

International Development Enterprises (IDE):

**The Development and Commercialization
of the Treadle Pump in Bangladesh**

A Case of Product Marketing on a Mass Scale

By Jeanne Downing and Paul Polak

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1.0 Introduction

This paper aims to test the practicality, validity, and usefulness of the performance measurement framework (PMF) developed from a series of conferences sponsored by the Committee of Donor Agencies for Small Enterprise Development, the International Labor Organization (ILO) and USAID. The purpose of the PMF is to assist donor agencies in measuring the performance of business development services (BDS) programs against a set of common indicators. Some of the PMF indicators, including those measuring sustainability, cost-effectiveness and impact are commonly used in the development community. Others measuring BDS market development are relatively new and reflect a shift in focus in the BDS field from the supply of subsidized services to a limited population to the development of a vibrant BDS market for large numbers of micro-, small-, and/or medium-sized enterprises (MSMEs).

2.0 IDE/Bangladesh and the Marketing Appropriate Technology Program

IDE launched its Marketing Appropriate Technology (MAT) program in 1984 with the goal of improving the welfare of Bangladesh's rural poor by treating them as customers rather than charity cases. IDE aimed to develop and market irrigation equipment that even the smallest farmer could afford and with which he could substantially increase his productivity and income.

The economy of Bangladesh can be characterized as agriculturally dependent. The majority of the population live in the rural areas, where almost half live below the poverty line (reporting year 1988/99, Statistical Yearbook, BBS, 1994). The 1996 World Development Report puts per capita national income at US \$220, making Bangladesh one of the poorest countries in the world. Nearly two-thirds of the population are functionally landless, and agricultural growth is very poor due to limited irrigation facilities.¹ Within this context, IDE/Bangladesh set out to increase farmers' access to irrigation technology through a private sector delivery system.

The Canadian International Development Agency (CIDA) was the primary donor for the IDE/Bangladesh's MAT program during the 1980s, then in the 1990s the Swiss Development Corporation (SDC) took over this role. The MAT program built upon previous efforts implemented by the Government of Bangladesh (GOB) and an NGO working in the north called Rangpur Dinajpur Rural Service (RDRS). Prior to the GOB program, the extraction of groundwater was done by traditional methods, at one extreme, and motorized pumps, at the other. The GOB program introduced hand tubewells based on the adaptation of the "No. 6 hand pump." Although the pump had been designed for drinking water rather than irrigation and was relatively expensive, within four years 88,000 of these pumps had been sold largely for irrigation. This program demonstrated the demand for manual irrigation equipment.

In the early 1980s, two additional manual pumps became available: the rower pump and the treadle pump (TP). The Mennonite Central Committee (MCC) developed the rower pump and RDRS the TP. In 1983/83, the No. 6 hand pump cost Taka 2,885, the rower pump Taka 1,667, and the TP with a bamboo tubewell² Taka 650.

In 1984, when IDE/Bangladesh started up operations, their goal was quite revolutionary. IDE aimed to use customer-focused marketing techniques, common among the business community but – at the time – uncommon in the development community, to mass market technology products to the poor. IDE refers to its project approach as "market-led product development."

¹ "Evaluation of IDE/KB Project, Marketing Appropriate Technology in Bangladesh," International Development Enterprises and Krishok Bhandu, A. Kohler et al for Swiss Development Corporation, May/June 1992.

² Today, the TP is sold with a PVC tubewell.

3.0 Defining the BDS Services, Facilitator and Providers

3.1 BDS Services and Providers and IDE as Facilitator

The BDS service associated with the IDE/Bangladesh MAT program could be defined as technology access. However, given IDE's emphasis on marketing as the key innovation of the program, "product development and commercialization" has been selected as the type of BDS provided, with the product defined as irrigation equipment.

As testimony to its forward thinking, IDE/Bangladesh has used the term "facilitator," only recently adopted by the Donor Committee, to describe its role in market-led product development and commercialization since the 1980s. As facilitator, IDE has invested donor funds or subsidies in R&D to further adapt the TP to the demands of the market and to develop and build the capacity of a private sector distribution system for the product, and to stimulate demand. The package of services offered by IDE/Bangladesh to private BDS providers include: technology research and development (R&D); technical training to manufacturers in production and quality control; training in marketing to dealers and installers; technical training to installers in pump and well installation, and repair and maintenance; business linkage services to manufacturers, dealers and installers; and promotional services, with some small cost sharing from dealers.

