7. Counseled ENPHO leadership on the merits of new approach.
8. Extended life of subsidy fund by approximately 25% if bulk ordering approach that is recommended is followed.

MICROFINANCE

For this portion of the GLAB project, we set the following goals:

Short-Term	Long-Term
• Identify microfinance avenues to expand the outreach of the KAF buyers. • Propose a micro-credit scheme to make the KAF more affordable to its buyers. • Design a financial and promotional plan with MFIs so that they agree to finance KAF purchase to their members • Initiate a pilot program with at least 2 MFIs	• Outline a sustainable growth strategy • Leverage MF organizations as a new channel to do awareness, promotion and sales

Background

Our team focused on establishing a KAF microfinancing mechanism in order to enable families with lesser means to purchase a filter. The World Bank, which provided a grant to this project via ENPHO, requires setting up a pilot microfinance project. However, ENPHO is a technologically-oriented NGO and ENPHO staff members have little experience in financing schemes. Therefore our task consisted of four parts: (1) exploring barriers to KAF microfinancing, (2) proposing solutions (funding and borrowing schemes), (3) identifying suitable microfinance partners (microfinance institutions - MFIs) and building relationships with them, (4) transitioning our knowledge and relationships to ENPHO staff.

Findings

Barriers to KAF Microfinancing

Microfinance institutions, in general, strongly prefer to lend money for income-generating activities. After researching this topic and discussing options with ENPHO staff in advance of our arrival in Nepal, common opinion was that microfinancing schemes would be difficult because the KAF was non-income generating,. However we soon found that this perception was misleading. After interviewing several MFIs and microfinance NGOs, we discovered several institutions that had succeeded in establishing schemes for products similar to the KAF. What we

did discover, however, was that a lack of funding (i.e. money to lend) was the main barrier to introducing a KAF loan; its non-income generating aspect is a secondary, and less important barrier.

MFIs can be rural banks, Saving and Credit Cooperatives (SCC, Coops) and financial intermediary NGOs. But generally banks will not provide small loans for a KAF purchase. There are three types of major funding sources of the MFIs such as savings, donor funds and loans from commercial banks. However few MFIs use bank loans because they are not creditworthy or cannot get good interest rate. Mainly Coops are funded by members' savings and Financial NGOs are funded by donors (see figure 1). Co-ops can not be funded by donor funds because of their non-social nature. The supply of total savings reserves and total donor funds available are very limited compared the demand for loans.

Credit Cooperatives *1	
Assets	
Cash	367
Investments	158
Loans	1,317
Other assets	405
Total	2,247
Liabilities	
Savings	**1,594**
Borrowings	**41**
Other liabilities	351
members capital	261
Total	2,247

Financial NGOs *2	
Assets	
Cash	226
Investments	24
Loans	228
other assets	174
Total	652
Liabilities	
Savings	**0**
Borrowings from donors	**399**
other liabilities	173
Capital	80
Total	652

*1 Aggregate 20 credit cooperatives in Nepal, *2 Aggregate 47 Financial NGOs in Nepal

(Nepal rupees in million) Source: Center for Micro Finance in Nepal

Table 3: Aggregate balance sheets of Nepal MFIs (As of Mid January, 2005)

Because the demand for microfinance is very high compared to the MFI's fund reserves, micro-lenders can be selective. The KAF loan might seem riskier (e.g. than an income generating investment) and therefore not be a priority. Additionally because the KAF loan amount is a small, the returns are not as attractive to MFIs.. Even very poor members in co-ops can borrow up to 5,000 NRs (the filter cost is 1,500 NRs or 750 NRs with 50% subsidy) over 6 months and the lenders can expect to make a reasonable return. Usually, the savings yearly interest rate is 8% and the lending rate is around 20%. The repayments are every week to every month.

During our discovery process, we also found that MFIs have an active network of people saving and borrowing money in their villages, but many areas do not yet benefit from the formation of a formal MFI.

Recommendations

The funding and borrowing scheme

We advised ENPHO to become a "lender" of sorts to the pilot MFIs in order to address the short-term need for liquidity in order to make a microfinancing pilot feasible.

