



iDE Ghana
Access to affordable and effective irrigation technology for small farmers in northern Ghana

by Annemarie Lager, 2011



iDE Ghana

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1 Summary

In 2009, an international non-governmental organisation (NGO) called International Development Enterprises (iDE) started its country programme in Ghana. Its mission is to create income opportunities for smallholder farmers. Thereby, it chooses water as the entry point, because water access and control is one of the most significant constraints that hinders smallholder farmers from lifting themselves out of poverty. Using a market-based approach iDE Ghana facilitates the emergence of a local irrigation technology market that works for the benefit of the rural poor. By establishing local private sector manufacturing and distribution of affordable irrigation technologies farmers can improve their farm productivity significantly and thus, their income.

iDE Ghana adopts a comprehensive strategy. Besides facilitating the establishment of an irrigation technology supply chain, it also engages in smallholder farmer capacity building. For example, it trains farmers in sustainable and market-oriented agricultural production that helps farmers improve their agricultural productivity. Last but not least, iDE Ghana also links farmers to high-value market opportunities, because efficient, constant and profitable market connections are indispensable for increasing farmers' income permanently.

In the following, iDE Ghana's approach to establish a local supply chain of irrigation technologies is illustrated. The time horizon embraces the period between iDE Ghana's foundation in September 2009 and the end of the first dry season in April/ May 2011. During the first dry season of its presence, iDE Ghana concentrated on a single product, the suction-only treadle pump. In total, almost 300 treadle pumps were sold. Critical to this success were partnerships, an adequate product-mix and microfinance. Challenges were mainly associated with the cultural mindset of farmers and the risk management of financial partners.

2 The groundwork and rationale for a supply chain of irrigation technologies

In order to frame a successful intervention plan, iDE Ghana has followed a strategy, called Prosperity Realized through Irrigation and Smallholder Markets (PRiSM). The PRiSM approach helps to better understand the unique opportunities and challenges that poor rural households or communities face. In particular, the model examines the specific small farm environment with regard to market opportunities and constraints.

Following the PRiSM model, iDE Ghana has first elaborated an intervention design for products and services that benefits smallholder farmers. Then, the intervention design has been implemented in coordination with partner agencies. Lastly, lessons learnt from successes and failures are and will be fed back into the intervention design and management – a process iDE Ghana is currently working on.

In the case of Ghana, the PRiSM model translates into practise as follows: Diverse field studies were conducted in order to design an effective intervention programme. Not only were natural



In Ghana, traditional smallholder farming relies on erratic rainfall and buckets to irrigate the fields due to the absence and inaccessibility of affordable irrigation.

resources assessed, but also the socio-economic aspect of Ghana. Generally, these explorations revealed that the vast majority of smallholder farmers in Ghana lack irrigation technologies. They rely on buckets and cannot afford the available irrigation technology. For all these reasons, iDE Ghana decided to build up a local supply chain of affordable and effective irrigation technologies.

Before expanding to other regions, iDE Ghana decided to start the programme in the Upper East Region of Ghana for the following reasons: In that region, surface and sub-surface water is available all year. Furthermore,

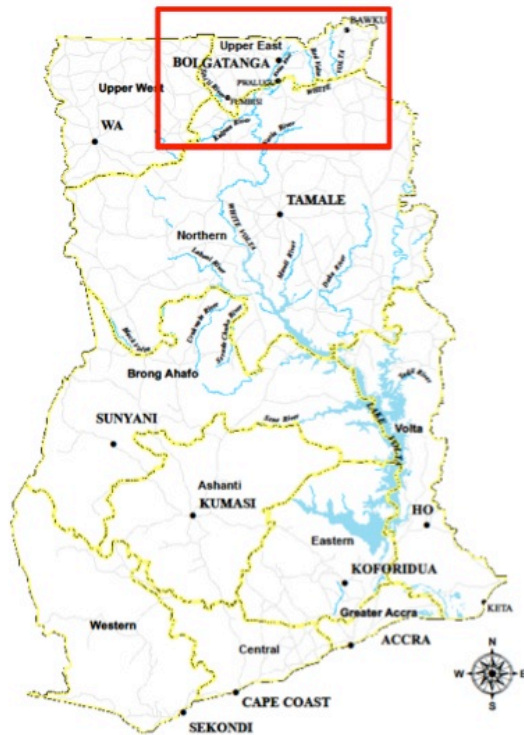
poverty rates are amongst the highest in Ghana and the population density also is higher than in other areas. Moreover, traditional bucket irrigation and low crop diversity are major issues. Therefore, affordable and effective small-plot irrigation technologies combined with training have the highest impact potential in the Upper East Region.

