CHAPTER 18

MoneyMaker Pumps: Creating Wealth in Sub-Saharan Africa

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The first of the Millennium Development Goals (MDGs) is to eradicate extreme poverty and hunger, with the target of halving the proportion of people whose income is less than $1 a day between 2000 and 2015. In Sub-Saharan Africa, rural poverty accounts for 83 percent of total extreme poverty, with 85 percent of the poor depending partly on agriculture for their livelihoods (World Bank 2000). Considering that agriculture can have the greatest impact on poverty and food security if the benefits of its development are reaped by the poor, priority should be given to the development of small-scale irrigation (Kidane, Maetz, and Dardel 2006). Agricultural growth is therefore a key to the realization of the first MDG.

Stimulating agricultural growth is critical to reducing poverty in Africa. Commercial agriculture, potentially a powerful driver of agricultural growth, can develop along a number of pathways. But agricultural productivity in Sub-Saharan Africa is the lowest in the world, with per capita output only 56 percent of the world average (FAO 2005), and agricultural output in Sub-Saharan Africa has not kept pace with population increase (Msangi and Rosegrant 2005). More than 80 percent of output growth in Sub-Saharan Africa since 1980 has come from expansion of the cropped area, compared with less than 20 percent for all other regions. Food self-sufficiency among Sub-Saharan Africans declined from 97 percent in the mid-1960s to 82 percent in 1997–99, without a substantial increase in household incomes that would allow people to afford food purchases. Agricultural families have remained locked in a low-input, low-income system, with low and stagnating agricultural yields.

Agricultural intensification has become the main avenue of growth in crop production, with agricultural water management (water harvesting and irrigation) the focus of this intensification in Sub-Saharan Africa. More reliable access to water for irrigation would stabilize yield, reduce the risk of harvest failure, and increase productivity and agricultural growth. Successful investment in agricultural water management technologies therefore presents an important opportunity for poverty reduction and economic growth. However, major constraints to using irrigation—including lack of surface storage structures, appropriate irrigation technologies, capacity to exploit underground water, community skills for irrigation, information on appropriate irrigation technologies, and investment in irrigation—must be addressed.

In some parts of Sub-Saharan Africa, investment in irrigation development at the community level is already bearing fruits. In Tanzania the Participatory Irrigation Development Project has had striking impacts, increasing farm income by 86 percent and enabling irrigator households to enjoy better-quality housing, acquire agricultural and household assets, access health services, and finance children's education (IFAD 2005). In four representative subproject areas, ownership of oxcarts and cattle increased considerably, the total number of grinding mills increased from 2 to 12, and the number of shops

increased from 2 to 74. Similarly, in Zimbabwe, irrigator households in the European Union-funded *Maunganidze* Irrigation Scheme reported an increase in income of more than 200 percent and turned a food deficit into a surplus. Investment in new housing and in water and sanitation was the most obvious sign of improved livelihoods, with a number of modern two- and three-room houses with ventilated pit latrines and in several cases protected water wells. IFAD concluded that these impacts were the result of investment in irrigation, because there were no other sources of income in the area.

Studies have shown that small-scale irrigation offers opportunities to improve livelihoods in Africa. However, there has been little technology-driven jump in productivity for the majority of resource-poor African farmers. IFAD (2005) estimates that of the potentially irrigable 39.4 million hectares in Africa, only 7.1 million hectares, or 18 percent of the total, have been equipped for irrigation. Expansion of irrigation has been slow. Over the past forty years, only 4 million hectares have become irrigated in Africa, by far the smallest expansion of any world region. The area developed for irrigation as a fraction of the irrigation potential for African countries is shown in map 18.1. A majority of African countries have exploited less than 50 percent of their potentially irrigable land, with 10 countries at less than 10 percent, 8 countries at 10 to 25 percent, and 6 countries at 26 to 50 percent. Eleven countries have exploited 50–75 percent, while only 2 countries have exploited more than 75 percent of their potential (FAO 2005).

The lack of exploitation of irrigation potential in Sub-Saharan Africa can be attributed to lack of access to appropriate and affordable irrigation technologies by the majority of farmers in these countries. The cost per hectare of developing land for irrigation in Sub-Saharan Africa ranges from $2,000 to $4,000 for small-scale irrigation and from $9,000 to $15,000 for large-scale irrigation, making it out of reach for most families and communities (Kidane, Maetz, and Dardel 2006). In India, the comparable cost for large-scale irrigation ranges from $1,500 to $2,000 per hectare.

In recent years, however, the development of appropriate and affordable irrigation technologies for poor Sub-Saharan Africa farmers and communities has been remarkable. One of these technologies is the human-powered irrigation pumps developed by KickStart International, which have been used by dynamic farmers and entrepreneurs to establish and run profitable small-scale agribusinesses.

KICKSTART INTERNATIONAL

KickStart International is a nonprofit social enterprise organization founded in Kenya in 1991. It now operates in Burkina Faso, Kenya, Mali, and Tanzania. KickStart's mission is to promote economic growth and employment creation in Africa by developing and promoting technologies that entrepreneurs can use to establish and run profitable small-scale businesses. The entrepreneurs raise small amounts of capital ($100–$1,000) to start a new enterprise, and KickStart helps them to identify viable business opportunities and obtain the appropriate technologies required.

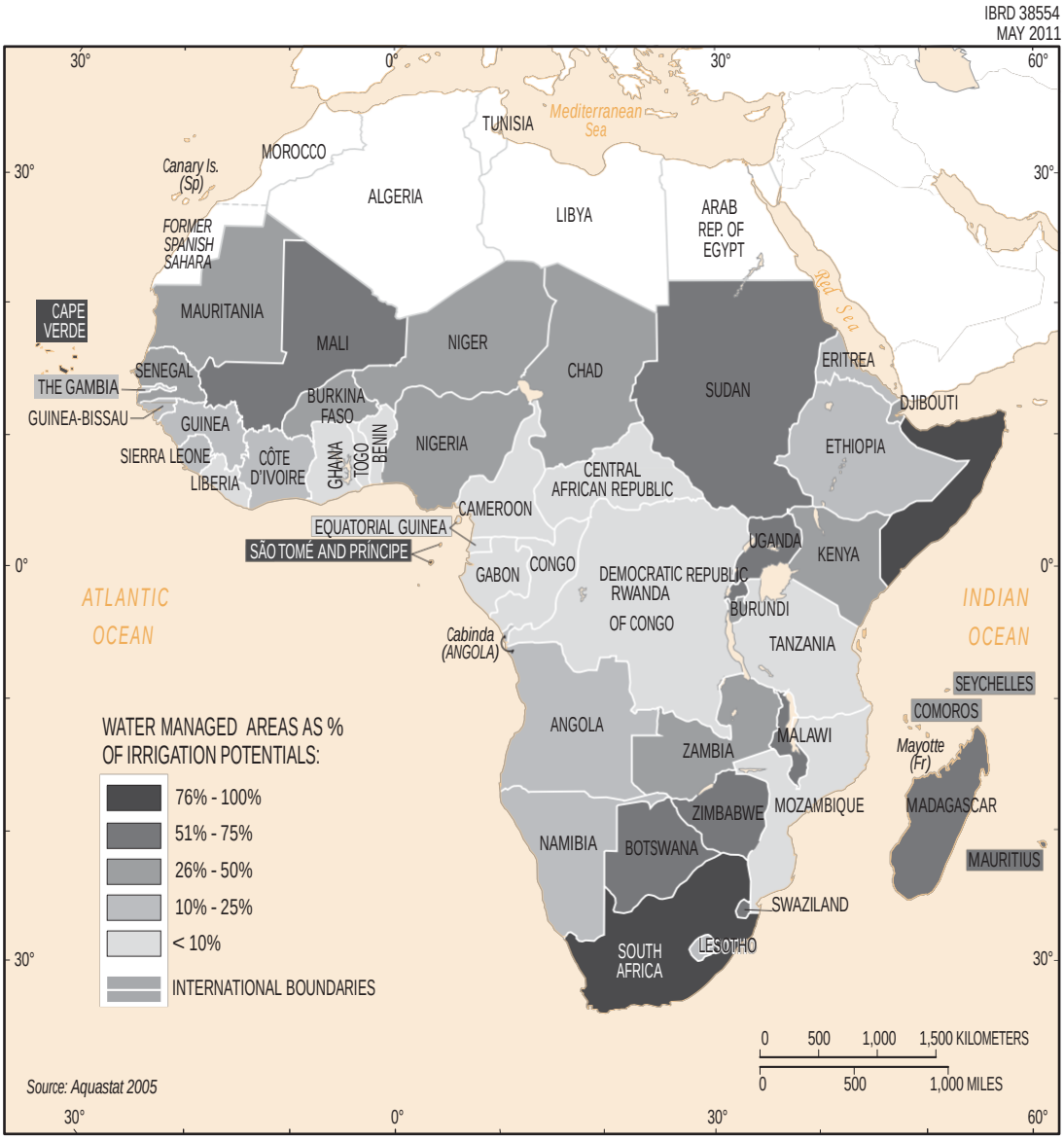
KickStart addresses poverty alleviation through development of appropriate technologies and innovations to enhance production, value addition, and income generation. These include, among others, irrigation pumps, an oil press, and a brick press. KickStart's irrigation pumps enable smallholder farmers to enhance productivity and improve household incomes and thus contribute to sustainable poverty reduction. KickStart has developed several human-powered pumps. These pumps have the distinct advantage of being operable without fossil fuels or electricity, which is not always available in remote areas.

