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Long Paper

**A MARKET-BASED APPROACH TO FACILITATE Self Supply
for Rainwater Harvesting in Uganda**

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ABSTRACT

This paper looks at the relationship between self supply and market-based development through the example of the introduction of a low cost rainwater storage container in Uganda. The services and products created through market-based development are best defined by the needs of the self supply community: responsiveness to consumer demands; affordability; and availability. This paper describes how the project is using business tools of consumer-led product design, mass media product promotion, existing supply chains and customer service to introduce the *bob* rainwater bag to Uganda. By providing an affordable product that meets the needs of tens of thousands of rural households EnterpriseWorks will accelerate self supply for clean water in Uganda.

INTRODUCTION

“Self Supply encourages the incremental improvement of household and community supply through user investment in water treatment, supply construction and up-grading, including small rainwater harvesting and groundwater systems” (Sutton, 2009). Self supply by its very nature must put the user first and provide technical and product solutions that provide good value propositions for the households, otherwise they will not invest in upgrading their level of service. In order for households to be able to improve their water supply systems using their own resources the private sector must offer the right products and/or services at the right prices and public policy must support self-supply. The products and services must also be widely promoted through a concerted advertising and educational campaign that both promotes the product and encourages behaviour change. This paper looks at the process of consumer led product development for a low-cost rainwater storage product, product promotion and behaviour change messaging and the development of a sustainable supply chain.

BACKGROUND

The EnterpriseWorks/VITA Division of Relief International (RI/EWV) has been working with small and medium businesses to supply water and to improve water quality for poor households for more than 30 years. Products and services range from manually drilled wells for irrigation to water filters for household water treatment. By promoting business opportunities and transferring technologies that improve both access and water quality, RI/EWV has clearly demonstrated that businesses can provide a means of ensuring sustainable delivery of water related products and services. The process is complex and requires substantial initial investment, but when done successfully, the benefits far exceed the costs.

The Government of Uganda through the Ministry of Water and Environment supports both the principle of self supply and the promotion of rainwater harvesting for improving rural water supply. These are critically important factors for a successful private sector initiative.

RI/EWV always begins the search for practical and affordable solutions for problems facing poor households with market research. In this case initial surveys of rainwater professionals and rainwater harvesting projects from around the world found that the major impediment to large scale uptake of domestic rainwater harvesting by poor households was the cost of

storage (EWV, 2009). It became clear that until a much lower cost storage product was available, there would be little chance for a market-based success. Using a business perspective, rather than a development one, the criteria for a new storage unit were established. The perspectives differ because a development professional looks at a rural household and calculates their water needs and the length of the dry season to determine the necessary storage capacity to provide the family with water throughout the year. However, a business seeks to provide a client with an affordable product that will be marketable because it provides a significant improvement over their current situation, even if it does not meet all of their needs.

This project was designed to move households up the rungs of the “rainwater ladder” starting from opportunistic collection in a few pots and pans to the provision of a substantial portion of their domestic supply. The project built upon lessons learned in the Thai Jar Programme (EWV, 2009), where incremental improvement in service was obtained through incremental investments. As Danert (2010) states “Given the incremental manner in which investments in rainwater harvesting can be made by households (i.e. adding gutters and increasing the storage quantity over time), the technology is a very suitable self supply option.” Rainwater harvesting programs from around the world reported that once people experience the convenience of having clean rainwater at home that they want more of it and they are willing to invest in more storage. The key is to get people on the ladder with an affordable solution.

FACILITATION OF SELF SUPPLY THROUGH MARKET-BASED SOLUTIONS

Self supply and market-based solutions are interdependent development concepts. The one describes the principle of households investing their own resources to improve their water supply while the other provides the means to do so through the commercial offer of appropriate and affordable products or services. In fact, it is responding to self supply consumer demand for suitable products that fundamentally drives the development of market-based solutions. Conversely, self supply aspirants are precisely the client base on which successful market-based development solutions depend. Consequently, the services and products created through market-based development are best defined by the needs of the self supply community: responsiveness to consumer demands; affordability; and availability.