The first schemes of funding to MFIs and lending to borrowers in the pilot project should be simple. The scheme can be improved in next stage after ENPHO develops insights from the first pilot project. The relationships between ENPHO, the MFI, and the borrower are depicted in the diagram below …

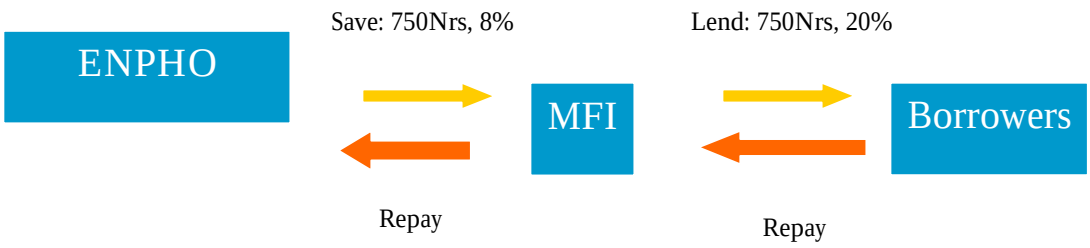

Figure 6: Proposed Microlending Money Flow

In the above diagram, ENPHO provides funding for the KAF loan (a revolving fund). The required funds are minimal. For example 75,000 NRs ($1,050 USD) for 100 filters (assumed subsidy of 50%). ENPHO can receive 8% savings interest from the MFIs or the 8% can be discounted in order to lure MFIs to adopt KAF financing. In either case, the original investment of 75,000 NRs would be returned to ENPHO by the MFIs as the loans are repaid. Discount of funding rate by ENPHO in exchange for discount of villager's borrower's rate is also possible.

	Regular rate	Discount rate	
Funding rate by ENPHO	8%	4%	0%
Villager's borrowing rate	20%	16%	12%

Table 4: Rate Options

The loan repayment terms should include remuneration periods of up to one year with monthly or weekly repayment schedules. The loans should be non-collateral in nature, based on group lending, and they should target women. However the final financing scheme should be decided by MFIs because they assume the risk.

Additionally MFI saving groups could become KAF promotion groups. MFI savings groups could have incentives to promote and/or sell the KAF (e.g. sales bonus). ENPHO will use the revolving fund interests paid to ENPHO as sales incentives for MFIs.

Suitable Microfinance Partners

We identified three local partners: 1) Lumanti, an NGO that supports savings group, 2) Nepal Rural Development Organization (NERUDO) an MFI, and 3) Center for Microfinace (CMF), a nonprofit consulting firm to MFIs. Lumanti and NERUDO agreed to cooperate with ENPHO to launch a pilot program in the Birganj area where we could test the efficacy and risk associated with a KAF loan.. ENPHO would provide revolving funds to NERUDO or to the Cooperatives seconded by Lumanti to cover the initial KAF loans. NERUDO and Lumanti were also interested in doing KAF awareness training in their saving groups meetings as they are always looking for new topics related to health, education, and/or income generation during their saving group meetings.

In Mudali, one of ENPHO's focus villages, there are no MFIs but there are saving groups that were established by UNICEF and NGOCC (NGO Coordination Committee) four years ago. We also recommended providing the revolving funds to these saving groups but also taking group guarantees on the funding because the groups are less

creditworthy than MFIs.

Transitioning our knowledge and relationships to ENPHO staff

ENPHO staff accompanied our team when we visited the above institutions and began to build longer-term partnerships. This was very useful for **transitioning our knowledge**, **sharing our findings**, **building ENPHO's own relationships with the institutions** and **raising motivation levels**. Sustainability of this microfinancing initiative was our primary endeavor.

Additionally we left some long-term recommendations behind as well. We recommend the pursuit of a growth strategy to other Terai districts and selecting additional trustworthy MFIs in contaminated areas. According to our study, there are 2,800 coops and 44 financial NGOs in Nepal and most of them are creditworthy (with high repayment rates and sound management practices).

We also recommended finding external sources of funding like donor funds (e.g. WaterAid, Water Partner International) in preparation for expansion of this program (and eventual exhaustion of KAF subsidy funds). In addition, we recommended that the KAF could be collateral provided that used filters can be resold, although no MFI expressed interests in this so far.