The business model

KickStart's business model is a fivefold strategy:

- *Market research for business opportunities.* KickStart identifies business opportunities through market research and feasibility studies that are aimed at assisting the rural poor.
- *Research and development.* KickStart designs tools to end poverty that can be used by small-scale entrepreneurs to start their own profitable businesses.
- *Private manufacturing.* After developing the tools, private manufacturers are contracted to produce the products in a way that ensures high-quality standards and optimal pricing for customers. KickStart's manufacturers are located in China, Kenya, and Tanzania, with the bulk of the products originating from China and, to a lesser extent, from Kenya. As of 2010, the manufacturer in Tanzania is capable of supplying only a portion of the Tanzania demand.
- *Marketing and distribution.* KickStart's products are introduced to the market through its own marketing and promotional activities, and the private sector supply chain is used to distribute the products locally. KickStart has more than 160 distributors in Kenya, more than 150 in Tanzania, more than 80 in Mali, and a few in

Map 18.1 Irrigated Areas as a Percentage of Potentially Irrigable Areas



Source: FAO 2005.

Burkina Faso. In countries in which KickStart does not have a marketing program, distributors have been hired. KickStart also liaises with local and international non-governmental organizations (NGOs) and with United Nations agencies to serve those organizations' beneficiaries and programs.

- *Impact assessment.* KickStart conducts socioeconomic impact assessments on the incremental benefits resulting from its products. Information gleaned from these assessments is used to make improvements to the technology and to generate ideas for future innovation.

Very often, KickStart is asked whether it would be better or more effective to simply give the pumps away. In both cases, the answer cases is no. The KickStart model of selling pumps through a profitable supply chain has been shown to be both profitable and sustainable in many African countries, creating employment opportunities and new

sources of income. Analysis has shown that the KickStart model increases the livelihood of farmers and their families more cost effectively than giving the pumps away would. Annex 18.1 provides further details on this topic.

KickStart uses a tipping-point concept to mark the beginning of sustainable technology infusion. The tipping point is where the volume of sales of the technology dramatically rises or increases, decreasing the marketing costs to a minimum, as illustrated in figure 18.1. KickStart estimates that the tipping point is achieved when 15 to 20 percent of the market potential in terms of sales is achieved. In Kenya, for example, KickStart aims to surpass the tipping point by 2014.

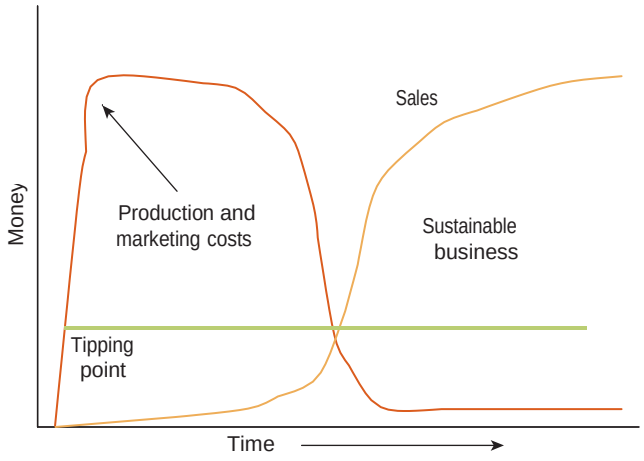
Impacts of MoneyMaker pumps at the farm level

The MoneyMaker pump technology has had a significant impact on revenue generation and wages at the farm, distributor, and manufacturer levels. Table 18.1 summarizes survey data of the income and wage impacts of KickStart's different types of pumps at the farm level. As shown in the table, household income increased by 191–200 percent in Kenya for all categories of pumps except for the MoneyMaker Hand Pump, which showed no change. In Tanzania, income doubled for households that used the MoneyMaker Hip Pump and tripled for households that used the Super MoneyMaker and MoneyMaker Plus pumps. For countries other than Kenya and Tanzania, the revenue data show an increase of 440 percent for the MoneyMaker pump.

Impacts of pumps at the manufacturer and retailer levels

Profits have been generated by the sales and manufacturing of the MoneyMaker range of pumps at the manufacturer and retailer levels, as shown in table 18.2. Skilled

Figure 18.1 The Tipping Point Concept



Source: Authors.

Table 18.1 Farm-Level Household Revenues and Wages per Pump, July 1991–November 2009 (*dollars*)

Pump	Annual income without pump	Annual income with pump	Percent increase in income	Annual wages	Wages over lifespan of pump[a]
Kenya					
MoneyMaker	628	1,885	200	126	379
Super MoneyMaker and Super MoneyMaker Plus	1,148	3,443	200	71	214
MoneyMaker Plus	248	744	200	21	63
MoneyMaker Hand	93	279	200	4	12
MoneyMaker Hip	832	2,423	191	60	174
Tanzania					
Super MoneyMaker and MoneyMaker Plus	493	1,478	200	41	123
MoneyMaker Hip	826	1,651	100	3	6
Other countries[b]					
MoneyMaker pump	183	995	444	18	54
Super MoneyMaker and Super MoneyMaker Plus	345	1,034	200	29	86
MoneyMaker Hand	38	—	—	2	6
MoneyMaker Hip	578	1,156	100	3	9

Source: KickStart International.

a. Wages over lifespan of pump = annual wages x lifespan of pump.

b. Burundi, Democratic Republic of Congo, Malawi, Mali/Burkina Faso, Mozambique, Rwanda, Sudan, Uganda and Zambia.

— = Data not available.