The *bob* rainwater bag is a direct result of this interdependency. In search of a means to increase uptake of domestic rainwater harvesting, RI/EWV learned that the one of the biggest obstacles was the cost of storage. Looking beyond the obstacle however, you find a population of self supply aspirants searching for products that allow them to take that first step up the “rainwater ladder”. A market-based solution is an ideal way to approach the well defined problem of developing a low cost water storage tank.

The product development process began with a literature review, 20 desk studies (EWV, 2009), and 5 field studies (EWV, 2009) which found that the prevailing cost of storage volumes less than 5000 litres ranged from USD 75 to 225 per cubic meter. What was needed was a product that significantly undercut these costs while also being easy to transport, suitable for a wide variety of conditions, durable, and able to maintain water quality over time. Seeking input from a broad design community, RI/EWV commissioned an internet design contest setting out the required parameters and came away with the initial concept of using a Flexible Intermediate Bulk Container (FIBC)- a tough, flexible, polypropylene bag commonly used in industry for bulk transport of granular materials.

Over the next 18 months the idea was modified and improved in collaboration with our potential clients in Uganda and manufacturers. Focus groups comprised of potential clients evaluated the initial product acceptability and helped define the features that customers considered essential. Subsequent field testing at the household level provided additional input into the design and helped to identify its strengths and weaknesses, both technologically and from marketing and sales perspectives. This is the essence of employing a consumer led product development process and the value of engaging self supply aspirants in the product development process- though it became clear early on that reconciling product features and price was going to be a challenge, the entire product development process remained focused on meeting the needs of the self supply community.

Once a product’s value has been established, it has no benefit to the self supply community unless it remains available through local distribution channels. A key component of a market-based solution is integrating the product into the existing supply chain and ensuring that profit is recovered at each step from manufacturing to retail sales. The profitability of the product for all actors will determine the sustainability of the technology in the community and likewise its continuing

availability to self supply aspirants. The supply chain and other important aspects of market-based solutions are discussed below.

IMPORTANT ASPECTS OF MARKET BASED SOLUTIONS TO FACILITATE SELF SUPPLY

Fundamental to any market-based solution is recognizing that success is not only achieving the intended social impact in the near term, but also in the ability of the enterprise to continue operating on its own profit. Sustainability of the enterprise through profit is critical to optimizing the long-term and widespread social impact. Hence when approaching development issues from a market perspective, there are several key project components to consider that closely mirror those addressed in any service or product related business plan. They are consumer participation, supply chain creation and management, promotional activities, behaviour change messaging, customer satisfaction and support, and continuous improvement.

In the case of the *bob* rainwater bag, RI/EWV has tailored the approach to suit the introduction of a specific product into an existing market, a new storage option for rainwater harvesting:

- Consumer participation is largely accomplished through a consumer led product development process.
- The supply chain is made robust by exploiting existing distribution channels and ensuring profit at each step.
- Promotional activities reflect consumer needs based on previous market research.
- Behavioural change messaging is designed to encourage correct use of the product to optimize the available benefits.
- Customer satisfaction is prioritized through an organized after-sales technical support program.

CONSUMER LED PRODUCT DEVELOPMENT

When designing for self supply, it is critical to involve representatives of the potential clients in the design process. This is the way that businesses operate to ensure that the product or service meets the needs and desires of the clients. If a product/service does not meet the needs of the clients then it will not have the desired impact on increasing self supply. Features that consumers want and are willing to pay for need to be incorporated into the product design. However, features that add cost and complexity but do not add to the perceived value of the product can result in very limited uptake. It does not matter if the additional features improve significant aspects of the product if those features are not in line with the client's priorities. If the client is unwilling to pay the higher price the additional costs cannot be justified. For this reason it is important to understand the clients' current needs and their priorities. In the field studies RI/EWV found that rural households' main priority was to have a lot of water close to the homestead while water quality was a secondary issue.