In addition, there is a huge informal network of metal workers in Suame Magazine, Kumasi. Seeing the availability of abundant materials and capable manufactures in that place, iDE Ghana decided to harness this network and to establish the treadle pump production side in Kumasi.

The physical distance between Kumasi and the Upper East Region also suggests the requirement of an intermediary, a dealer in this case, in order to organise the distribution.

With regard to the product itself, the fixed suction-only treadle pump was found adequate for smallholder farmers in terms of costs, lifting capacity and simplicity. Product

range enlargements are envisaged for a later stage, when the irrigation technology market and the programme have matured.



iDE Ghana started its programme in the Upper East Region of Ghana with a regional office in Bolgatanga. The production side is in Kumasi.

3 Partner scoping

Partners are key to any activity in the developing world. Not only do they have valuable local knowledge, they also facilitate implementation and communication and reduce transaction costs in general. iDE Ghana has partnered with diverse institutions:

- **International Water Management Institute (IWMI):** IWMI is an international research centre embedded in the larger Consultative Group on International Agricultural Research (CGIAR). iDE Ghana has gained valuable insights from IWMI's expertise on ground water resource assessments and other related topics, such as soil compositions.
- **Ministry of Food and Agriculture of Ghana (MoFA):** MoFA is the responsible agency for Ghana's agricultural sector that also is responsible for the irrigation sector. iDE Ghana aims to collaborate with MoFA and its extension workers in the terms of providing trainings to farmers.
- **Ecumenical Church Loan Fund (ECLOF) Ghana:** ECLOF Ghana is a microfinance institution affiliated with the finance institution ECLOF International based in Geneva, Switzerland.

iDE Ghana has partnered with ECLOF Ghana on a loan pilot programme. In other words, ECLOF Ghana provides loans to smallholder farmers for acquiring irrigation technologies. Specifically, the loan pilot programme integrates the particularity of the vegetable crop cycle¹ and also incorporates a savings component.

- **International Telephone & Telegraph Corporation (ITT Corporation):** iDE Ghana also collaborates with private sector companies in order to test and develop new products for rural poor in the developing world. ITT Corporation is a private American corporation that engages in realising innovative ideas and product designs for this specific target group. Currently, iDE Ghana is testing ITT Corporation’s low-cost solar pumps².

4 Efficient product- mix and supply chain building

An efficient product-mix is crucial to simulate local demand for irrigation products. iDE Ghana has adapted and implemented following concept:

4.1 Product – The suction-only treadle pump

The only suction-only treadle pump is an adequate irrigation technology for smallholder farmers in Ghana that lifts water from a depth of up to seven meters. It is a

simple technology easy to use and to maintain. Furthermore, it provides the farmer with the adequate quantity of water he realistically needs.

In terms of production, three manufacturers are currently producing treadle pumps with iDE Ghana’s assistance.

In terms of quality, attempts to punch parts manually were not satisfying. Therefore, a kind of specialisation has emerged due to technical reasons: One manufacturer has a machine required for mechanical punching. Therefore, he punches all parts of the treadle pump.

As the other two manufacturers do not own such a machine, they subcontract the punching of the required parts to the first manufacturer. A similar subcontracting relationship also exists for the rolling of the cylinder.



Manufacturer 1
(Specialisation in punching)



Manufacturer 2



Manufacturer 3

A kind of specialisation has emerged between the manufacturers. Due to quality reasons, manufacturer 2 and 3 are subcontracting the punching of special treadle pump parts to manufacturer 1.

