

TITLE:

Catalysts of Agricultural Supply Markets: Case for Smart Subsidies in Zambia

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PAPER ABSTRACT:

The decision to purchase new productive technologies, however promising, presents great risks for the rural poor. Saving even relatively small sums involves difficult choices and sacrifice. The result is that farmers are disinclined to purchase new technologies and manufacturers, wholesalers and retailers are unwilling to invest in inventory and supply. This predictable cycle is one of the greatest challenges for developing sustainable markets. In response, NGOs often try to ensure equitable access for rural farmers through free distribution of pumps, seeds, or other technologies. To break this chain, smart subsidies can be used to accelerate demand and supply for critical production technologies. Properly administered incentives can attract commercial suppliers to actively address the needs of rural, underserved smallholder farmers without creating dependency. This paper presents the case of smallholder farmers in Zambia to highlight how incentives can play a role in developing weak agribusiness service markets.

Introduction

Better farming inputs and appropriate agricultural technologies such as improved irrigation pumps and drip irrigation systems can enhance agricultural productivity for farmers regardless of size. Yet smallholder farmers with meagre incomes typically make choices that avoid the risk of unknown effective technologies – however appropriate or productive these might be. The response by some development practitioners is to introduce new farming technologies through free distribution. This often leads to limited scale and outreach with distorted, weak agricultural input supply markets. Such programs also fail to impart a spirit of entrepreneurship among the recipients of the technologies.

This paper presents an alternative approach to accelerate technology adoption – namely discount vouchers. Mennonite Economic Development Associates' (MEDA) current project in Zambia is used as a case study to highlight the role of smart subsidies in economic development. The term 'smart subsidy' should be understood as not having a market distortion effect or creating a donor dependency. Through the project, incentives have been used to address risk aversion among smallholder farmers in testing new and productive technologies. The private sector has also been engaged with the message that smallholder farmers, not only NGOs, are valued customers of agricultural inputs and technologies. This paper argues that smart subsidies can develop weak agri-business markets by enabling private sector firms to realise the value of serving the needs of small enterprises. It includes a discussion on the merits of the discount approach in addition to factors that ensure sustainability of project impacts after the discounts are withdrawn.

Background Situation of Zambian Farmers

In 2008, Zambia ranked 163 out of 179 countries on the United Nations Human Development Index (United Nations, 2008). Interesting to note that while the HDI score for Sub-Saharan Africa as a region has increased (though nominally), Zambia's HDI score has decreased over the last twenty years. Over 63.8% percent of the population manages to survive on less than a dollar a day (United Nations, 2008). The population is also geographically dispersed with 65% percent living in rural areas (United Nations, 2008).

The failure of agriculture in Zambia is one of the major contributors to rural poverty (PRSP, 2006). The majority of the country's population (70%) relies on agricultural activities for their livelihoods; as such the sector drives the country's economic growth. Increasing agricultural productivity is therefore a critical component of Government of Zambia's Poverty Reduction Strategy Paper (PRSP) with the horticultural sector playing a key role. Demand for fruit and vegetables is high given the prevalence of vegetables in the local diet plus the strong export market (regional and European) (PRSP, 2006). Yet most small-scale farmers in Zambia currently produce for subsistence purposes only; in fact, only one in five small-holder farmers actually produce horticulture crops for sale. (Hichiaambwa and Tschirley, 2006).

Farmers living along the main highways and rail line are more likely to be connected to markets and are in a better position to exploit commercial opportunities. In order to sell to these markets, smallholder farmers must be able to address a myriad of issues such as weak market linkages, inadequate support services, and high production costs. Farmers with appropriate irrigation technologies are able to transition from rain-fed cereal crops to production of high-value vegetable crops. Low-cost technologies such as treadle pumps, hip pumps, and drip irrigation systems, provide more efficient water use, labour-saving benefits, extended growing seasons, and ability to produce in the off-season. Studies have shown that through the adoption of these

technologies farmers earn, on average, an additional \$100 in net income per annum (Frausto, 2000). International Development Enterprises have found that this figure may be potentially higher in Zambia given the limited suppliers currently producing horticultural crops (Frausto, 2000).