Development of the *bob* rainwater bag began with an understanding of the rainwater storage problem through desk study research, recognition of contributing barriers to uptake facing rural households, and determination of the critical features that potential clients wanted in a product. There were some key issues:

- **Transportation** - In rural areas, particularly in underserved areas, transportation is often a major obstacle with the majority of products being transported by pack animals, motorbikes, or head-loads. Any product should be easily transportable, ideally by a single person for 10 km or more.
- **Cost** – Most rural households are subsistence farmers who have limited disposable cash during much of the year.
- **Storage Capacity** – Although households want as much water as possible a modular design was adopted that allows for improved service with additional investment.
- **Availability** – The product must be available close to the end users and must readily fit into existing distribution channels.
- **Good Value Proposition** – The cost per litre of storage must be superior to other options on the market.

From the initial design, development continues through an ongoing product improvement process. The product was vetted through field testing in 3 districts where 150 prototype rainwater bags were installed over a 9 month period at participating households. Throughout this period, RI/EWV listened to the community's response to the product and was able to incorporate some of this feedback into an improved design for the commercial product. Similarly, as the commercial product is purchased and installed RI/EWV will continue to gather feedback from the target demographic and the early adopters in a constant effort to make the *bob* more appealing and more accessible. From problem to solution, these steps constitute a product development process as shown in **Table 1** below.

TABLE 1: PRODUCT DEVELOPMENT PROCESS

Defining the Opportunity



Households collect rainwater using whatever means and containers are available

Millions of households collect rainwater for a portion of their water supply

Rainwater is a good water source generally free of environmental pollutants and pathogens

Rainfall is widely distributed where people live

Defining the Challenges



Rural clients are poor and most rely on subsistence farming for their livelihoods

Target clients are the rural poor who have seasonal income streams and limited cash

Rural poor are risk adverse and slow to adopt new ideas

Environment is harsh placing the product at risk

Defining the Product Design



Initial concept was presented to potential clients to get their feedback

Key Features

- Transportable
- Low Cost
- Good value in terms of price per liter
- Easy to use
- Adaptable to wide variety of conditions
- Maintains water quality over time

Refining the Product Design



Between the prototype and product launch many changes were based on client feedback

Changes Made

- Non-white color to hide dirt
- Lock for tap
- Increased capacity 1000 to 1400 liters
- Increased length of outlet piping

Future changes being considered include an inlet screen, a support stand, and an improved outlet fitting.

SUPPLY CHAIN CREATION AND MANAGEMENT

Central to the creation of the supply chain is ensuring that all participants profit from their handling of the product, from manufacturers to retail outlets. After all, profit is the driving force behind sustainability in market-based development solutions and what keeps the technology available to the self supply community. There can be no profit gap and no reliance on donor funds beyond the start-up phase of the business. However, profit alone is not the only consideration when evaluating the sustainability of supply chain options. It must also be stable and well established, flexible enough to respond to local conditions, and extensive enough to ensure availability of the product to the intended market.

The challenge of maintaining supply chain profitability lies in the incremental costs passed on to the self supply aspirant as the product moves from manufacturing to the retail shelf. For this reason, the combination of manufacturing, transport, and import costs should be optimized to have the lowest final price. While researching regional manufacturing capabilities, RI/EWV found that the polyethylene liner used in the product could not be produced in East Africa. Adding to this complication is a 100% import duty imposed on bulk plastic material by the Ugandan customs authorities. The import duty ultimately forced RI/EWV to look overseas for both the manufacture and assembly of the *bob* rainwater bag and partners in China and India were considered. China was chosen as the most reliable and cost effective manufacturing alternative and the specific partner was chosen for their experience with other rainwater products and their ability to contribute to the product improvement process. While local or regional manufacturing and assembly is often perceived by the aid community to be more suitable for development initiatives, market-based solutions should remain ideologically neutral to local manufacture or importation and allow the market to decide. If local manufacturing and assembly costs push the retail price out of the target consumer's range, then the enterprise will be doomed from the start.