¹ Agricultural loans are particular, because they integrate the specific characteristics of the plant cycle in the repayment rates. Therefore, repayment starts later than in conventional credit systems, because yields (and thus revenues) can only be harvested significantly later.

² Another partnership that focuses on solar treadle pumps is emerging between the Solar Lab of the University of Applied Science in Biel, Switzerland, and iDE Ghana.

4.2 Price

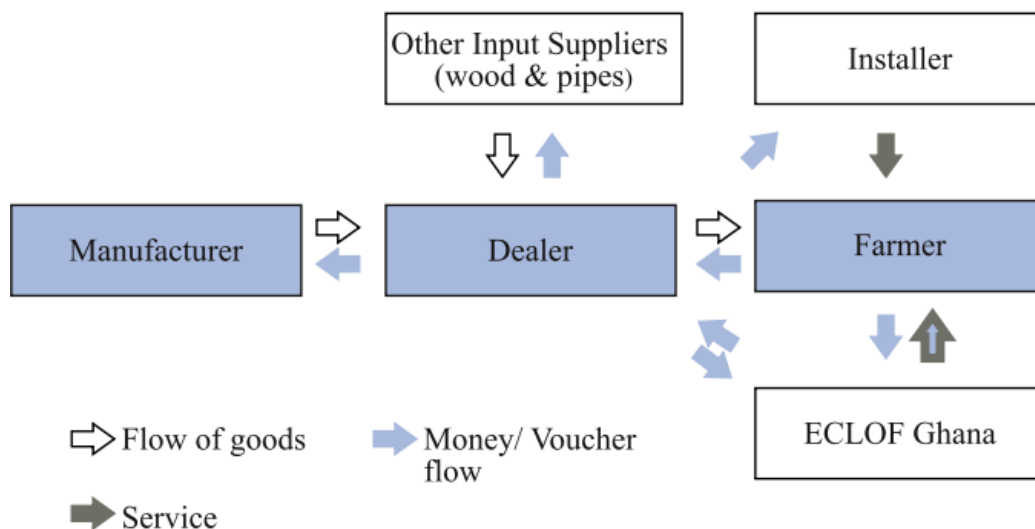
Price setting of products designed for the poor is a delicate balance between a too high price setting, which affects sales, and a too low one, that reduces profits. iDE Ghana has developed a fixed suction-only treadle pump for GHS 90 (as of July 2010) that is a very competitive price in Ghana. iDE Ghana further lowers the entry barrier for farmers by connecting farmers to microfinance institutions that provide loans. The cost structure of the fixed suction-only treadle pump is given in Table 1:

Table 1: Cost structure of the fixed suction-only treadle pump

Component	Price
Production cost	40 GHS
Cost of transportation from production hub to dealer	6 GHS
Cost of wooden treads and PVC pipes	30 GHS
Dealer margin (20%), 2 GHS to be passed to installer	8 GHS
Installation cost	4 GHS
Cost of transportation from dealer to village	2 GHS
Total cost	90 GHS

4.3 Place and supply chain

Before iDE Ghana's started in 2009, no existing supply chain for low-cost, manual irrigation technologies had been in place in Ghana. In other words, production and distribution have to be developed and structured. The production side in Kumasi and the selling place in the Upper East Region of Ghana further suggest that transport and the contact between seller and buyer have to be organised. Therefore, iDE Ghana decided to organise the supply chain around agro-input dealers.



The supply chain of treadle pumps is organised around agro-input dealers located in Navrongo and Paga, the Upper East Region of Ghana. ECLOF Ghana plays a key role in the money flow; it provides loans to farmers that stimulate the demand.

The dealers reside in Navrongo and Paga, in the Upper East Region of Ghana. Local agro-input dealers already entertain business relations with smallholder farmers. Moreover, the integration of irrigation technologies in the dealers' product range complements the dealer's core business. By offering related services, such as providing agronomic advice to farmers, the dealer can even further enlarge its income spectrum.