Irrigation Technology Dissemination in Zambia

MEDA's assessment in Zambia focused on water resources and access to appropriate and affordable water technologies with identification of effective ways to both stimulate demand, without creating dependency, and strengthen supply, without weakening investment and entrepreneurship on the part of the suppliers.

Most readers of this journal would likely agree that free handouts of these technologies would have significant adverse consequences. Free distribution would distort the market and make it difficult for private sector actors to enter this line of business; access to technologies would therefore only last as long as the project period. Similar experiences with subsidized fertilizers in Zambia have highlighted the issues with this approach. For example, according to the World Bank, the Fertilizer Support Program (FSP), which aimed to improve food security and alleviate poverty through provision of subsidized fertiliser, suffered from high costs and administrative inefficiencies. Not only did the project crowd out private sector input dealers, there was evidence that the targeting was inaccurate and that the actual value of maize produced was greater than the cost of the project (Gregory, 2006).

Alternatively, MEDA could have explored supply side strategies to enhance the technology market. Matching grant programs for technology manufacturers and importers might have provided these firms with the incentive to improve their production processes or efficiencies. Unfortunately, matching grants often do little to replicate the market with impact beyond the life of the project (McVay and Miehlbradt, 2006). And while a matching grant may stimulate supply, it would not nurture the nascent demand for these technologies. MEDA could have also developed a training program for suppliers to enhance their marketing capacity or developed a quality control system to address product issues. Both are important elements to building the market; however, these activities alone would not have been sufficient. Farmers would still be hesitant to try the technology and suppliers would continue to remain in Lusaka selling their technologies from the capital.

The Voucher Approach

MEDA decided to focus instead on demand side interventions as a way to accelerate the market for these technologies. It was understood that enhancing adoption rates requires substantial behavior change through scaled demonstrations of the positive benefits from appropriate technologies.

In the value chain development context, vouchers have primarily been used for subsidized training to microentrepreneurs. One of the first projects to use this approach was the Kenya Micro and Small Enterprise Training and Technology Project, financed by the World Bank. Using a demand-side subsidy, the project provided vouchers to small enterprises to encourage their participation in technical and business management courses; these discounts provided an incentive for commercial training providers to enter this market (Hallberg, 2006, World Bank 2005). There has also been a call for the use of vouchers as a way to ensure more market-oriented relief programs that allow target beneficiaries to purchase food and other goods from local retailers (McVay and Miehlbradt, 2006).

Other studies have highlighted the role that vouchers can play in stimulating the market for inputs, specifically fertilizers and seed (Gregory, 2006). While there have been issues with some of these programs, input vouchers have been seen as having the potential to operate as a pro-poor, smart subsidy to help subsistence farmers transition to cash crops (Gregory, 2006). For example, a voucher program in Nigeria for fertilizers showed that almost half of the farmers had better access to fertilizers while dealers felt that had better stock security (Gregory, 2006). Critics of the voucher approach may argue that the use of vouchers for small-scale producers hinders sustainability. However, these examples show that vouchers are not necessarily market distortive subsidies; they can be effective mechanisms by which to develop links between producers and supply chains.

The voucher strategy appealed to MEDA as an alternative to the handout approach previously adopted in for the following reasons:

- Vouchers do not hide the real cost of the technology. Farmers are aware that the discount provided is in fact a price reduction (which is viewed as being offered by the suppliers).
- The voucher is offered as a clear one-time cost reduction from suppliers; this is not an ongoing price subsidy but rather a promotion to allow farmers to test the technology. Each farmer is given a period in which to redeem their voucher, after which the voucher expires. The discount voucher is designed along the lines of common commercial product promotion models that are typically undertaken by private sector to allow customers to test a new product.
- Research has shown that farmers are more likely to apply and use technologies when purchased as opposed to being provided for free. As such, they also serve to automatically direct the limited subsidy to farmers who are most likely to use the voucher efficiently.
- Farmers are still required to pay for the majority of the technology cost. As farmers are rational consumers, it can therefore be expected that only those who want to enhance their production under irrigation will take up the offer.
- Vouchers create demand that draws a commercial network into rural areas, increases the capacity of retailers to invest in inventory, and strengthens the technology market for future clients.
- By enticing suppliers to enter the market, after-sales service is now available for technology users. This was not the case when technologies were distributed for free as maintenance services and spare parts markets were not developed.