Table 2: Sales to Date (March-June 2011)

<u>District</u>	<u># of Sales Points</u>	<u>Sales</u>
Kabale	4	17
Kamwenge	4	20
Isingiro	3	32
Mbarara	2	31
Totals	13	106

The most reliable starting point to achieve the supply chain targets is to align the new product with similar existing products and exploit established local distribution channels. Prior to the commercial product launch, RI/EWV identified hardware stores as the optimum outlets for the *bob* rainwater bag due to their experience with rigid plastic tank sales. Primary distributors in each operating district were selected in consideration of their locations, their retail networks, and their willingness to take on a new and unfamiliar product.

The risk associated with new product sales proved to be a significant impediment to signing on the selected distributors. In response, RI/EWV agreed to mitigate this risk by allowing the distributors to sell the product on consignment until demand

was established. Already, a portion of the distributors have begun to purchase the product directly. As the product gains a foothold in the market and demand increases, all distributors will be expected to purchase directly. By being flexible on this step in the supply chain, RI/EWV was able to overcome a major obstacle to commercialization while maintaining the necessary profit margin.

The local retail networks of the distributors were intended to act as conduits into the more remote villages and communities for which the *bob* rainwater bag was designed. However, sales to date reflect a lack of distribution to these remote retail outlets, likely due to a lack of demand resulting from insufficient marketing and an absence of capital or credit with the distributors. In order to better penetrate these target areas, RI/EWV sales agents are now playing an active role in setting up regular market day promotions across their districts. The sales agent is assisted by a representative from one of the district distributors, and the target market is in a location where that distributor has existing retail relationships. This strategy allows RI/EWV sales agents to facilitate the last step in the supply chain by creating local product awareness and demand, identifying the remote retailers, and subsequently strengthening the distributor/retailer relationship to encourage the movement of the product into these more remote areas after the initial marketing effort.

PROMOTIONAL ACTIVITIES

The importance of product promotion is often overlooked by the development sector due to a lack of market pressure acting on donor activities. However, bringing a new product to market through private sector channels requires a robust and comprehensive marketing strategy to build demand and convince the public of its value. The marketing strategy must also incorporate educational messaging to ensure proper use of the product so that its value is fully realized after it has been purchased. In turn, the promotional activities attached to market-based solutions feed back to greater interest in self supply. The RI/EWV marketing strategy for the *bob*



rainwater bag achieves the product and educational messaging through a combination of traditional marketing outlets such as radio advertising and live promotional activities plus direct customer engagement via trained product installers and sales agents.

The marketing effort was kicked off by commissioning an advertising company to develop a locally relevant marketing strategy. They were responsible for creating the brand name, logo, and promotional materials for mass media and retail sales locations. The entire package was focused on highlighting the role that the *bob* rainwater bag can play in addressing the water supply issues faced by the rural poor. Just as the product development process begins with market research to identify the needs of the self supply community, the product message should be directed at these very same needs- cost, value, capacity, availability, and transportability.

Subsequent to seeding the pilot districts with radio advertising and print materials, the *bob* rainwater bag was formally launched through live promotional activities including a VIP luncheon and staged promotions. An important aspect to any marketing campaign is to understand the target community and approach them in an established way to deliver the message. In this case, respects were paid to district officials through a product presentation at a lunch reception and the general public was invited to a 4 hour promotion which included a product ambassador, comedians, and dancers. All actors took turns to entertain and inform the audience.

The initial product launch activities were very successful in promoting the product and raising public awareness. However, the limitations became evident after a couple weeks when sales remained flat. With a new and unfamiliar product, it is necessary to follow the launch with a consistent and regular presence in the target communities. Consumers must be given time to accept the product and be convinced of its value, know where and when they can purchase it, and have time to gather funds for the purchase. To adapt to this process, RI/EWV sales agents are travelling to weekly markets across their districts on a regular schedule. For example, a sales agent will be at the same market every Monday for 4 weeks. Each week they follow a promotion routine and each following week, new customers have had a chance to gather funds and return to purchase the bag. This is also the time that the educational messaging begins through direct engagement with the potential consumers.