Table 18.2 Manufacturer and Retailer Profits and Manufacturer Skilled Jobs, July 1991 to November 2009

Technology	Manufacturing		Retailing
	Pretax profit ($)	Skilled man days	Pretax profit ($)
Kenya			
MoneyMaker	310,694	1,738	20,918
Super MoneyMaker	61,378	10,391	155,882
Super MoneyMaker Plus	75,604	12,799	215,000
MoneyMaker Plus	33,999	3,837	58,284
MoneyMaker Hand Pump	27,712	1,564	6,455
MoneyMaker Hip Pump	33,197	2,997	37,844
Total	**542,584**	**33,325**	**494,382**
Tanzania			
MoneyMaker	26,874	219	2,239
Super MoneyMaker	38,248	2,878	35,306
Super MoneyMaker Plus	269,024	20,241	292,034
MoneyMaker Plus	985	132	985
Money maker Hand Pump	925	108	1,013
MoneyMaker Hip Pump	[a]	[a]	17,332
Total	**311,870**	**23,578**	**348,910**

Source: KickStart.
a. Not manufactured in the country.

manpower jobs have also been created in the manufacturing of the pumps. Between July 1991 and November 2009, retailers' profits from MoneyMaker pumps totalled $494,382 in Kenya and $348,910 in Tanzania. At the manufacturer level, profits over the same period amounted to $542,584 in Kenya and $311,870 in Tanzania. The manufacturing of the pumps involved more than 33,000 and nearly 24,000 skilled man days in Kenya and Tanzania, respectively.

MONEYMAKER PUMPS PRODUCT LINE

Criteria for pump creation

KickStart is guided by a unique set of criteria in designing its products: income generation, return on investment, affordability, energy efficiency, portability, ease of use and installation, strength and durability, design for manufacturing, and cultural acceptability. These criteria are defined as follows:

- *Income generation.* Every pump model developed and marketed must have a business model that clearly predicts profitability and can be supplied to entrepreneurs.
- *Return on investment.* A purchaser of a MoneyMaker pump should be able to fully recoup his or her investment within six months.
- *Affordability*. Because the target purchasers of the pumps are some of the world's poorest people, designs and manufacturing must ensure that retail prices are affordable, ideally less than $150.
- *Energy efficiency*. All pumps are human powered and thus must be extremely efficient at converting human power to mechanical power
- *Ergonomics and safety.* The pumps must be safe to use for long periods of time without stress or injury.
- *Portability.* Pumps must be small and light enough to carry home from the point of purchase on foot, by bike, or by minibus.
- *Ease of installation and use.* All pumps must be easy to set up and use, without additional training or tools, not even a hammer or screwdriver.
- *Strength and durability.* The pumps are designed and built to withstand heavy use. The pumps carry a one-year guarantee upon purchase.
- *Design for manufacturing.* For manufacturing to be truly effective, pumps must be produced in large quantities, but in the developing world manufacturing capacity is limited. The design of pumps must be such that the pumps can be manufactured within the capacity of the local manufacturing industry.
- *Cultural acceptability.* The pumps must be adapted to the culture in the countries where they are sold.

A team of engineers, designers, and technicians develop and test prototype pumps to ensure their performance, cultural acceptability, and durability. In addition to design and

development, KickStart creates marketing awareness and assembles sales teams to sell the pumps. Importantly, KickStart employs innovative marketing techniques that are accessible to potential customers in remote villages without fossil fuels and electricity, including community pumping competitions during market days and demonstrations at retail shops and individual farms.

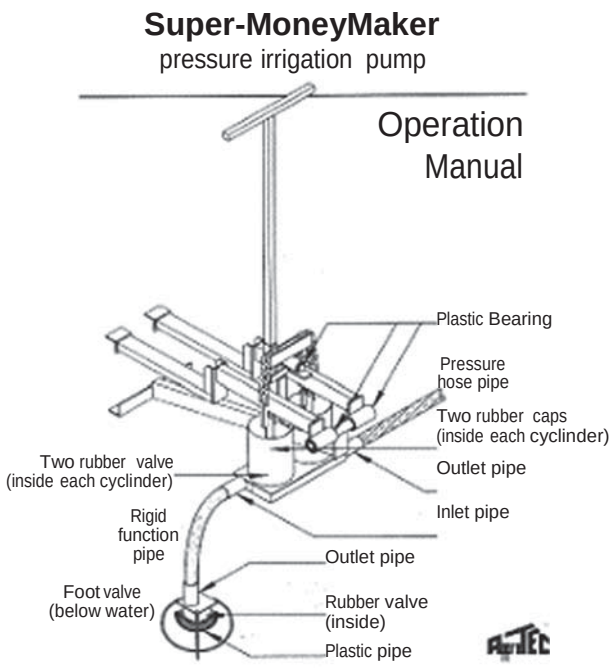
Types of pumps

Original MoneyMaker Pump. KickStart's debut pump, the original MoneyMaker, was introduced in September 1996. This small, treadle-operated pump could pull water from as deep as 7 meters and be used to furrow irrigate up to 0.8 hectares of land. The pumps demonstrate the potential poverty reduction effects of micro-irrigation: more than 4,050 original MoneyMaker pumps were sold between 1996 and 1999, generating more than $3.9 million annually among user households in East Africa. User feedback, however, indicated that farmers needed a pump that could lift and push water through a hosepipe or sprinklers. In response, KickStart introduced the new Super MoneyMaker pump in October 1998. The new suction and pressure pump superseded the original MoneyMaker, which was taken off the market in February 1999.

Super MoneyMaker Pump. The Super MoneyMaker pump is used to pump water from hand-dug wells, rivers, streams, lakes, and ponds. A twin-cylinder pump, it is ideal for sprinkler and drip irrigation, for filling overhead water tanks, and for use with nozzles and sprays attached to the end of the delivery hose. The pump can draw water from a depth of 7 meters and pump it 14 meters above the ground. It can be used to irrigate up to 0.8 hectares of land. The design and operation of the Super MoneyMaker pump is shown in figure 18.2. An improved, easier-to-use design of the Super MoneyMaker pump, Super MoneyMaker Plus, was subsequently introduced.

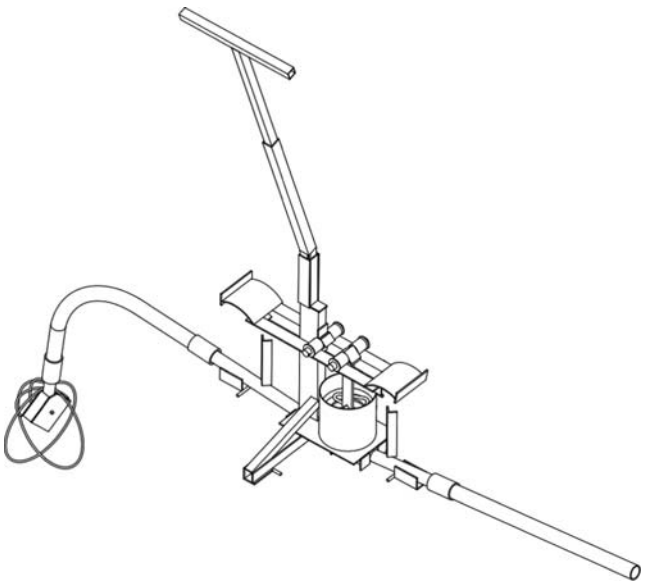
MoneyMaker plus pump. Responding to demand for a lower-cost pressure irrigation pump, KickStart designed and launched the MoneyMaker Plus pump in July 2001. This small, leg-operated pump has one piston and one cylinder but can still pull water from 7 meters deep and push it more than 14 meters above the ground. It can be used to irrigate up to 0.4 hectares of land. The design and operation of the MoneyMaker Plus pump is shown in figure 18.3.