Lastly, we strongly recommend that ENPHO hire, contract, and/or train an individual to their "microfinance" expert. Skills in this area should be developed at ENPHO as it would greatly facilitate the launch, monitoring, and expansion of KAF financing plans. This individual would need skills in proactive networking (reaching out to different organizations like CMF as well as local co-ops and the entrepreneurs and NGOs), educating (teaching co-ops on the merits of the KAF), microfinance (how it works, what is required – a small-scale banking/lending background would be a big plus), and project management (managing the implementation and monitoring the long-term success of joint ENPHO-MFI initiatives) .

PROJECT TAKE-AWAYS

- This was the first time we've worked with a non-profit organization. Reliance on donations presents a much different mindset from that in a corporate setting because of the short time horizon associated with limited funding and because of different donor priorities for each project. Such an environment presents challenges for long-term strategy, program and project standardization, monitoring and evaluation, and organizational learning.

- Furthermore, the relationships among NGO's with similar missions was surprising. There is a sense of competition for funding that manifests itself in issues of turf and credit. There is much potential for synergy that must begin with building trust among the NGO's. There is a water NGO forum in Nepal which is an arena for sharing best practices and establishing partnerships, but without mutual trust, this forum is underutilized.

- NGO's are great partners for launching initial social enterprise products. However, NGOs are not and should not be the sole entrepreneurs responsible for long-term sales and market saturation. We feel strongly that part of this mission should be to develop true entrepreneurs who are able to generate income for themselves and others through the KAF. NGOs are funded by other sources and do not have the same drive or creativity that a true, stand-alone entrepreneur has.

- Household vs. community-level technologies raised many questions for us. The strength of the KAF is that it is a household level technology and therefore individual families can quickly make decisions regarding the purchase of a filter. Likewise, household level filters help to ensure the integrity of the water because the water will have been treated as close to the time/location of consumption as is possible. However, if the goal is reach as many people as possible with safe, treated drinking water, we saw incidences of village/community-level technologies that appeared to have wider benefits for many people at once (examples: Rotary-installed filters in the TIMMI school district; AMAL filters installed at village pumps in West Bengal). While we realize that this raises challenges associated with maintenance and group adoption, we believe that a community/village model holds great promise and would urge that the KAF is adopted to a more industrial scale as well.

- Last, but not least, accomplishing anything during a civil war is challenging! The team (and the organizations with whom we were working) experienced nightly curfews, significant/ubiquitous military presence, and many last minute challenges as a result. However, despite the challenges, we are proud of the contributions we were able to make and we sincerely hope that ENPHO, MIT, and the related organizations feel the same.