MEDA's Voucher Program

The goal of MEDA's market development program is to accelerate supply and demand for appropriate and affordable water technology products without dependency while strengthening local businesses to ensure their long term viability and sustainable reach to underserved rural populations in Zambia. Originally the voucher value was set at approximately USD50. A variable voucher approach (with a discount of 40%) will be used by the program going forward. The discount value was set based on the market conditions and indicative willingness-to-pay, with flexibility to respond to market changes as the interactions between suppliers and farmers evolve.

New irrigation technologies and agricultural best practices were taught and demonstrated through training sessions, agricultural fairs and other information sessions organized by MEDA's partners and the irrigation suppliers. Partners include International Development Enterprises

and Zambian National Farmers Union. After attending these sessions, farmers are entitled to a discount certificate to purchase their preferred irrigation technology. However, the discount is only for a portion of the cost; farmers are required to contribute the remaining amount through their own savings or other sources of income. Recipients then take their certificate to one of a number of registered retail outlets to purchase their preferred technology. Retailers are able to submit redeemed certificates to water technology manufacturers and importers in exchange for new inventory while still maintaining their mark-up. The manufacturers and importers then redeem the certificates with MEDA. All voucher transactions are conducted electronically via a SMS System.

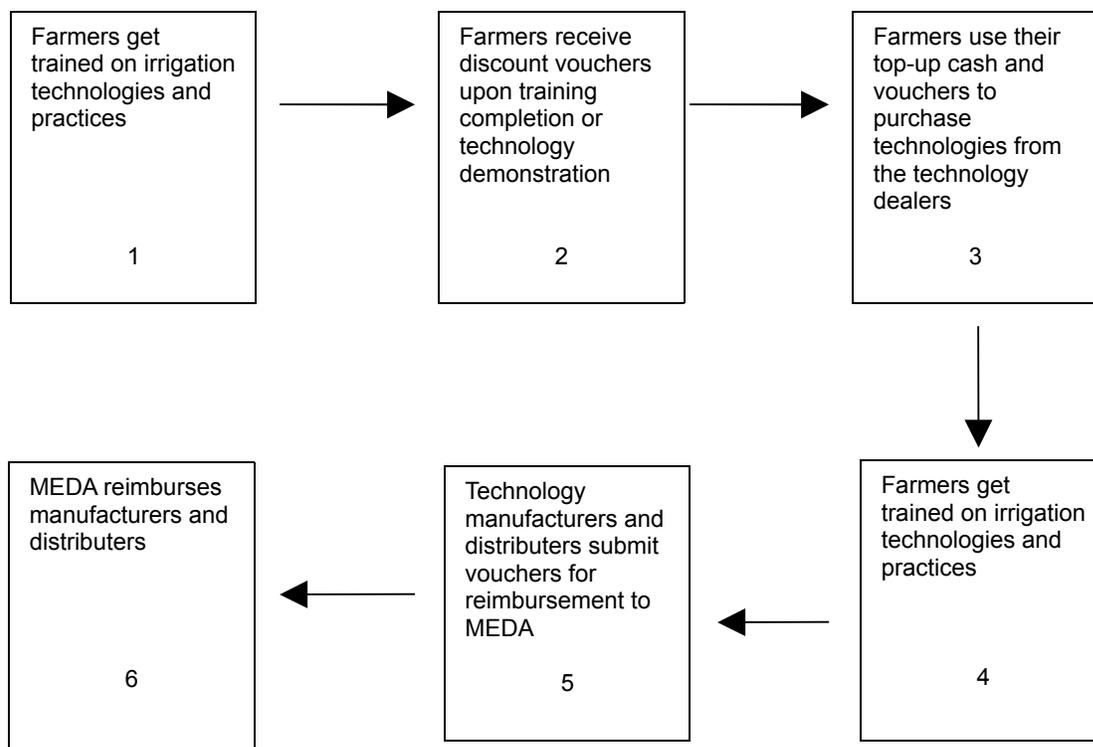


Figure 1 Market Stimulation Model

While there have been a number of voucher programs for small enterprise development, the commercial model adopted and facilitated by MEDA represents some new perspectives on voucher program management in the context of market development.