Figure 18.2 Design Diagram and Field Operation of the Super MoneyMaker Pump



Source: KickStart International.

Figure 18.3 Design Diagram and Field Operation of MoneyMaker Plus Pump



Source: KickStart International.

MoneyMaker Hip Pump. The MoneyMaker Hip Pump is a unique pump developed to meet the needs of the very poor people who cannot afford the twin-cylinder Super MoneyMaker pump or the single-cylinder MoneyMaker Plus. The MoneyMaker Hip Pump debuted in stores in 2006, however, sales and marketing efforts began in 2008. The pump weighs only 4.5 kilograms, and can irrigate up to 0.4 hectares of land.

The design of the MoneyMaker Hip Pump includes a super-efficient valve box and a simple pivot hinge. By attaching a hand pump to a hinged platform, the mechanics of the pump were changed to allow operators to use their legs, body weight, and momentum, rather than the few muscles of the upper back and shoulders. This makes the pump more energy efficient, and it is capable of irrigating at least 0.4 hectares. Like the Super MoneyMaker, the MoneyMaker Hip Pump can draw water from 7 meters and pump up to 14 meters above the ground.

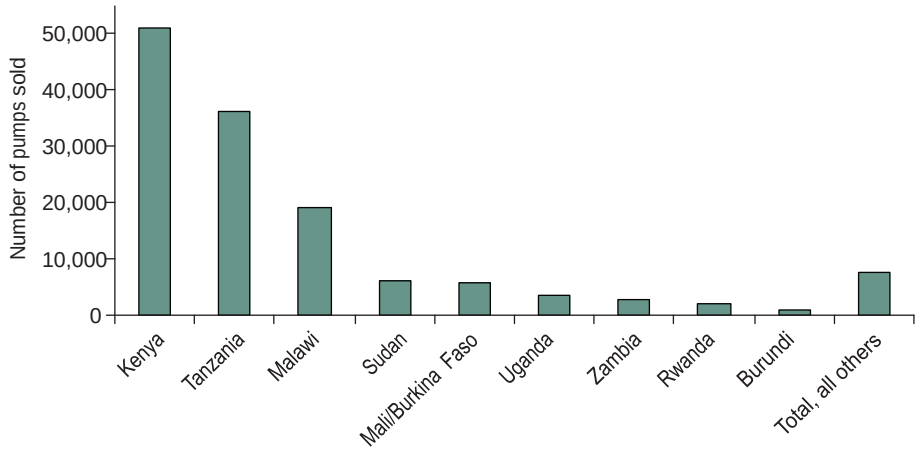
These pumps retail for $35 to $100. Between July 1991 and November 1999, more than 137,000 MoneyMaker pumps of all types were sold, with a vast majority of them purchased by residents of African countries. Kenya, Tanzania, and Malawi are the countries in which the greatest number of pumps have been sold, and the Super MoneyMaker Plus is by far the most commonly sold MoneyMaker pump (annex 18.2). Figure 18.4 details the number of pumps that have been sold across the continent.

MoneyMaker pumps are developed through design criteria consideration to meet the needs of the target market. Final prototypes are field tested for long periods of time (six months or more) with all feedback incorporated into the final design. The first batch of pumps was field tested through the private sector supply chain that stocked the products and retailed them to the end users. Because KickStart's mission includes poverty reduction, an assessment of the pumps' impact is carried out at "zero age," and again in the 9th and 18th month after procurement. The zero age survey provides the baseline data on which comparison is made for the subsequent 9th-month and 18th-month surveys. Manufacturing begins after the successful testing of the pumps. Manufacturers are trained and provided with parts produced by KickStart to ensure quality standards for all the pumps. The pumps are supplied through distributors and retailers for eventual sale to farmers.

KickStart embarks on intensive promotion and marketing campaigns to create awareness about and generate demand for its products. Marketing and promotion of high-quality products to poor people requires substantial resources. For KickStart, this is possible through donor and government support. Until a critical mass is reached (15 to 20 percent of the market share), the tipping point is not realized. However, once the tipping point is achieved, operation costs are substantially reduced and the business becomes sustainable and profitable and many more distributors start selling the product.

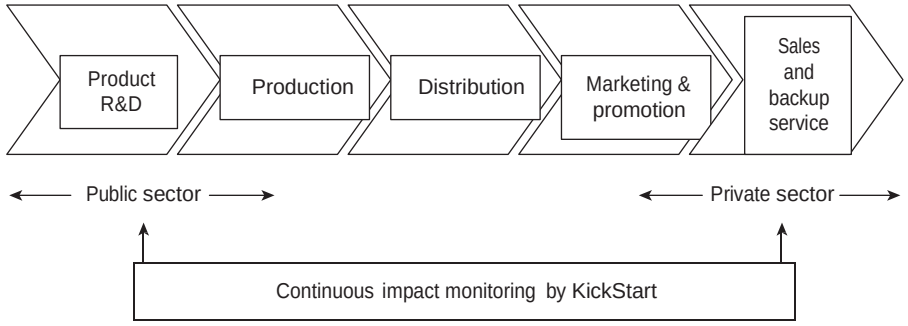
MoneyMaker pumps are designed to last for three years but some have, with good maintenance, operated for more than six years. Critical in this good maintenance is the replacement of piston cups every 3–12 months (depending on hours of usage and the quality of water used).

Figure 18.4 Number of MoneyMaker Pumps in Various Countries, 1996–June 2009



Source: KickStart sales data 1996–2009.

Figure 18.5 MoneyMaker Pump Supply Chain



Source: KickStart International.

Table 18.3 Costs of Various Steps in the MoneyMaker Pump Supply Chain

Supply Chain Step	Cost ($)
Manufacturer	65
KickStart	72
Wholesaler	100
Retailer	115

Source: KickStart International.

MoneyMaker pumps supply chain

The MoneyMaker supply chain is a five-phase process including research and development (R&D), production, distribution, marketing and promotion, and sales and backup services, as shown in figure 18.5. KickStart carries out R&D and marketing and promotion directly. The other phases are executed by the private sector with monitoring by KickStart. Donor participation is very crucial to carrying out product R&D and creating product awareness because it enhances demand and consequently creates an attractive business opportunity for the private sector.

Production, distribution and retailing costs, and profits amount to $115 per pump for the Super Moneymaker pump (table 18.3) and are borne by the farmers who purchase the pumps. Other costs amounting to $264 a pump, incurred during technology development, promotion, sales, and impact monitoring, are currently borne by donors.

All the design work behind KickStart's products is carried out at Nairobi, while products are manufactured in either Thika, Kenya; Arusha, Tanzania; or in China. KickStart recruits and trains a network of distributors and dealers (more than 150 dealers in Kenya alone) in cities, towns, and small market centers. The pumps are sold, with a markup of 7 percent to KickStart, to distributors in the private sector through KickStart's coordination, which maintains business accounts with each distributor or dealer. Most of KickStart distributors are Agrovets shops (sellers of agrochemicals and veterinary products) frequently visited by farmers. Initially, KickStart provided distributors with credit terms that required them to pay KickStart once the consignment was sold. As demand for KickStart products grew, the credit period was reduced to 30 days after receipt of consignment. KickStart also requires that distributors be willing to demonstrate and market the pumps.

KickStart identifies different marketing and promotion strategies to create awareness among potential end users of its products. These include above-the-line (those using mass media) and below-the-line (nonmedia) promotions to close sales. In Kenya, Tanzania, Mali, and Burkina Faso, sales teams are trained to communicate the benefits of the MoneyMaker pumps and promotion of farming as a business to potential customers.