IDE's role in facilitating business linkages has been key to its success in outreach. The private-sector supply chain for producing and distributing TPs and other irrigation equipment includes manufacturers of irrigation equipment, dealers (both wholesalers and retailers), and installers. Prior to IDE's interventions, urban-based manufacturers largely sold their products to wholesalers. Rural-based dealers traveled to Dhaka to purchase inventory from wholesalers for sale to rural customers. IDE changed this business practice by facilitating business linkages between manufacturers and an extensive network of rural-based dealers, thus cutting out the wholesalers.

As the market for TPs expanded, IDE began training a larger and more decentralized pool of manufacturers located in rural areas. Again linkages with dealers were promoted. While rural-based manufacturers had typically sold through a few dealers, IDE encouraged rural manufacturers to significantly expand the number of dealers they wholesaled to. Manufacturers learned that by adopting this new business practice, they could greatly increase their outreach and sales.

BDS providers, as defined by the PMF, sell products/services directly to MSMEs at unsubsidized prices. Within the MAT program the manufacturers, dealers, and installers are the providers of BDS. As shown in Figure 1, the manufacturers produce TPs and other irrigation equipment³, which they sell through dealers. Dealers stock TPs, PVC pipe and filters, and other irrigation equipment for sale to farmers. Installers bore the well for the farmer, install the PVC pipe and filter and pump, train farmers in pump use, and provide repair and other after-sales services. Small farmers pay dealers the market price for the equipment, and installers a market price for their BDS services.

Because of linkages among manufacturers, dealers, installers and most importantly the customers, the BDS suppliers are not passive recipients of IDE services. While as facilitator, IDE has made significant interventions to stimulate demand, create order in the market, encourage business linkages, and expand the market through extensive promotional campaigns, the BDS providers assume the costs and risks of producing, selling, and servicing the TPs. Moreover, market information is passed up and down the supply chain from customer to installer, from installer to dealer, and from dealer to manufacturer. The proximity of these BDS providers to the customers they serve and their

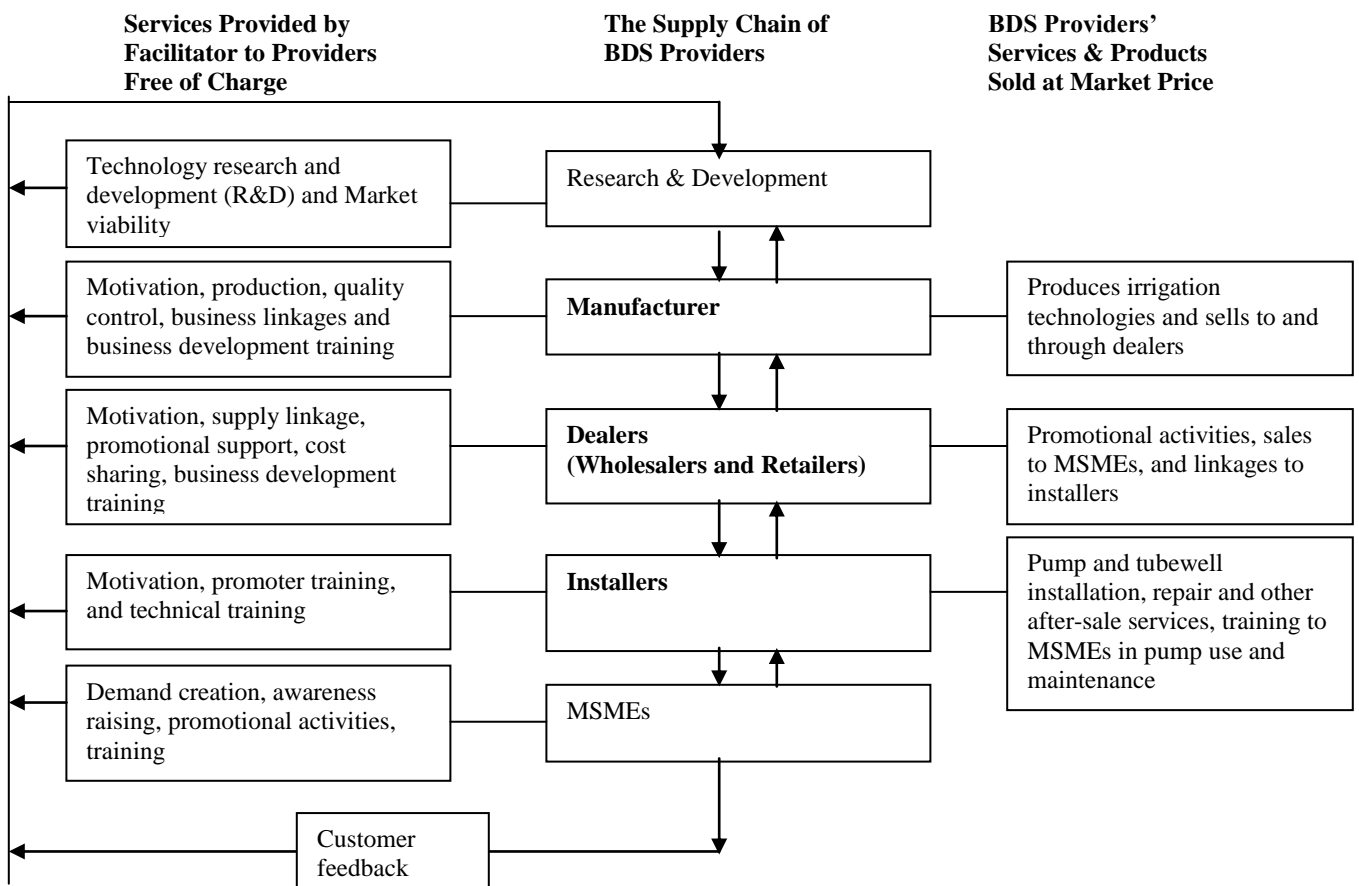
³ Other irrigation equipment includes other manual pumps such as the No. 6 hand pump and, in some instances, PVC pipe and filter for the tubewell and motorized pumps.