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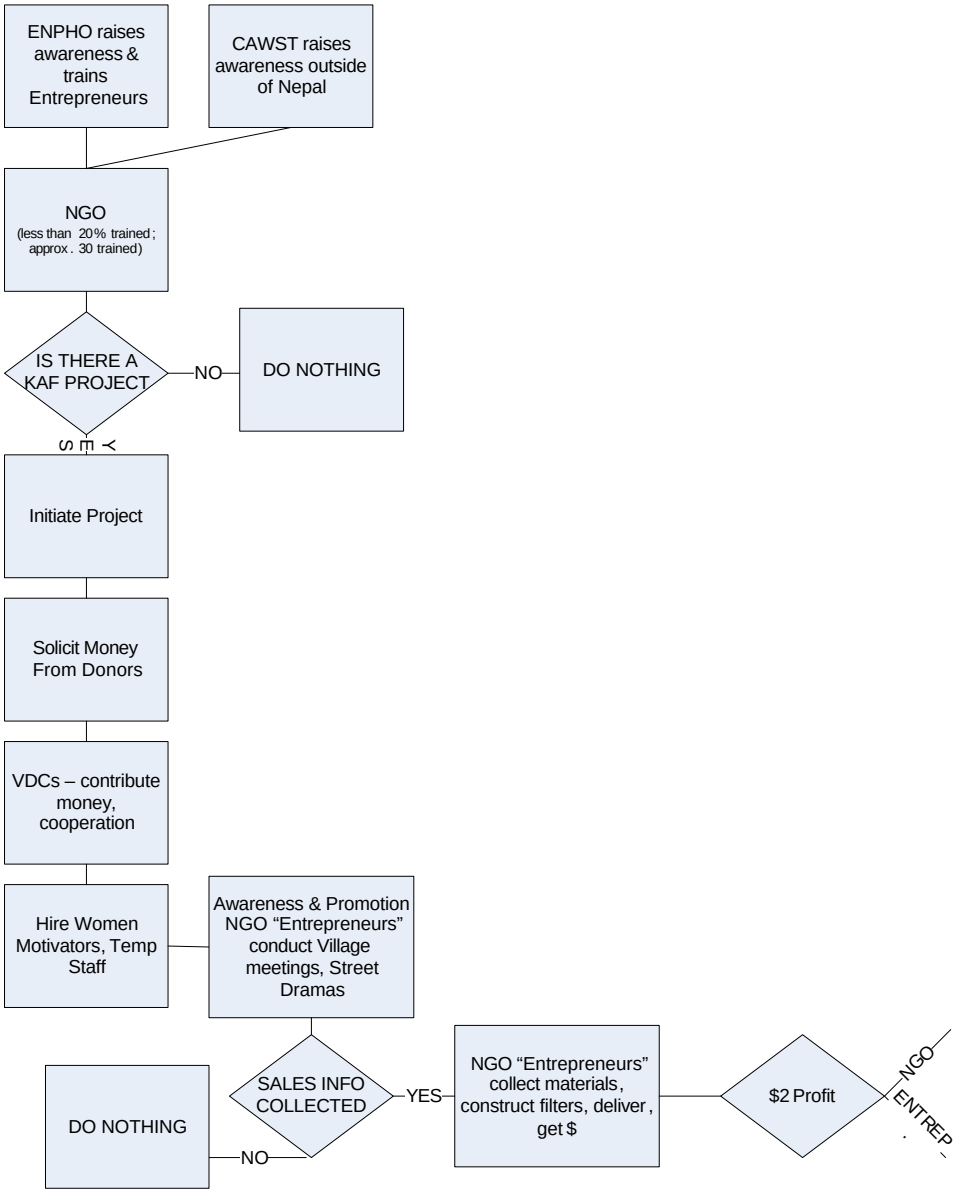
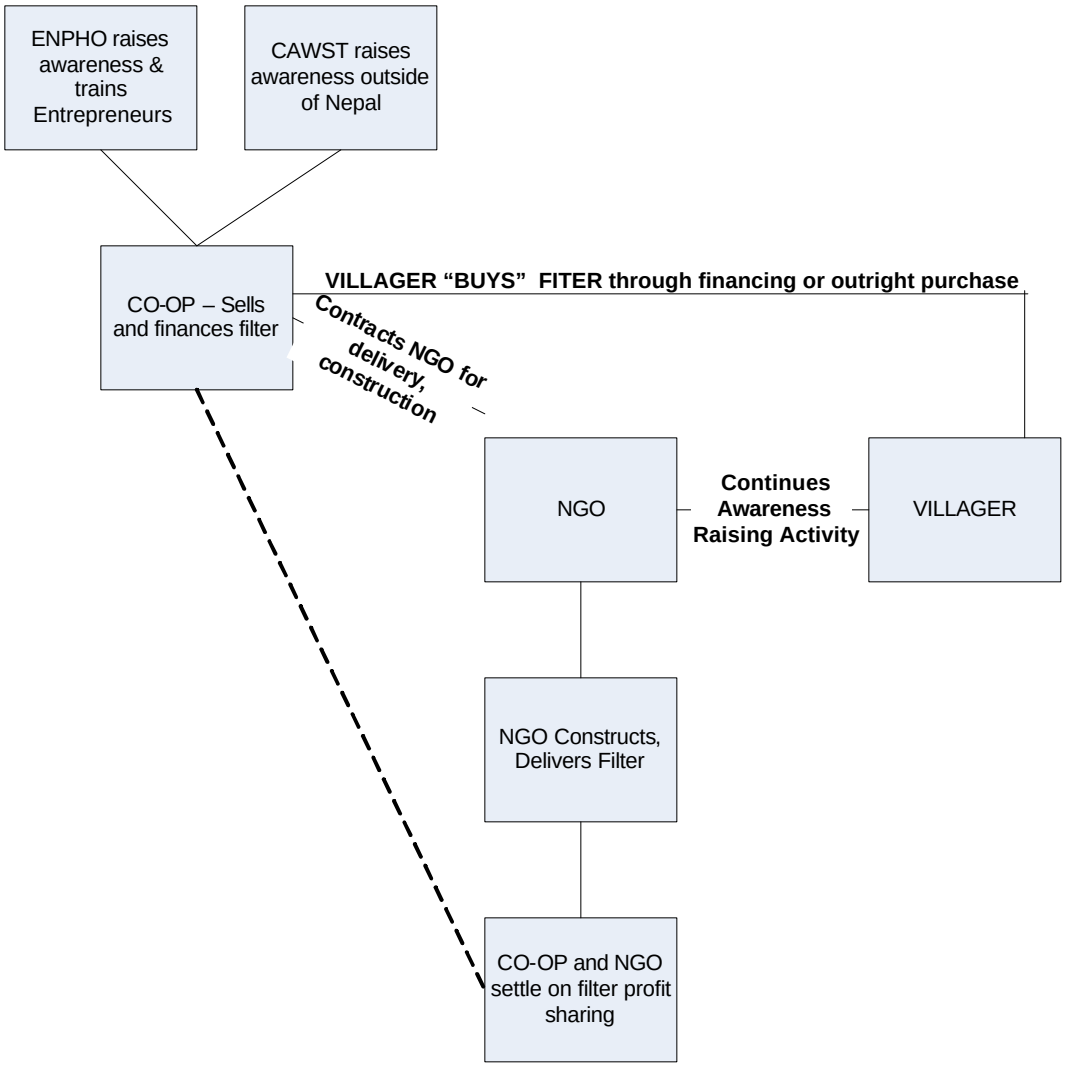
APPENDIX A: The Sales Process Flow