- **Invisibility of MEDA.** Most voucher programs do not insist on invisibility for the funding organization. It is typical for the vouchers to carry the logos of the funding organization. In the context of market development, remaining outside the supply chains is a key determinant to a smooth exit strategy. Experience shows that once voucher recipients know the source of funds is a development organization, they are likely to request additional discounts thereby reducing prospects for a sustainable market. Under the voucher program, MEDA strives to maintain its invisibility; the vouchers, for example, carry the logo of the suppliers not MEDA.
- **Technology sales are made through the suppliers' commercial outlets and agents.** While other voucher programs would use both public and private sector for voucher distribution, management and redemptions, MEDA has insisted on a purely private sector driven model for sustainability. Therefore, the commercial sector handles the

logistics of technology distribution, marketing, storing, transporting and selling the technologies. Owing to supply-side weaknesses, MEDA has provided complementary support activities but without further subsidization of service provision.

- Use of a commercially driven model allows for expansion and availability of technologies in all the places where vouchers are distributed; suppliers have been more willing to invest in retail networks in geographic locations where they know that there is effective demand.
- Rather than create parallel markets for technology distribution, the voucher program attracts new investment from existing and new private sector suppliers, fostering competition and increasing options and technology choices for farmers.
- Use of electronic vouchers based on a short messaging service (SMS) application serves as a real-time monitoring tool and acts as a new planning tool for investments by suppliers. The SMS application has served as the first tier for fraud control; the message to farmers has been that the voucher is 'electronically' monitored and not transferrable.

These added dimensions allow MEDA to be innovative in its voucher program and advances the thinking on voucher delivery in a technology promotion context.

In order for the project to achieve the intended goal, a number of critical design issues needed to be addressed, including the following:

- Suppliers and retailers sign on to the voucher program to directly market water technologies and use the discount voucher as part of their sales strategies. MEDA is invisible and the discount is seen as a promotion coming directly from technology suppliers allowing farmers to test and see the benefits of the technologies.
- There is transparency on the real price to the smallholder farmers.
- Technology suppliers are encouraged to be proactive in direct marketing and sales of the technologies to smallholder farmers, including establishment of appropriate distribution networks and technology demonstration activities.
- The discount vouchers operate as electronic vouchers which facilitates real time monitoring and performance tracking while addressing fraud issues.
- MEDA and its implementing partners are completely outside the water technology supply chain. Some of the agri-business organizations MEDA works with development organizations that are new to market development approaches and therefore MEDA continues to provide technical assistance to ensure all key stakeholder organizations understand market development best practices.

While the vouchers are an important component towards building the irrigation technology service market, it is not the only area of activity. Complementary activities, such as training of suppliers on marketing, support for farmers to access new markets, and financial services linkages will be critical to the project's success. Related activities currently implemented by the project will be downloaded to the private sector as part of the project's exit strategy once these firms understand the merit of these efforts and are willing to invest resources in continuing these initiatives. For example, MEDA organized agri-fairs where the different participating suppliers had the opportunity to demonstrate their various product offerings. Next irrigation season these sessions will be organized by the suppliers themselves. The expectation is that as suppliers see the benefit in reaching out to farmers and invest in marketing activities, further interventions by

MEDA will no longer be required. MEDA has not partnered with NGOs who wish to be both market facilitators and direct technology providers and therefore is able to stay out of the supply chain. As the demand for the technologies grows, MEDA is able to concentrate on developing long-term solutions for continued access, including development of appropriate financial products for technology acquisition. The expectation is that as the vouchers are withdrawn, demand for the technologies will be raised, suppliers will understand the importance of investing in marketing and distribution, and microfinance institutions will have an appropriate product that assists farmers in the upfront capital cost of these technologies.