IMPACT OF MONEYMAKER PUMPS ON DEVELOPMENT

Impact assessment methodology

Through its monitoring teams, KickStart assesses key indicators of the impacts of the MoneyMaker range of pumps. A range of data is collected to carry out this monitoring process: the number of pumps manufactured and sold is logged, purchasers' details are recorded in a database, and training recipients' details are recorded. Later, KickStart's monitoring staff visit a random selection of distributers, retailers, and purchasers to interview, administer questionnaires, and gather statistical data for technology impact analysis. These socioeconomic surveys are conducted at three points in time: at "zero age" (before use of the

pumps) and during the 9th and 18th month of usage. The parameters monitored include pump ownership; pump management; and impact of the pumps on incomes, food security, livelihoods, and investment.

Pump ownership and management

KickStart's impact assessments (KickStart 2008) show that 88 percent of the people who purchase pumps are male. Management of the pumps, however, is not carried out strictly by pump owners; rather, it changes with time. At zero age, 81 percent of the pumps are managed by the owners, a figure that fell to 46 percent at 18 months. On the basis of gender, the surveys show that at zero age, 23 percent of pumps are managed by females, a figure that increased to 60 percent at 18 months. This is not surprising since, as time passes, women's interest in the pump grows because it provides a means of increasing income for families' daily needs. Men, on the other hand, look at other long-term high-capital investments that subsequently generate higher returns. For example, farmer Samuel Ndungu (one of the four profiled below) opted to leave his treadle pump to his wife while expanding his irrigated enterprise with a motorized pump. This change in management shows how women have been empowered to improve their livelihoods with MoneyMaker pumps.

Impact on irrigated area

The area under irrigation using the pumps sold in Sub-Saharan Africa between 1991 and 2009 is estimated to be more than 31,000 hectares (table 18.4).

Table 18.4 Area under Irrigation Using the Pumps, and Crops Grown in those Areas in Various Sub-Saharan Africa Countries, 1991–2009

Country	Area being irrigated[a]	Crops
Kenya	12,326	Horticultural crops
Tanzania	8,785	Horticultural crops
Malawi	4,665	Maize, horticultural crops
Sudan	1,531	Horticultural crops
Mali/Burkina Faso	1,433	Horticultural crops
Uganda	896	Horticultural crops
Zambia	679	horticultural crops
Rwanda	540	Horticultural crops
Burundi	284	Horticultural crops
Total	**31,138**	

Source: Generated with KickStart sales data 1991–2009.
a. Area irrigated is generated using a conversion figure of 0.3 hectares per pump at 80 percent pump utilization.

In Kenya, socioeconomic surveys have shown a substantial increase in the area under irrigation at the household level following the purchase of a MoneyMaker pump. At the zero age survey an average of 0.02 hectares per household was under irrigation (typically bucket irrigation) but rose to 0.2 hectares under hip pump irrigation, a nine-fold average increase.

Impact on households

Although rural farmers are risk averse and have very little cash to spare, demand for MoneyMaker pumps has increased steadily over the years, a trend that may arise from the change in lifestyles after purchasing the MoneyMaker pumps, as indicated by the profiles of four typical "farmer-preneurs" shown in table 18.5.

According to KickStart survey data, incomes in households using MoneyMaker pumps have risen from as little as $100 to more than $10,000 annually, in addition to extending food availability periods from 3 months to 12 months, thus eliminating food insecurity. The change in livelihood of the irrigating households is manifested in investment of the extra income in purchase of assets such as bicycles, motorized pumps, dairy cows, modern houses, and land. Some irrigating households have also expanded their enterprises to include dairy, poultry, small-scale maize milling, and transport. With the increased incomes, payment of school fees for their children has eased, and the number of people employed on such farms has also increased. In addition, the MoneyMaker technology has encouraged the introduction of high-value crops, with their attendant improved agronomic practices. And the technology has been frequently adopted by neighboring farms, whose owners and workers have received on-farm training nearby.

Job Creation. Investment in agricultural water management through small-scale irrigation creates jobs both for the families who own the pumps and the labor they hire, because irrigation increases farm output and requires more workers, especially where high-value crops are grown. Statistical analysis by KickStart (1991–2009), for some Sub-Saharan countries, has shown that, on average, when families started bucket irrigation, 0.17 jobs were created; after the acquisition of a MoneyMaker pump, the number of jobs created rose to 0.55 per household.[1] Of that 0.55, family members represented 0.51 and waged labor represented 0.04, while distribution on gender basis was 0.32 and 0.22 for men and women, respectively. The jobs created included pump operation, land preparation,

Table 18.5 Farmerpreneur Profiles before and after Investing in MoneyMaker Pumps

Name	Samuel Mburu Ndungu		Felix Muiruri		Catherine Gwambie		Mahamoud Guindo	
Country	Kenya		Kenya		Tanzania		Mali	
Age	45		34		40		48	
Gender	Male		Male		Female		Male	
	Before	*After*	*Before*	*After*	*Before*	*After*	*Before*	*After*
Farm enterprise	Bucket irrigation	Super MoneyMaker and petrol pump	Bucket irrigation	MoneyMaker Hip Pump	Rainfed and bucket irrigation	Super MoneyMaker	Bucket irrigation	Super MoneyMaker
Income ($/year)	$100	$1,000–$2,000	$480	$10,440	—	—	$400	$700
Food availability (months)	3	12	3	12	3	12	3	12
Assets (house, bicycle, farm animals, etc.)	1 house, 1 cow, 1 goat	2 houses, 2 cows, 7 goats, 3 bicycles, one motorized pump	—	—	Chickens	1 modern house, 2 businesses, chickens	—	—
Land size (number of hectares)	0.6	1.0 (0.4 being purchased as of time of survey)	0	0	0.8	1.2	0	0
Land irrigated (hectares)	0.4	MoneyMaker: 0.8 hectares (0.4 rented); motorized pump: 2 hectares	0.2 (rented)	0.8 (rented)	0.8	1.2	150 square meters	300 square meters
Family size	8		5		5		6	
Number of employees on the farm		Workforce has grown fivefold		Workforce has doubled	0	2	None	None
Crops	French beans	French beans, tomatoes	None	French beans, tomatoes, baby corn, green maize	Maize, beans	Vegetables	Vegetables	Vegetables and fruits
Ease of facilitating children's education	Difficult	Easy	Difficult	Easy	Difficult	Easy	Difficult	Easy

Source: KickStart International.
— = Unavailable.

weeding, and harvesting. Pump operation represented the largest proportion of the jobs created, with 33 percent of the pumps being lent out to neighbors, generating 0.03 jobs at no cost. The Kickstart analysis also shows that MoneyMaker pumps increased the number of jobs created by more than 220 percent. In most countries, where many youths are not currently engaged in productive activities, irrigation provides an opportunity for a net increase in the jobs created.

Income. In addition to job creation, MoneyMaker pumps have a positive impact on farm incomes generated through irrigation, as shown in table 18.2.

Poverty. Data (1991–2009) from Kenya, Tanzania, Mali, Burkina Faso, and other countries show that 439,839 people have been moved out of poverty (table 18.6). The poverty reduction to pump ratio (number of people moved from poverty per pump unit) varies but is clearly higher in Kenya, Tanzania, Mali, and Burkina Faso than in other countries in which the pumps are sold. This implies a higher efficiency of pump utilization in the above four countries and is commensurate with the level of technology promotion and demonstration of on-farm profitability. These last two factors are essential ingredients in high pump utilization efficiency and need to be replicated in other Sub-Saharan Africa countries to achieve similar success levels in those locations.