Current Sales Process



Recommended Sales Process with Co-Ops as Co-Sellers Involved



APPENDIX B: KAF Creative Brief: Recommended Format

Creative Brief:

Kanchan Arsenic Filter – Women Motivators Flier

Background

- The Kanchan Arsenic Filter (KAF) is a pioneering and award winning technology.
- Usage gives people clean, safe and good tasting water by removing such elements as iron, arsenic and other harmful microbes.
- The audience is rural and has little to no literary skills and they lack an understanding of the harmful effects of arsenic (because they can't see it, taste it or smell it and because its effects take years to develop).
- The focus area is the Nepal region of Teria in the south of the country and where 500,000 to 1,000,000 people live.
- There are currently very low levels of water filter usage or understanding of water filter benefits by these rural people. They might have seen candle filters used though it is doubtful that they have seen the KAF in a home.

Objective

- Initial contact of the KAF representative occurs via "door to door" efforts. The flier being produced is handed to the woman of the house and is left with her.
- The desired reaction from both the dialog and printed material is "I want more information on KAF for my house."

Selling Idea

- "Drinking clean water for a healthy and productive life for me and my family"

Reasons to Believe

Rational

- Scientific proof (keep this simple and direct, NOT technical) Eliminates iron, arsenic and dirty water.
- Stops immediate health problems as diarrhea, stomach sickness and worms.

Emotional

- Other woman and their families are very happy with their KAF.
- Current KAF owners in other villages were offered 1500 rupies and they would not sell their unit.
- Personal experience of the harm of arsenic

Target Audience

- Village woman living in Terai
- A mother or house wife
- Will not make the purchasing decisions but can heavily influence it (the men make the money and control spending)
- Age range is 20 to 50 years old
- They typically can't read

Additional Details

- ENPHO Logo
- Regional Terai addresses to buy a filter or get more information
- Red Cross Logo
- More picture and less text

APPENDIX C: PSI "Bubbles" Framework

Below is an example excerpted from PSI's "Behavior Change Framework" document. A copy of this document has been provided to ENPHO. However, this diagram outlines the key domains or "bubbles" which we believe should be used to market the KAF. For more information, please refer to the PSI document.