interdependency allows customer feedback to be integrated into product development and modification. It also ensures that information about product demand is available to all.

IDE provides another service, which is key to new product development. Commonly when a new product is developed in a country that lacks patent laws, which is most if not all developing countries, “copy cats” emerge. These “copy cats” take advantage of the new market opportunity by producing sub-standard copies priced below higher-quality products. Since the product is new, customers are unaware of the differences in quality, and yet are motivated to buy the poor-quality product because of its cheaper price. The end result, of course, is that the customer is eventually disappointed, tells his neighbors that the product is not worth buying, and thereby ruins the market for everyone.

This kind of behavior generally produces a chaotic market. To create order in the market, IDE/Bangladesh has identified market leaders, trained in the importance of quality control, used branding to differentiate high-quality pumps in the market from the low-quality copies, and launched promotional efforts to create awareness among customers about branded, quality TPs. According to IDE, both the branding of the product and this educational effort to create order in the market, while time consuming, are critical to the successful commercialization of a new product.

Figure 1: BDS Services, Providers and Facilitator



3.2 Facilitation Versus Direct Service Provision

The role of IDE/Bangladesh in TP product development and commercialization has shifted over time. IDE’s struggles with its appropriate role over the 15 years of the MAT program provide important lessons for

practitioners. IDE began its product commercialization effort in Bangladesh by exerting considerable control over the market: by selecting manufacturers, setting prices and quality standards, and wholesaling pumps produced by manufacturers to a network of dealers developed by IDE. According to a 1991 publication,⁴ the success generated by a quality product, the outreach afforded by the network of dealers, and few irrigation alternatives stimulated other producers – i.e., “copy cats” - to enter the market. As these untrained, manufacturers flooded the market with poor-quality TPs at competitive prices, IDE realized it was losing control. At this point, a decision was made to step out of the role of direct service provider and assume a role of market facilitator. Rather than competing with the private sector, IDE decided to provide marketing and technical assistance to those producers who were interested in opening up new areas or taking over from IDE existing markets. The objective became to improve quality and business practices and develop marketing networks using private dealers.