IMPACT ON SUB-SAHARAN AFRICA

The impact of a technology depends on its adoption rate, which is largely determined by the awareness created. Marketing of the MoneyMaker technology requires a huge financial investment that is not possible for many African countries. Financial resources are particularly limited in Mali and Burkina Faso, leading to low awareness levels and hence low levels of impact compared with Kenya and Tanzania.

Despite the financial constraints, KickStart estimates that between 1991 and 2009, more than 87,000 small-scale agricultural enterprises were created using the MoneyMaker range of pumps. These businesses generated new profits totalling over $77.2 million annually and employing more than 100,000 people. Each pump is used to irrigate 0.3 hectares of land (on average), and generates an average net annual income of $1,100 a year for its owner, representing a 100–450 percent increase in the incomes that poor rural people made from sale of crops before the adopting the MoneyMaker technology. In Kenya by 2009 more than 12,000 hectares of land were estimated to be irrigated using KickStart irrigation pumps. Irrigation investment costs less than $60 per hectare annually compared with the conventional sprinkler systems, which cost more than $600 per hectare annually. In short, MoneyMaker pumps remove the obstacle of huge initial capital investment for demand-driven, small-scale irrigation development.

Kenya's experience with MoneyMaker pumps

Thousands of entrepreneurial farmers in Kenya are now irrigating with KickStart's range of MoneyMaker pumps, changing their small subsistence farms into vibrant commercial enterprises. The average size of plots held by smallholder farmers is between 0.2 and 1.0 hectare and generates about 25–80 percent of total family income annually (IPTRID 2005). When they use irrigation, farmers are typically able to grow and sell three to four high-value crops annually. These "farmerpreneurs" in Kenya over 2007–09, have increased their incomes ten-fold on average, and some have made annual profits of up to $5,400.

Table 18.6 Number of People Using Kickstart Pumps Who Have Moved Out of Poverty in Select Sub-Saharan Africa Countries, 1991–2009

Country	Pumps sold	Enterprises created or transformed	People moved out of poverty	Poverty reduction to pump ratio
Kenya	51,357	40,720	203,600	3.96
Tanzania	36,603	29,495	147,475	4.03
Mali and Burkina Faso	5,970	4,673	23,365	3.91
Other countries[a]	43,676	13,079	65,399	1.50
Total	**137,606**	**87,967**	**439,839**	**3.20**

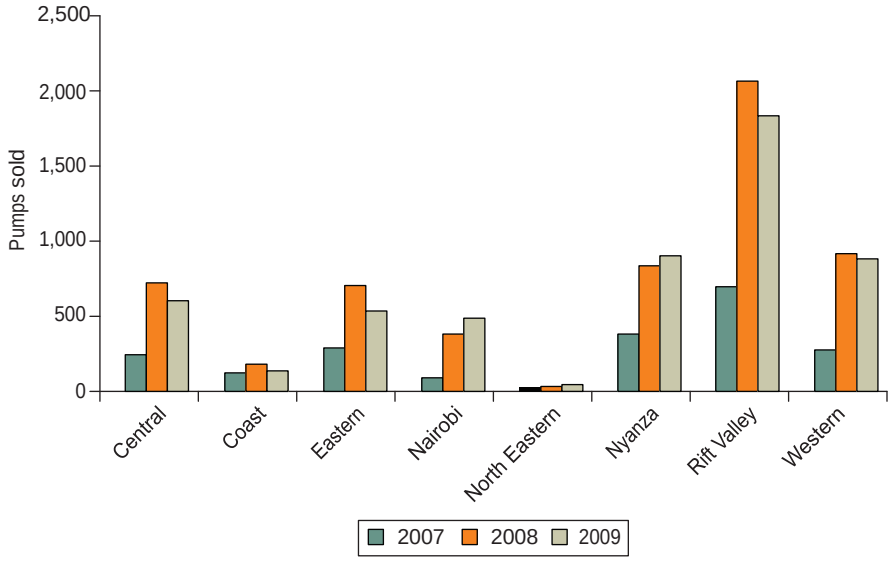
Source: KickStart 2008.
Note: Here, poverty is defined as an income of less than $1 a day.
a. Burundi, Democratic Republic of Congo, Malawi, Mozambique, Rwanda, Sudan, Uganda, and Zambia.

Distribution and Utilization. The distribution of the MoneyMaker range of pumps in various regions of Kenya is shown in figure 18.6. This distribution reflects the agricultural potential in the region, the ability of farmerpreneurs to purchase the pumps, and the availability of surface and shallow groundwater sources.

Wealth Creation. According to KickStart data, the average net annual income per family using the MoneyMaker pumps in Kenya ranges from $800 to $10,440. As of December 2005 about 33,000 pumps had been purchased by farmers and were generating household income totalling $31.4 million (K Sh 2.2 billion) annually. Impact monitoring survey data showed that 91 percent of the purchased pumps generated total income of $93.8 million (K Sh 6.7 billion) during their life span of three years. The other 9 percent are pumps that were not used for various reasons such as water source being too deep for the pump to reach. Table 18.7 shows the income generated by each type of MoneyMaker pump.

Income and Employment Creation. In most parts of rural Kenya, as elsewhere in Sub-Saharan Africa, time is an available resource that is very often underutilized because opportunities for productive employment activities are lacking. KickStart's ranges of MoneyMaker pumps are designed to create opportunities for rural people to more fully use their available time on productive activities. In Kenya, the average annual household income rose from $3,465 (K Sh 242,529) before the pump to $4,700 (K Sh 328,973) after acquisition of the pump (KickStart sales data 1991–2009). Although total household income rose from several sources, including farming, employment, pension, remittances, businesses, and collection of rent, income from irrigation contributed the highest proportion of the total, at 47 percent. KickStart's monitoring

Figure 18.6 Regional Distribution of MoneyMaker Pumps Sold in Kenya, 2007–09



Source: KickStart.

Table 18.7 Wealth Creation with MoneyMaker Pumps in Kenya

Irrigation technology	Pumps purchased 1996 through 2005	Annual income ($ millions)	Cumulative income over three years ($ millions)
MoneyMaker Suction Pump	3,305	2.31	6.93
Super MoneyMaker	13,657	17.44	52.31
Super MoneyMaker plus	7,401	9.45	28.35
MoneyMaker Plus	6,639	2.00	6.00
Hand Pump	2,221	0.23	0.23
Total	33,223	31.27	93.82

Source: IPTRID 2005.

surveys (2008) also show that Super MoneyMaker pump irrigation over an 18-month period on average increased pumping and watering jobs by 465 percent in Kenyan farms. This is in addition to increased jobs in other crop production activities. Based on the number of pumps sold, the area irrigated and hence the number of jobs created, Kenya has made the largest gains of all the countries in which MoneyMaker pumps have been sold.

Assets, Housing, and Investment. KickStart surveys show that in Kenyan households using MoneyMaker pumps, the number of local cattle owned declined by 31 percent, whereas the number of the more expensive dairy cows increased by 7 percent, indicating availability of surplus resources available to purchase them. Dairy cows produce more milk than the local cattle, thus increasing family income. There was also more fodder available to feed the dairy cows, which demand more fodder than local cows. Similarly, there was an increase in the number of donkeys and carts in households using MoneyMaker pumps, indicating the demand for extra transport with the use of MoneyMaker technology. In addition, households increased their investments in businesses (shops, transport, poultry, and dairy) by 32 percent. KickStart surveys also show improvement in housing among households in Kenya after they started MoneyMaker pumps. In 2008, the incidence of "improved" houses—those constructed from stone and timber—increased by 38 percent and 10 percent, respectively, demonstrating investment in better housing and therefore improved livelihoods.