Below is the market development framework being implemented in Zambia:

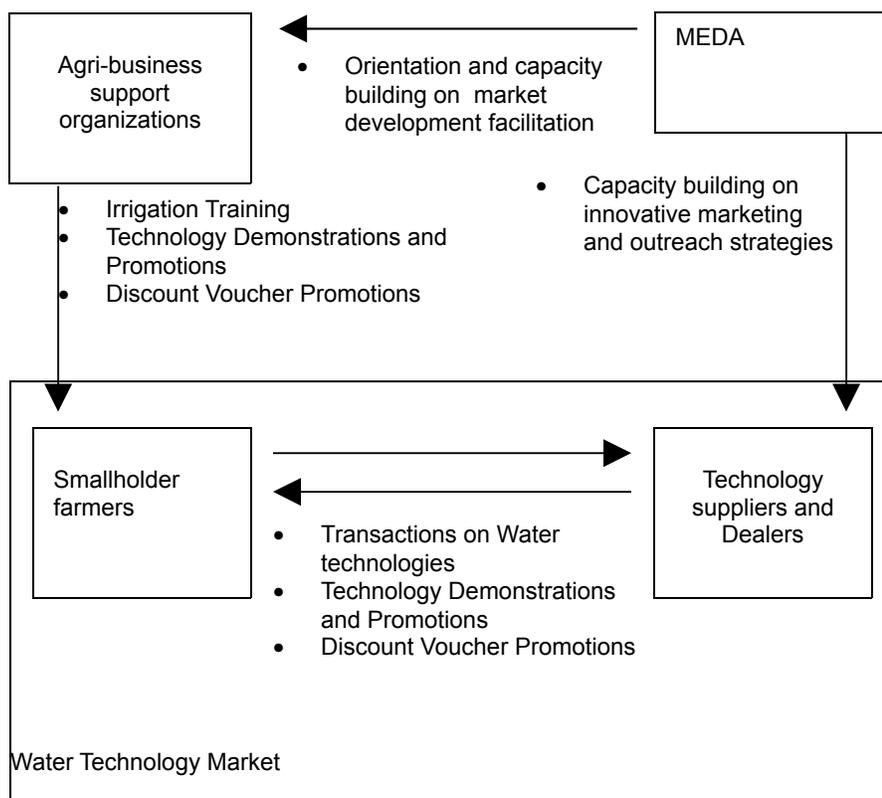


Figure 2: Voucher Program Market Development Model

Overview of Project with Results

The project has recently finished its first year of operation. Initial results and anecdotal evidence have highlighted the positive potential impact through the discount approach. In the previous irrigation season, over 3,500 vouchers were distributed with close to 500 redeemed. Critics may argue that the level of redemption appears low when compared to typical voucher programs. Important to note is that the cost of the pump still represents a large capital investment for farmers, particularly in comparison to the price of a training course. Due to issues with supplier inventory and distribution network management, suppliers failed to take advantage of the prime

irrigation season (April to June) leaving some of the stimulated demand unserved. This meant that the expectation of higher redemption rates was not realised. In order to ensure that the project achieves desired scale, the project team has identified a range of strategies to engage suppliers more deeply in marketing and inventory investment. The voucher performance in the first irrigation season should be evaluated in the context of the degree of the market deficiencies and weaknesses that accounted for the pace at which technology suppliers have taken up the business opportunity. A year would therefore serve as a learning opportunity for suppliers to address risk aversion, reorganize their investments and map out strategies to adequately respond to the emerging market opportunities. In a market development program, qualitative changes are good pointers of long-term sustainable market changes expected once the market actors have fully embraced the market opportunities. This is the context to which this article should be read. Suppliers involved with the project have already indicated strong preparations for the upcoming irrigation season. With the success of these new strategies, the expectation is that the redemption rate will increase significantly in the upcoming irrigation season allowing the project to achieve scale.

The project started implementation in a very weak market for irrigation technologies. While the project is only through the first year of operation, there are positive signs of a growing market with changes in market dynamics beyond access to the targeted product or technology. Table 1 highlights some of the key results experienced to date:

Table 1: Market Development Changes

Market Aspect	Demand Side	Supply Side
Risk aversion	<ul style="list-style-type: none"> ➤ Growing number of farmers using own funds and vouchers to purchase the technologies 	<ul style="list-style-type: none"> ➤ Suppliers investing in more new, quality inventory of the technologies
Seller-buyer interactions	<ul style="list-style-type: none"> ➤ Farmers' affirmation and appreciation of first-time interactions with suppliers ➤ Farmers making informed buying decision and technology choices 	<ul style="list-style-type: none"> ➤ Suppliers' affirmation that selling technologies directly to farmers has brought realisation that smallholder farmers can be direct customers of such agricultural technologies
Client satisfaction	<ul style="list-style-type: none"> ➤ Farmers provided with warranty and are therefore able to ensure poor quality products are repaired in a timely manner. 	<ul style="list-style-type: none"> ➤ Suppliers and manufacturers switching from poor quality to better quality technologies
Direct technology marketing	<ul style="list-style-type: none"> ➤ Farmers have gained exposure to all available technologies on market (previously did not have this opportunity) 	<ul style="list-style-type: none"> ➤ Suppliers beginning to market technologies through agricultural fairs and technology demonstrations as well as setting up distribution networks ➤ Suppliers slowly embracing innovation in marketing and service provision ➤ Sales increased by more than 100% following implementation of water technology fairs which provided farmers with an opportunity see and test the technology before purchase.
Technology sales	<ul style="list-style-type: none"> ➤ Farmers who have successfully installed technologies are serving as a testimonial marketing to other farmers leading to increased sales 	<ul style="list-style-type: none"> ➤ From an annual average of 120 direct technology sales to nearly 500 direct technology sales to smallholder farmers in first five (5) months of one irrigation season. ➤ Suppliers previously mainly sold to NGOs; only 5-10% was the portion of direct sales to smallholders

		<ul style="list-style-type: none"> ➤ Increase from one active supplier at the beginning of the voucher program to four suppliers in five months ➤ Manufacturing and restocking now based on direct effective demand by smallholder farmers not NGOs orders.
Cost of Technology	<ul style="list-style-type: none"> ➤ Farmers' choices of technologies reflective of the cost of technology; however, many showing enthusiasm for graduation to higher irrigation technologies 	<ul style="list-style-type: none"> ➤ Sourcing of new technology suppliers and bulk orders pushing the prices of technology down ➤ Positive signals of reduced prices as increased competition and as suppliers seek new sources of suppliers of technologies
Technology Performance and Other Emerging Impacts	<ul style="list-style-type: none"> ➤ Increased family participation in farming; motivated by presence of efficient technology 	<ul style="list-style-type: none"> ➤ Local manufacturers responding to competing imported technologies and feedback from farmers

Future success lies in proactive investments from the suppliers particularly in appropriate levels of inventory, business interactions with farmers and innovative and cost effective direct marketing. The cost of reaching out to farmers has been an issue for most suppliers requiring innovation in marketing and distribution networks. While some private sector companies appreciate and are receptive to development programs that are based on pure business principles, past interactions with development organizations that do not apply market development approaches mean it is hard to get suppliers to fully embrace their lead roles, often requiring push from the facilitating development organization.

Box 1-Pointers to the creation of a sustainable market

Two demand surveys conducted by the project, independently from suppliers, to assess market changes reveal that farmers have not only appreciated the fact they have been able to acquire the technologies through a discount promotion but also that they have had direct contact with suppliers. Many who plan to upgrade their technologies in the near future noted that they now know exactly where to go to purchase these technologies. With the experienced improved productivity and increased production, many noted that their capacity to buy these technologies at full price has been enhanced.

“ I never knew I would acquire an efficient technology this year”, “I certainly plan to purchase another technology next year”, “In just one season, my production levels have increased significantly and should be able to upgrade to higher technologies” , some voices of farmers in Zambia

Risks of Vouchers

Despite the strong potential for this approach, there are some risks that need to be addressed when applying a voucher model.

- *Inadequate value chain analysis or market assessment prior to selecting the voucher model.* It is important that as part of the program design process, due attention is paid to supply and demand issues to ensure that the voucher approach is the right model or appropriately structured.