In the early 1990s, IDE began developing a new strategy that included the establishment of a wholesale company, Krishok Bhandu, Ltd. (KB), to ensure the sustainability of TP commercialization and quality control. This strategy would again put IDE in the role of direct service provider. The donor (the Swiss Development Corporation), however, contended that establishing a private company with public monies created “conflicts of interest” and refused funding for KB. IDE again reverted to the role of facilitator. Nonetheless, in 1995 Krishok Bhandu (KB) - staffed by a number of former IDE staff - established itself without SDC support. Today KB is a company of 59 staff persons with a network of 500 dealers and operationally self-sufficient. In 1999, KB sold 11,000 TPs, (and 60,000 No. 6 hand pumps) at the highest in the market. Like any business, KB maintains tight control over its prices, dealers, and producers, though KB itself is now manufacturing products.

While KB has made contributions to the BDS market, its relative lack of success with the TP and its high price for the TP suggests that IDE’s facilitative role has been more beneficial to MSMEs. Moreover, the 1999 impact study (T. Shah et al) asserts that used and lower-quality TPs are a thriving part of the market. This finding suggests that KB’s strategy of direct service provision – in order to control quality - may not, in fact, reflect the demand of the market.

4.0 The PMF BDS Market Development Indicators

4.1 Defining the Market and Market Indicators

The irrigation equipment market in which IDE intervenes is national in scope and only limited by areas where irrigation is possible. The market segment targeted includes small farmers, with landholdings between .05 and 2.49 acres of land (FAO and BSB, 1989 and 1986 respectively) and some percentage of the landless, who are either tenant farmers or share-croppers.

4.1.1 Expanding the Market for BDS

The first objective of the Market Development Indicators is to expand the market for BDS. The indicators for this objective include market size - both number of MSMEs served and the value of BDS provided - and market penetration. IDE does not collect information on MSMEs served but rather on the number of pumps sold. Some farmers use multiple pumps to irrigate their dispersed plots, and some farmers use one TP on multiple tubewells. Since the TP is mobile, farmers can use one pump on several tubewells, moving the pump from one tubewell to the next to irrigate as many as four plots. Consequently, it is difficult to know to what extent one pump represents one MSME. For the sake of this analysis, products sold are used as a proxy for number of MSMEs served.

⁴ Orr et al, 1991.

GOAL 1: OUTREACH (SCALE AND ACCESS)

ASSESSING BDS MARKETS

OBJECTIVE	Indicators						
		Market	Program				
		1998	1989-90	1991/92	1996/97	1998-99	Cumulative
Expanding the Market for BDS	Market Size: Number of SMEs purchasing services	12.5 million ⁵	32,906 48000 ⁶	98,000 195,000	71,302 127,000 ⁷	31,551 73,557	565,862 1.3 million
	Market Size: Amount of sales by BDS providers*	na	\$855,556 \$1,248,000	\$3,074,510 \$5,200,000	\$2,003,803 \$3,048,000	\$757,224 \$1,765,368	
	Market Penetration: % of potential SME market reached with a BDS		n.a.	n.a.	n.a.	10.4% ⁸	
Developing a high quality, diverse, competitive market	Number of BDS providers	n.a.	20 mfgrs 30 dealers ⁹ 75 instal's ¹⁰	n.a.	n.a.	84 mfgrs 962 dealers 2,420 instal	
	Number of BDS service-types		7	n.a.	n.a.	14	
	Well distributed, wide price range for BDS services	1999: 50 taka – 6,000 taka \$1 - \$120	1993 study indicates price range for TPs between Tk 350 and Tk 150.				
	Average price for a unit of BDS		\$9.87 ¹¹ \$26 ¹²			\$5.60 \$24	
	Number and proportion of multiple-user customers in the market		n.a	n.a.	n.a.	31%	
	Market Distortion: Average subsidy content		0%	0%	0%	0%	0%
Increasing Access to BDS services to under-served groups	Extent of Access: Number and % of SME who represent under-served groups	650,000 landless farmers who irrigate 5% of market				% landless	
	Target Market Penetration: % of potential SME targeted markets						

⁵ Estimated farmers with landholdings between .05 and 2.49 acres using irrigation equipment, based on census data, plus 10% of an estimated 6.5 million landless farmers

⁶ Alan Sauder, CIDA evaluation, 1992

⁷ Based on extrapolation.

⁸ This assumes that all pumps sold are still operating, which is unlikely.

⁹ “The Treadle Pump: Manual Irrigation for Small Farmers in Bangladesh,” by Alastair Orr, A.S.M. Nazrul Islam, and Gunnar Barnes. RDRS. July 1991 p. 26.