Food Security. Food security exists when people have physical and economic access to food that is sufficient and nutritious enough to meet their dietary needs and preferences for an active and healthy life. Food security can be achieved through producing one's own food (self-sufficiency), having sufficient income to purchase food, or a combination of both. KickStart surveys (2008) show that households using the Super MoneyMaker pump increased their food surplus by 35 percent in the 18 months following the adoption of the technology.

DRIVERS OF SUCCESS

MoneyMaker success stories are numerous. Three such stories from Kenya, Tanzania, and Burkina Faso are presented in box 18.1.

In developing its irrigation pumps, it is KickStart's policy to ensure four main outcomes: achieving the highest impact in the shortest time possible; achieving a

Box 18.1 Money Maker Success Stories

Daniel Karanja Njenga and Nancy Gathoni in Kenya

While living in an internally displaced person camp after their home and farm were looted during Kenya's postelection violence in March 2008, Daniel Karanja Njenga and his wife Nancy Gathoni participated in a promotional demonstration of the MoneyMaker Hip Pump. "When I saw the . . . demonstration and heard about it on the radio," Daniel said, "I knew it was the answer to how we could earn an income quickly and get back to farming."

Daniel's first purchase with the relief funds provided to him by the Kenyan government ($130) was the MoneyMaker Hip Pump and hoses. The manually operated pump is lightweight, costs less than other pumps, and is easy to use. It does not require electricity or fuel. With it, Daniel was able to irrigate his small 1/8th-acre plot and grow crops during the dry season when most farms are bare. Daniel and Nancy now earn a decent living selling their *sukuma wiki* (kale), a staple food for Kenyans. They are also helping hungry neighbors and friends struggling to get back on their feet after the violence. Daniel has plans to expand his plot to grow cabbages and tomatoes and purchase a dairy cow.

Daniel and Nancy are two of many other farmers in Kenya who are becoming successful businessmen and women able to feed their families, pay school fees, and medical expenses. According to KickStart's research, an average farmer can make about $120 a month selling crops produced using the MoneyMaker pump.

In Kenya MoneyMaker pumps are also providing hope to people facing a tough combination of challenges in recent years: postelection violence, escalating food prices, a difficult economic situation, and continued high levels of poverty.

Catherine Gwambie in Tanzania

Catherine Gwambie and her husband, Hawzi Mwami, are an entrepreneurial couple from Tanzania who had dreams of becoming successful shop owners in Dar es

Box 18.1 (continued)

Salaam. They farmed in their native Kigoma, growing and selling maize and beans to save enough to open a shop selling household supplies.

Although the shop was reasonably successful, it did not generate as much income as the couple needed to support their family. Hawzi decided to buy land on which he could raise chickens and Catherine could start growing vegetables for sale. It was a good business, but bucket irrigation on the land took a lot of effort.

In early 2007 Catherine heard an advertisement for the Super MoneyMaker pump on the radio. She excitedly told her husband about this new pump that was affordable and made irrigation easier and quicker. Hawzi was not convinced. Catherine, however, insisted that the pump would make her life easier and decided to use her own money to purchase it. Together, the Mwamis went to the Kariakoo market in Dar es Salaam to buy a Super MoneyMaker.

The pump increased Catherine's productivity so much that she expanded to another plot and now employs her daughter and young sister. With the extra income they are now earning, the Mwamis have plans to send three of their young children to good secondary schools and to build a nicer house for their family.

Hawzi now freely admits that his wife was right about the pump, and between their two businesses, they see a bright future for their family.

Mahmoud Guindo in Mali

Mahmoud Guindo, a 48-year-old farmer with a wife and four children, had long struggled to make ends meet on credit. He moved from his home in Dogon County to Bamako, where he was employed as a security guard earning $400 annually. In an effort to boost his income, he began farming a 150-square-meter plot, which was still inadequate to meet his family's needs.

To increase his annual income, Mahmoud wanted to build a bigger garden, but he was sceptical about how he would water a larger plot of land. After seeing an advertisement for KickStart's MoneyMaker pump on television in 2008, Mahmoud wanted to buy it. He did not have enough money, however, so he approached his boss for a loan. Both men agreed it was a tangible asset that would provide a profitable and quick return on investment.

Since buying the pump in October 2008, Mahmoud has almost doubled his annual income, from $400 to $700, by selling fruits and vegetables. The additional cash flow is allowing him to pay off some debts while simultaneously providing sufficient food for his family.

Source: Authors.

cost-effective program; ensuring that the income-generating process is self-sustainable, and ensuring that the process if scalable and replicable in other areas.

KickStart employs six approaches to achieve its development goals, as described below. In addition, KickStart's success has been driven by the desire of farmer to produce on-farm profits and get out of poverty through adoption of appropriate and affordable technology

Market Research. KickStart's technological gap studies identify profitable small enterprises that can be established by local entrepreneurs with limited capital investment and determine the technological and socioeconomic requirements of those opportunities. The studies evaluate raw materials, competing products, potential market demands, and constraints and opportunities for small enterprises.

Designing New Technologies and Business Packages. KickStart designs and develops the tools, equipment, manuals, and business plans required for establishing small enterprises. It also designs the production protocols and quality control procedures required for manufacturing new pumps.

Training Manufacturers to Produce MoneyMaker Pumps. KickStart trains private manufacturers to set up assembly lines and quality control mechanisms to mass-produce its machines and tools.

Promotion of MoneyMaker Pumps. KickStart promotes the MoneyMaker and works with the private sector to ensure that pumps are well known and easily available to small-scale investors, reducing product risk for entrepreneurs. The risk to entrepreneurs is further reduced by the fact that the

pumps are guaranteed for a period of one year following purchase. Farmers have the right return their pumps if their wells are too deep for the operation of the pump or if the pumps break down due any manufacturing fault.

On-farm Profitability. The enhanced water utilization that has come with the MoneyMaker range of pumps has increased farm incomes, a major incentive for practicing and potential farmers.

Farmers' Need to Get Out of Poverty. Despite being hardworking and dedicated, farmers in Sub-Saharan Africa have long been seeking a means to escape poverty. The MoneyMaker technology has accorded them an affordable opportunity to do just that.

Partnership with Donors. KickStart raises funds for research and development, marketing, and awareness promotion of MoneyMaker technologies and associated business plans. KickStart's donors include a large number of public and private donors such as the Bill and Melinda Gates Foundation, the Rockefeller Foundation, and the David and Lucille Packard Foundation.

SCALABILITY AND TRANSFERABILITY OF THE SUCCESS

The scalability and transferability of KickStart depends crucially on the existence of three things: a sustainable supply chain involving manufacturers, distributors, and retailers; use of appropriate marketing technologies until the tipping point is reached; thereafter, the technology is self-propagating; and policy changes to encourage entrepreneurship and removal of handouts of technologies.

Maximization of the use of the technology is essential. For example, the Super MoneyMaker is currently used to irrigate an average 0.3 hectares, despite being designed to irrigate 0.8 hectares. This limitation is attributed to the limited land available to the farmer. Participatory usage, in which farmers share a single pump, can also increase the use of the pumps and the amount of land area being irrigated. Additionally, expansion of the pump's utility from sprinkler irrigation to include drip irrigation would enhance the water and energy use efficiencies and therefore increase the land coverage. In Naro Moru, Kenya, for example, MoneyMaker pumps are used to pump water from shallow wells into raised storage tanks that feed into drip irrigation systems. This arrangement has the effect of increasing the area under irrigation.