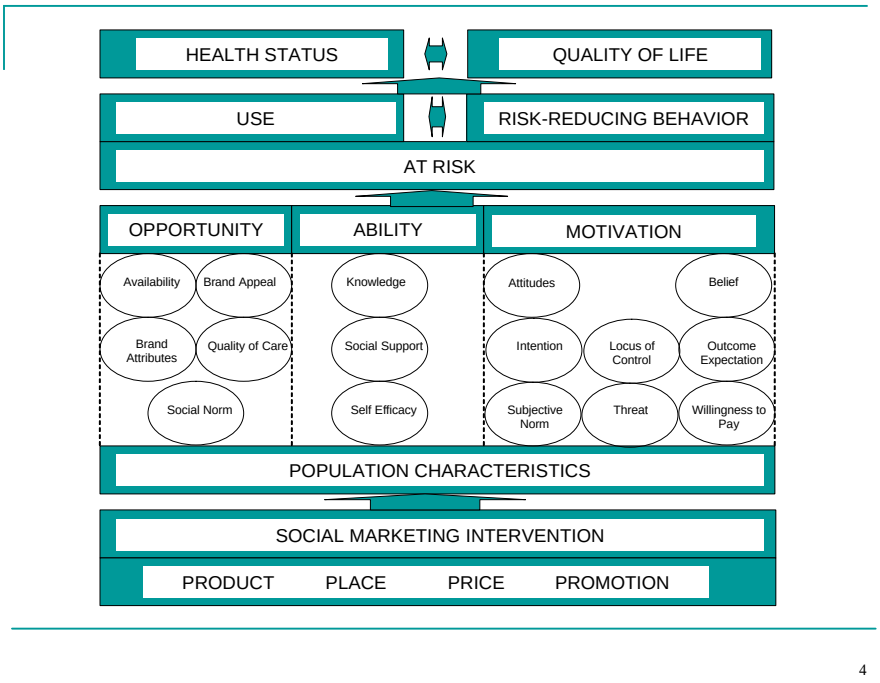


Figure 8: PSI's "Bubbles" Behavior Modification Framework

APPENDIX D: The Long Term Supply Chain

In the longer-term, Tommy Ka Kit Ngai (in cooperation with Michael Siu at Hong Kong Polytechnic) have designed a new KAF to address quality challenges as well as to improve aesthetics and branding around the product. The new KAF has been designed to be produced via blow mold manufacturing techniques which should, in theory, reduce the cost of the product (plastic pieces plus piping) by approximately 50%. Given that the KAF is not just an arsenic filter, but also a biosand (i.e. antibacterial) filter, this product has FAR-REACHING sales possibility and represents a true opportunity to expand the KAF into other territories where bacterial challenges loom large.

Long-term Accomplishments:

1. Met with GEM to discuss possible blow-mold manufacturing of this product; learned about a number of challenges with the current design (size and weight) which are being addressed in the design (weight reduction, added vertical reinforcements). It does not appear viable (in the short term) to engage GEM to product this filter due to blow mold machinery constraints; however, GEM will provide a quote to ENPHO by end of Feb. 2006.
2. Submitted inquiries to 30 plastic manufacturers across India, China, Malaysia, Taiwan. Have received positive feedback (interest in producing the filter) from 3 manufacturers to-date. Detailed specs have been sent.
3. Learned about approximate pricing of blow mold and likely transport/import challenges that may be encountered (no stacking of design, excise taxes, etc.). The added cost (and challenges) of import/transport will need to be factored into the ultimate decision to proceed (or not) with a proprietary design for the filter.
4. Exploring expansion options with other programs so that funding for this initiative might be supported by multiple countries/players.

Long-term Recommendations:

1. Compile final production quotes from at least 5 plastic manufacturers across India and China by March 2006.
2. Compile final *mold* quotes from at least 5 mold makers by March 2006.
3. Evaluate production costs and commitments required.
4. Evaluate funding options (loans, donors).
5. Discuss partnerships across Nepal as well as with countries/programs (India, Bangladesh, Cambodia, Vietnam for arsenic; as well as with countries in need of biosand filters (African nations).
6. Build long-term relationships with solid international partners for this initiative (likely candidates: Red Cross, Rotary, World Bank, Simavi).