In terms of flow of goods, the dealer is in the centre of the supply chain and acts as intermediary between the manufacturer and the farmer. The manufacturer produces the pump in Kumasi. The treadle pump is sent by public transport to the dealer in the Upper East Region, namely either to Paga or Navrongo. The dealer stocks the pump and orders other spare parts necessary for the treadle pump, such as pipes. He also provides the farmer with the contact details of potential installers. The transport from the dealer to the farmer is supposed to be organised by the farmer. Subsequently, the farmer contacts the installer, who renders the service of installing the treadle pump on the farm. The installers shall also take care of any after-sales services included in the warranty.

In terms of money flow, the dealer pays the manufacturer 50% of the price by the delivery of the treadle pump. The other 50% are paid once the dealer sells the treadle pump to the farmer. In contrast, the manufacturer, has to pay for raw materials directly in cash. The installation costs of 6 GHS are included in the selling price and provided to an independent installer by the dealer. The farmer himself receives a loan from ECLOF Ghana in form of a voucher of GHS 90. By buying the pump, the farmer gives the voucher to the dealer, who hands it over to ECLOF Ghana and gets subsequently reimbursed in cash.

iDE Ghana is assisting all actors along the supply chain in order to smooth the establishment of the treadle pump supply chain: It supports the producers with technical advice, establishes links and trust between all actors along the supply chain, trains independent installers for after-sales services and connects farmers to ECLOF Ghana.



iDE Ghana staff controls quality in terms of leakage and cylinder uniformity.

4.4 Promotion



M. Jagula is one of the two treadle pump dealers in the Upper East Region. Besides selling general agro-inputs, she is also actively promoting the treadle pump in Navrongo.

Farmers in the Upper East Region of Ghana are scattered all over the region. Illiteracy and different dialects and languages further make a uniform promotion difficult. Therefore, iDE Ghana places emphasis on demonstration farms and social interaction in order to raise farmers' awareness of the product. Farmers need to physically touch and try the product out. The acquirement of a treadle pump is a high investment for farmers. Therefore, social interactions and follow-up are key to smallholder farmers in order to clarify all issues, doubts and benefits of a treadle pumps.

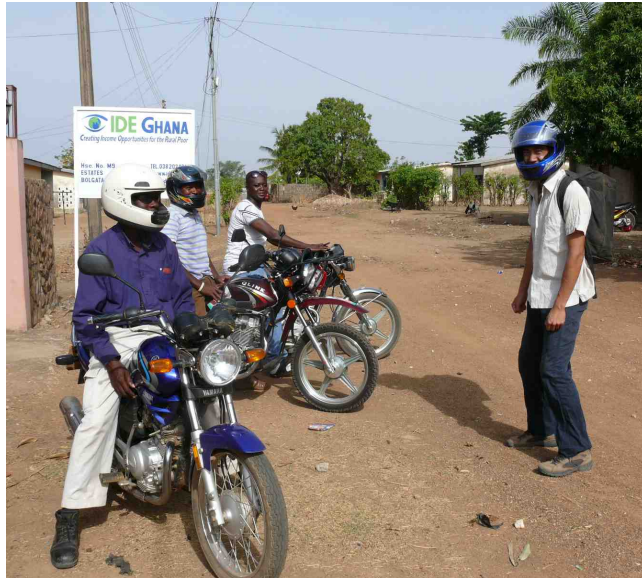
iDE Ghana has installed demonstration farms in 21 villages. It has further recruited so-called community-marketing facilitators who are permanently in contact with farmers. Besides such dynamic promotion, iDE Ghana has implemented some static promotion strategies: T-Shirts with the iDE Ghana emblem and pictures. Dealers also promote the treadle pump in their shops with product exhibitions and photographs.

5 Microfinance

iDE Ghana has partnered with ECLOF Ghana. ECLOF Ghana is a microfinance institution that provides loans to farmers who want to buy irrigation technology. The loan structure looks as follows: The farmer gets a loan of GHS 160 in total. GHS 90 of the GHS 160 are allocated in form of a voucher for the treadle pump. The rest is given in cash in order to buy critical farm inputs.