If each family in Kenya with access to water from underground storage, rivers, streams, ponds, or dams used a treadle pump and irrigated 0.3 hectares of land, for example, that country would not be experiencing the food shortages and hunger it has recently. Assuming water accessibility, an irrigation potential of 540,000 hectares, and a 20 percent share of this irrigation potential for the MoneyMaker technology, Kenya would need about 360,000 of the MoneyMaker range of pumps. Based on KickStart's sales figures, as of 2005, only 9.2 percent of the potential number of pumps had been sold, and 14.2 percent by October 2009 (KickStart sales data 1991–2009). Additionally, KickStart aims to increase access to 20 percent of the potential irrigation market in Kenya, after which the technology will be self-propagating. After the tipping point is reached and assuming 80 percent pump utilization efficiency, 17,280 hectares would be under irrigation through the MoneyMaker range of pumps.

In Sub-Saharan Africa, more than 87,967 small agricultural enterprises had been created by 2009 using MoneyMaker pumps. These businesses generate $81 million each year and offer 93,462 new jobs annually. This new wealth has helped move 439,839 people out of poverty. A further indication of the benefits of irrigation is the establishment of small-scale businesses within the vicinity of nearby village markets, thus creating indirect employment. This has led to improved access to nutrition, education, health, housing, and welfare services for farming communities.

KickStart's systematic, replicable method of measuring the impacts of its products is an aspect of the organization's success that could be replicated by other organizations. Every product comes with a one-year guarantee, and every buyer fills out a guarantee form when the product is purchased. The guarantee reduces the perceived risk of buying the product, and the forms give KickStart a database of all pump owners.

Scaling up the MoneyMaker technology success in Sub-Saharan Africa should involve technology promotion, demonstration of on-farm profitability and a sustainable supply chain, and high levels of efficient pump use. The still-low pump utilization needs to be addressed through on-farm pump utilization research that looks at, for example, shifting from direct irrigation pumping to indirect through storage tanks, or changing the application method from sprinkler to drip. All these require enhanced budget levels similar to or greater than the current promotional budgets in Kenya and other African countries. In addition to the aforementioned interventions, government

policies should shift to favor accessible small-scale irrigation technologies.

LESSONS LEARNED FROM MONEYMAKER PUMPS

Prospects

In Sub-Saharan Africa, intensification, rather than expansion, of cropped areas, is key to agricultural growth and poverty reduction. One way of achieving this is introduction of simple innovative technologies such as MoneyMaker pumps for agricultural water management. Through irrigation, farmers can diversify into high-value horticultural crops and fodder crops.

The concept of farmer entrepreneurs, in which agricultural enterprises are run as viable businesses, is now fully integrated as policy in Kenya and needs to be introduced in other African countries. As KickStart's products have shown, when poor people have access to technology to generate wealth, they use that technology quite effectively to move themselves out of poverty. Technology acceptance by farmers and a sustainable supply chain is assured through the KickStart model. A study (IPTRID 2006) on the experience with treadle pumps, introduced in West Africa by an international NGO, Enterprise Works, found the need for improved after-sales service and a coordinating agency with a longer-term program, such as the sort KickStart provides in East Africa. The study recommended the adoption of the KickStart model to ensure the sustainability of the West African program.

Technology infusion

The participatory approaches to technology infusion employed in the KickStart model involve marketing through demonstration and competitions. Marketing of technology is important in creating and enhancing adoption of technology. Creation of organized marketing groups and structures is important in poverty reduction. Cultural and gender sensitivity in technology development and infusion is an important consideration in technology. Technology evolution changes are driven by users of the technology. For example, in response to user demands, the Super MoneyMaker pressure pump, which facilitated sprinkler irrigation, was developed to replace the original suction-only pump and was quickly adopted by farmers.

Challenges

Despite its efforts and success, KickStart has not been able to design the ideal pump that combines high performance without maintenance irrespective of the intensity of use, terrain in which it is operated, and water quality.

The low pump utilization efficiency, irrigating on 0.3 hectares of the possible 0.8 hectares, could be attributed to direct irrigation pumping, which causes fluctuating sprays. It may be possible, however, to improve pump utilization efficiency through indirect irrigation pumping through storage tanks or using the pumps in combination with more efficient water application methods.

Annex 18.1 Economic Analysis of Pumps Given Away versus Sold

Item	Giveaway model	KickStart selling model	Remarks
Donor funds	$2 million	$2 million	Start with the same amount of funds.
Costs per pump	$290	$257	Each pump is $33 cheaper to sell than to give away.
Manufacturing	*65*	*65*	Why? It costs $65 to manufacture each pump; they are then sold to a wholesaler at $72, giving revenue of $7 per unit. This earned income helps support the organization.
Revenue	*0*	*$–72*	
Distribution	*$85*	*0*	
Promotion and sales	*0*	*$124*	Costs of administration, fundraising, technology development, and impact monitoring are the same in either model. The giveaway would not require marketing and promotion but would incur costs to distribute the pumps. Staff would be needed to coordinate, and vehicles and fuel would be needed to transport the pumps. KickStart would also need to provide hoses or the pumps would be useless. In the KickStart model, distribution costs are handled by the wholesaler.
Admin, technology development, impact monitoring, fundraising	*$140*	*$140*	
Total units distributed	6,897	7,782	Donor funds divided by cost per pump. The KickStart model puts nearly 900 more pumps in the field.
Percent used in enterprise	30%	80%	KickStart's goal is not to distribute pumps. Rather, it is to help people create small enterprises. It is here where the difference in the two approaches becomes apparent. When a person makes an investment, he or she is committed to making a better future. Impact monitoring data indicates that 80 percent or more of pumps bought are used to create jobs and income. The same research shows less than 30 percent of pumps given away are used to create a business. The KickStart model creates three times more small businesses than the giveaway model.
Number used in enterprise	2,069	6,226	
Average new profits and wages	$1,100	$1,100	These businesses will generate an average of $1,100 in new profits and wages each year.
Net present worth over 4 years	$9,103,600	$27,394,400	Here is an estimate of the new profits and wages these new businesses will create in four years. The KickStart model leverages $2 million in donor funds into more than $27 million in profits and wages for these families—three times more than the giveaway model. This is money that is spent locally, supporting other business and stimulating the local economy.
Number of people moved out of poverty	10,345	31,130	KickStart estimates that each enterprise supports a family of five. The KickStart Model moves more than 20,000 more people out of poverty, and it does it at one-third the cost per person of the giveaway model.
Cost to move one person out of poverty	$193	$64	

Source: KickStart International.

Annex 18.2 Number and Type of Pumps Sold in Various Countries, July 1991–November 2009

Pump type	Kenya	Tanzania	Malawi	Sudan	Mali/ Burkina Faso	Uganda	Zambia	Other countries
MoneyMaker	3,305	438	0	0	0	212	0	95
Super MoneyMaker	13,683	3,837	0	80	0	539	1	857
Super MoneyMaker Plus	16,985	26,988	18,503	6,138	5,609	2,885	2,368	7,709
MoneyMaker Plus	7,674	264	0	141	0	0	0	30
MoneyMaker Hand Pump	2,217	431	30	0	0	0	0	50
MoneyMaker Hip Pump	7,493	4,645	905	120	361	97	462	2,454
Total	**51,357**	**36,603**	**19,438**	**6,379**	**5,970**	**3,733**	**2,831**	**11,295**
Grand total 137,606								

Source: KickStart International.

NOTE

1. The analysis defines a job as an economic activity that occupies an individual for five hours daily for 150 days annually.

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