BEHAVIOUR CHANGE MESSAGING

New product messaging must be accompanied by educational messaging to ensure that the value of the product is fully realized after it has been purchased. The benefits from this behaviour change messaging are two-fold: the greatest individual impact is achieved by optimizing use of the product and the perceived increase in product value encourages greater uptake through self supply. Thus the behaviour change messaging augments the product messaging and becomes a significant factor in the product's increased social impact.

While the bulk of product messaging is achieved through traditional advertising venues addressing the public at large, behaviour change messaging is well suited to individual or small group dialogues. There are three primary opportunities for RI/EWV to engage their self supply consumers in this manner- through sales agents on market days, through trained installers performing product installations or service calls, and again through sales agents performing product follow up visits. Though market days are a more informal opportunity dependent on consumer interest, those performing installations, service calls, and follow up visits are trained to engage the customer on several topics to increase their understanding of rainwater harvesting principles and product related best practices. Examples include practicing first flush to avoid collecting

Case Study 1: Robinah Kabashekye, Isingiro



Robinah got *bob* in September 2010 from Relief International field office in Mbarara, Uganda. At the time of launching the rainwater harvesting pilot project, each participating household contributed USD 13 for procurement of gutters, down pipes and materials for the base.

Robinah does not feel happy when dry season sets in because her source of water in bob will have been cut off. When the rains are high, bob fills to capacity after two rains. *“I have not had any technical problems with bob. Valery (RI Technical Assistant) comes to inspect my bob after 2 to 3 months to see how it is performing”* she points out.

Robinah likes bob because it keeps water cold all the time and has no dirt at all. At first Robinah says she got worried about someone putting poison into the water or bob being pierced by people who are jealous but now she no long worries about that. *“In fact neighbours have come to love it but only say it is small compared to my household size. I tell them I will buy another bob once I get money”*, she proudly says.

Robinah noted that the price of USD 45 for a bob is too much for her to pay because she is a small scale farmer and it takes a long time to earn that much. *“Neighbours wish to get bob but say money for it is too much. You see, the people who had despised bob now are hungry for it as they see how good it is to the household”*, Robinah says.



accumulated debris after extended dry periods, discussing how to clean and protect the rainwater bag, and encouraging the use of an inlet screen.

It should be noted that behaviour change messaging is not only product specific but seeks to increase the community’s general and conceptual understanding of rainwater harvesting. This ultimately serves several purposes if effective: increased understanding encourages home-grown innovations; the market becomes primed to successive product introductions; and consumers are better equipped to participate in the product development process.

CUSTOMER SATISFACTION

As with any product or service in the private sector, customer satisfaction is critical to commercial success. This is even more pronounced at the start-up phase because the community at large will look to the early adopters for feedback on their experience with the product. There are five aspects to RI/EWV’s strategy to ensure customer satisfaction:

- Maintaining realistic customer expectations through honest advertising claims.
- Behaviour change messaging to optimize use of the product.
- Training installers to perform installations and service calls.
- Prioritizing responsive after-sales support.
- Providing a product warranty.

Together these activities create a safety net to protect the consumer from becoming dissatisfied with the product which in turn protects the product’s reputation in the market. In the end however, every aspect of a market-based development program contributes either directly or indirectly to the self supply customer experience. This is the whole point after all-addressing development issues by treating targeted groups as clients, not beneficiaries.

REACHING THE POOR

One of the perennial problems with market-based solutions is that they do not reach the poorest segments of society, at least not in the short term. A challenge for development practitioners and the national and local governments is how to best reach poor households with products or services that their better off neighbours purchase. Too often the response is simply to give away the product to poor households. Experience has shown that often this does not have the desired outcomes; products are not used correctly, they do not match the household needs, or there are other enabling conditions that are not present, such as a hard roof in the case of rainwater harvesting. RI/EWV is keenly aware of the problems of reaching the poor, but we are also committed to establishing

sustainable supply chains and wish to avoid the market distortion that occurs when large numbers of products are given away. In discussions with officials at the Ministry of Water and Environment (MWE) they agree that while this product could “revolutionize rainwater harvesting in Uganda”, free distribution would be counterproductive to the efforts to establish a sustainable supply chain that will assure product availability in the future.