- *Inappropriate voucher value.* If the value is not significant enough, the discount will not serve as an adequate incentive for farmers to try this technology. If the discount is too high, then the farmer no longer pays a realistic portion of the technology price.
- *The full-price of the technology is not affordable.* If the technology is not reasonably priced then the demand and market for technology once the voucher is withdrawn will not be sustained. The involvement of multiple suppliers has helped introduce competition meaning that prices are relatively affordable.
- *Leakage to non-target farmers.* The project has developed and applied an electronic Short-Messaging-System for voucher distribution and dissemination. The system incorporates a number of fraud prevention mechanisms to ensure the intent and integrity of the vouchers is upheld. To date, the program has not witnessed any incidences of fraud. The use of these mechanisms (including distinct farmer identification numbers) and the incorporation of an SMS system prevent vouchers from having a cash value, other than for the purchase of a technology. Additionally, these technologies are better suited for smaller plot sizes; larger farmers self-select themselves out of the program.
- *Failure to ensure adequate exit strategies* for the activities surrounding the voucher program, such as agricultural fairs, that support the distribution and marketing of technologies. As MEDA enters the second year of implementation, strategies are being developed to download activities to the private sector. From the beginning of the project, this expectation was shared with project partners.
- *Limiting Time Duration.* The MEDA project will only run for three years. Given the initial reluctance of commercial suppliers to engage in marketing, it would have been ideal to run the project over a longer period.
- *Implicit handouts.* Even when building a commercial supply chain, there is the potential that NGOs can “implicitly” insert themselves in the value chain by handling transportation or monitoring quality control. It was important that the project team avoided such activities.

Factors for Sustainability

While the project is in its early days, the high level of direct sales to farmers and initial results reveal the potential of the program to address farmers’ risk aversion. Once positive behavioural change towards technology adoption is experienced, the vouchers can be removed leaving behind functioning supply chains. In order for this to occur, the Zambia project has highlighted some critical factors for success that will contribute to sustainability.

- *Be low-key.* One of the important messages that MEDA has conveyed to all stakeholders is that MEDA’s role need not be highlighted. MEDA’s name is not marked on the vouchers and the project vehicles do not have MEDA stickers. Instead, MEDA tries to ensure that farmers are aware that that the promotion comes from the suppliers, not MEDA or its partners. This has been easier said than done as farmers often ask what MEDA’s role is in the project. However, private sector companies have shown appreciation of this strategy as it puts them in the forefront.
- *Ensure that there is a range of competitors in the marketplace.* Farmers have the voucher to purchase either a treadle pump or drip irrigation kit. No supplier is promoted over another. A supplier’s success is therefore dictated by their ability to serve farmers’ demand with the best product and appropriate service.
- *Price is critical.* It is important to ensure that buyers - smallholder farmers in this case - know the real price of the subsidized product. The discount should be transparent. It is equally important that the discounted price does not vary widely from the real cost of the product.
- *Incorporate complementary activities as appropriate.* In very weak supply markets, as was the case in Zambia, the voucher may not be enough to stimulate the market. Complementary or corresponding supply-side interventions are sometimes necessary to

demonstrate the business case to private sector companies before their full engagement. This is usually the case when private sector actors are sceptical about the profitability and viability of servicing smallholder farmers or the market has significantly been distorted by free products. Such supply-side interventions may include awareness on retail network development or support for innovative marketing strategies.

- Find strategies to highlight the demonstration effects. Small holder farmers who are able to substantially increase their incomes as a result of a treadle pump or drip irrigation system are the best promoter of the product. Using successful farmers as model farmers will be critical to ensuring that the demand for these technologies is sustained over the long-term.
- Ensure that the vouchers are time bound. In the case of Zambia, each certificate has one-year validity. The voucher program will only operate for three years – after which the discounts will be withdrawn.
- Develop long-term complementary solutions. A critical factor for success of the voucher model in Zambia is the development of financial services. MEDA is also working with local financial institutions to develop their capacity in agricultural lending. Once the voucher has stimulated demand for these technologies and suppliers have invested in a retail network, farmers will be able to access the financial products that facilitate their purchase of these technologies. Finance is the long-term solution but it is not the sole solution if demand and retail networks are not developed.

Conclusion

MEDA's project in Zambia highlights how a voucher approach is being used to catalyse a sustainable supply chain for much needed agricultural technologies. The program's facilitation of commercial distribution systems aims to ensure sustainability of benefits for clients and other farming households after the project ends. Through stimulating the private sector (including technology demand and supply), MEDA's project will promote buyer-seller relationships which will enhance market relationships and interaction. The voucher approach and its role in market development still has its critics. However, MEDA's project in Zambia is demonstrating that when properly designed with appropriate measures for sustainability, a voucher program can act as an effective market stimulant. The experience in this voucher program also shows that smart subsidies serve as stimulants for gradual market developments in weak markets that have been distorted by handouts. The ability to effect multiple market changes from a single market catalyst affirms the strength of well designed market stimulants.

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