Upon signing of the loan, the farmer will receive a voucher for the irrigation equipment, which he will present to the dealer. The dealer will give the voucher to ECLOF Ghana and receive immediate cash from ECLOF Ghana in turn. After a grace period of two and a half months, the farmer starts to repay the loan to ECLOF Ghana at an interest rate of 3%/month.

Out of 274 treadle pumps, 272 were sold on this described credit scheme. Therefore, microfinance seems to be the most critical component for triggering the demand, even more essential than price reductions per se.



iDE Ghana's and ECLOF Ghana's field officers are in permanent contact with smallholder farmers in the Upper East Region. They cater for social interactions and follow-ups, thus creating trust. ECLOF Ghana field staff is visiting smallholder farmers on a weekly basis in order to collect the money (repayment rates).

6 Small farm production strategy and links to output markets

Not only does iDE Ghana make a product available and accessible, it also invests in farmer training so that farmers can use the irrigation technology efficiently. In order to further increase smallholder farmers' income, iDE Ghana also engages in linking farmers to secure output markets. Therefore, iDE Ghana's strategy goes beyond the establishment of a supply chain of irrigation technologies. It embraces a holistic strategy by offering beneficial packages and by aligning agricultural production effectively with the demand.

6.1 Small farm production strategy: trainings



Crop diversification and the introduction of higher quality seeds allow farmers to compete with imported vegetables. For instance, cabbage demand is very high but cabbage has rarely been planted locally.

The physical availability and affordability of irrigation technologies is pivotal to increase farmer's productivity. However, farmers also need the knowhow of using the irrigation technology efficiently that goes beyond the mere irrigation of the field. Simple agronomic measures, such as using better seeds or efficient pest and disease control, complement irrigation and can contribute to poverty alleviation in the end. Complementing the supply chain of irrigation technologies with such services is one of the most promising ways for both

poverty alleviation and generating additional income for producers or dealers in this case.

At this stage of the project, iDE Ghana still actively engages in providing trainings to lead farmers, but also to dealers and other actors who are supposed to hand the knowledge down to smallholder farmers. However, iDE Ghana will facilitate the integration of such advisory services and other package offers in the supply chain in the long run. In terms of training content, iDE Ghana has focused on vegetable production and on integrated pest and disease management along the complete plant cycle, from best field preparations practices to growth patterns and field and plant monitoring.

6.2 Output markets: market queens and other options

Vegetables are highly perishable. Therefore, efficient market connections are required. Studies carried out by iDE Ghana in collaboration with diverse academic partners have shown that selling opportunities for farmers are a constraint, but not the major constraint in Ghana. In general, farmers sell their produce at local markets or to so-called market queens. Market queens establish the link between farmers and remote markets. Even though market queens have many advantages in terms of knowledge and price setting, they generally have the potential to connect farmers well to markets. Another advantage of market queens is of logistical nature, that is to say, they often organise the transport of the produce.



Market queens are secure buyers of smallholder farmers' produce and are together with local markets the most important sales channel.

iDE Ghana continuously analyzes markets in order to better align the vegetable production with the effective demand. It also explores ways of improving market links. For example, iDE Ghana is currently investigating the possibility to connect farmers with the emerging oil (petroleum) extracting industry. In other words, iDE Ghana explores whether farmers can regularly provide vegetables for the meals of these industry workers.

7 Challenges and remedies

iDE Ghana has faced different challenges to building up an efficient supply chain:

First, micro-finance has been crucial to the supply chain of irrigation technologies and the entire value chain. Cash-flow constraints are present everywhere; it starts with the farmers, but it is also pivotal for manufacturers and dealers. Nobody has large savings and short-term thinking in terms of cash is predominant. In other words, nobody can afford to lock up his money. Even though iDE Ghana's treadle pumps are amongst the lowest priced irrigation technologies in Ghana, access to loans lowers the entry barrier to irrigation technologies significantly. ECLIF Ghana stopped giving loans towards the end of the dry season due to the repayment rates. This decision has contributed to the stagnation of the treadle pump demand and the supply chain. The dropping demand may partly be explained by this temporary unavailability of loans. However, the fact that farmers may not purchase irrigation technologies at the end of the dry season may also have contributed to the temporary stagnation of the treadle pump demand. Furthermore, issues related to previous

philanthropic non-governmental and governmental activities may also have played a role in the experienced stagnation of the treadle pump demand. An extensive evaluation of the repayment issues may elucidate the issue in detail. Nevertheless it can be said that all actors are very sensitive to cash-flow issues. Therefore, further investigations on a possible



Product development: The mobile treadle pump will be introduced in the next dry season. Its advantage is that it can be used flexibly on more than one well. It further corrects the weakness of the fixed only treadle pump, namely the breaking of the wood pedals. The production costs of the mobile treadle pump are estimated at GHS 109 (as of March 2011).

extension of the loan scheme are required, for example, such as providing loans to all actors along the supply chain. Secondly, price fluctuation of raw material has been a further challenge, in particular in the case of wood. For instance, within eight months the price for wood and pipes rose over 30%. However, the loan structure has not taken this fluctuation into account. Therefore, the loan structure should be adapted to be more flexible to this situation. Moreover, new products that use raw materials with more stable prices can help to circumvent this problem. In other words, product-mix adaptations can further mitigate this problem of price fluctuations. For instance, the envisaged mobile treadle pump will have metal pedals instead of wood pedals in order to improve the product and to react to the volatile wood price fluctuations. With further widening of the product range in the future, iDE Ghana also will try to address the various needs of farmers in different areas. For instance, the introduction of a rope pump shall serve the needs of farmers in areas with deeper water tables.

Thirdly, partnerships have been proven of utmost importance not only to acquire local knowledge, but also in the implementation process. ECLOF Ghana has played an essential role to spur the demand of irrigation technologies. However, the whole supply chain has also become dependent on ELCOF Ghana to a certain extent. Therefore, additional financial partners may mitigate that dependency risk. Furthermore, iDE Ghana may also wish to consider new financing models in relation to product developments that are less dependent on certain micro-finance institutions.

A fourth critical factor is the change of the



S. T. Kamassah (right), iDE Ghana's programme manager in Bolgatanga, clearly communicates the role of iDE Ghana as facilitator for the emergence of a pro-profit irrigation market – a role that is completely distinct from conventional NGOs present in the area.

cultural mindset, not only of farmers but also of all actors along the supply chain. The change has to occur at a comprehensive level. First, farmers have to adapt their farming behaviour to completely new agronomic practises with the access to irrigation and the shift to higher value-crops. iDE Ghana has and continues to assist farmers in this transition with the help of demonstration farms and trainings. Secondly, the change of the cultural mindset also includes the farmers’ and the other actors’ perception of the role of NGOs. Many but not all Ghanaian farmers are used to benefits from philanthropic actions, which have induced a kind of “sit-and-wait” culture. In other words, farmers are accustomed to be helped and to get things for free. Hence, it has been essential for iDE Ghana to communicate its role as facilitator of a profit-making venture completely different from traditional NGOs present in the region. Changing the cultural mindset of farmers is a big task and cannot be done by iDE Ghana alone. Nevertheless, clear communication about iDE Ghana’s role (as a facilitator) has proven essential to the emergence of an irrigation technology market.



A. Opoku (left), iDE Ghana’s project engineer in Kumasi, assists manufacturers with the production of the treadle pump.



At this stage of the project, iDE Ghana’s field officers still support and guide installers in terms of after-sales services.

8 Conclusion

Within less than two years, an effective irrigation technology market for small farmers has emerged in Ghana. Four factors have proven critical: partnerships, an efficient product-mix, microfinance and the cultural mindset. iDE Ghana has succeeded to balance (and will continue) to balance these factors and to combine them in an efficient strategy. In sum, iDE Ghana has facilitated the emergence of an efficient irrigation supply chain – a market-based approach that works for the rural poor.