In order to determine the effect of price on the uptake, use and impact of the *bob* rainwater bag in Uganda, RI/EWV has partnered with Innovations for Poverty Action (IPA) to conduct a study in over 3,000 households. Participating households will randomly receive a voucher for a discount on the *bob* rainwater bag as part of a market promotion event. The study will enable us to determine what level of subsidy maximizes the benefits (i.e. additional time for productive activities, better school attendance, lower incidence of water borne disease) from *bob* rainwater bag in the participating households. It is not enough to maximize the uptake if the product does not achieve the desired impacts on household well being.

By using vouchers that must be redeemed in retail outlets a subsidy can be provided without distorting the market. In this case the vouchers will be used for the IPA study. A similar system could be used to provide a targeted subsidy to needy households without creating market distortion because all of the businesses in the supply chain still receive their profit margins. The voucher system uses telephone based Short Message Service (SMS) that allows the retailers to have instant verification of the voucher and to receive credit on their next order of product. Because the subsidized product is purchased locally there is an incentive for the retailer to stock the product, thereby making the product available for other clients who did not receive a subsidy. In addition, local purchase stimulates the development of the supply chain so that when subsidies are no longer available the product will still be available. This is a win-win situation.

While vouchers can promote supply chain development, large scale give-away programs risk depressing market development. For example, if a donor purchases a container load of rainwater bags from the national distributor or imports them directly from the factory and then gives them away in large numbers in a given area, the market becomes depressed. The distributors and retailers are cut out of the market and the product is often resold in the informal market, compelling merchants, who may otherwise have been supplying the rainwater bag, to seek more profitable products. At the end of the day when the subsidy ends there is no supply chain to provide the product to interested consumers. Clearly this is not the objective of development.

Case Study 2: Juliana Tukamushaba, Kamwenge



Now that it is dry season again Juliana uses water from unprotected water hole located on the land for cattle herders about a one hour to walk from her home. *“But the well is drying up and there was a time when the herders found me at the well, they took away the water I had collected and gave it to their cattle. I was very sick and they did not mind refusing me to take the water home”*, she recalls.

She says, *“I use four jerry cans when it is time to wash clothes and only two jerry cans when there is no need for washing clothes.”* It is amazing that the water hole that Juliana uses to get water from is the same well that the cattle are taken for water twice in a day. *“The cows drink from this well much as we also get water from it”*, she pointed out.



During conversations with Juliana, she explains some changes experienced after *bob* installation. There has been a reduction in incidences of children suffering from flu and cough. Juliana is terminally sick and is on daily medication. *“I have been sick for quite some time and take medication twice a day. My doctors advised that I must use clean and boiled water for taking drugs and yet there was no clean water in the village. I had to work hard and buy mineral water from shops every day for taking medicine. When we got bob last year the problem and expenses on clean water for taking my medicine stopped. I do not work so hard to get money for buying mineral water anymore and I also feel much stronger now.”* However, Juliana still has to walk to the well during prolonged dry season.

Another way for poor households to obtain products like *bob* is through credit. RI/EWV is working with microcredit institutions and targeting women’s groups to convince them to offer loans for the purchase of *bob* to their members. The formal microcredit institutions already offer loans for larger water storage tanks to their more prosperous members, but the payments exceed the capacity of many rural households. Due to its low cost *bob* could be a product for their less affluent clients. It is also well suited for women’s groups that are using a “merry-go-round” system of informal credit where one member would get a *bob* each cycle.

CONCLUSIONS

The private sector is well positioned to provide rainwater harvesting products to meet the demand of self supply aspirants. While having the right products available on the market is a necessary condition for accelerating self-supply, it alone is not sufficient. There is the need for promotion so that potential clients are aware of the products, education to ensure that clients know how to use the product, financial support to enable poorer households to participate and a favourable public policy environment that both promotes self supply and encourages the private sector to provide products at affordable prices.

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