¹⁰ Estimated based on 1999 ratio of manufacturer to dealer

¹¹ This is for a pumphead only.

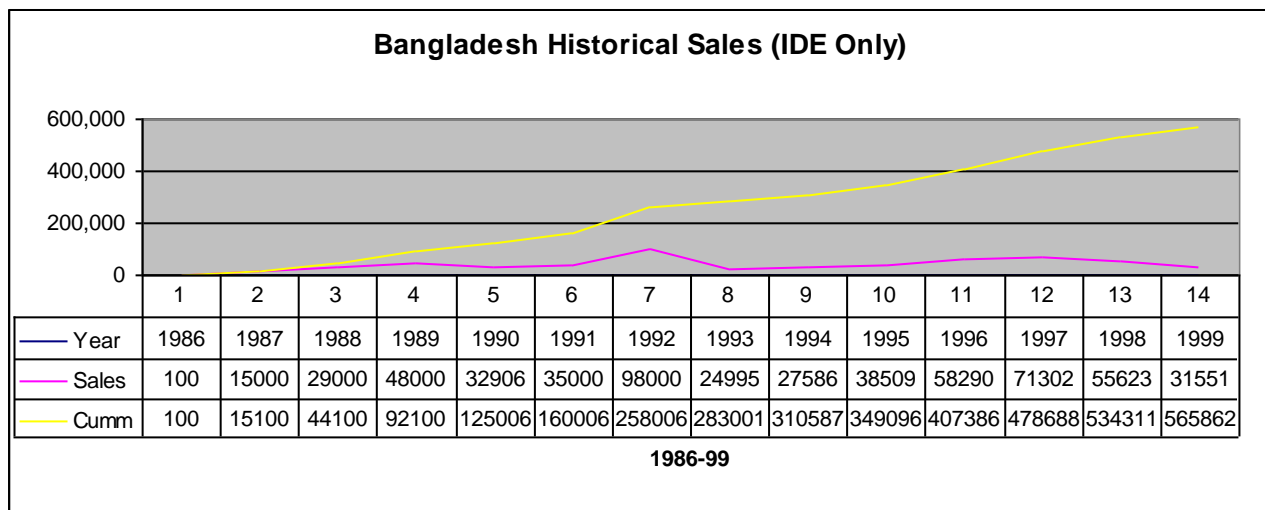
¹² For an installed pump, including tubewell, PVC pipe and filter

Even quantity of sales, however, is imprecise since IDE only collects information from BDS providers that it directly assists and who are classified as market leaders. Yet as many as 75%¹³ of all pump manufacturers receive only indirect assistance from IDE. These producers benefit from IDE's facilitation in the market, including promotional efforts and new product development. Since IDE's strategy is to facilitate rather than control the market through direct assistance (training and advertising) to market leaders, all manufacturers are beneficiaries of the MAT program. IDE simply tries to exert pressure on this larger group of producers by establishing standards for quality. This strategy has, for the most part, proven to be successful, and it is facilitative. In being facilitative rather than controlling, IDE cannot easily measure the sales of producers. As a result, total sales – that include direct and indirect – can only be estimated. This is the price of working with the private sector.

Figure 2 shows annual and cumulative sales of TPs for directly assisted manufacturers. These figures do not include sales of other pumps, sales by other NGOs, or sales by indirectly- assisted manufacturers. Only sporadic data is available for these other category of sales. In 1999, IDE/Bangladesh reported sales on seven additional products. In the 1980s and early 1990s, data is available on rower pumps, of which a cumulative of 62,000 were sold by 1992. To confuse things further, a CIDA evaluation (Sauder, 1992) estimated that indirectly-assisted manufacturers had produced a cumulative of between 160,000 and 200,000 as of 1992. And finally, IDE estimates that there were approximately 1.3 million pumps in the field at the end of 1999.

For the purpose of measuring outreach for the PMF, both the most conservative sales figures reported in Figure 2 for IDE directly-assisted sales of TPs, as well as the much larger figure. Using data from manufacturers on pumps produced suggests that the conservative number is far below the number of pumps being produced. For example, in 1997/98, manufacturers of manual pumps, including several versions of TPs and rower pumps, produced 93,000 pumps. Manufacturer data for 1998/99 is over 73,000 very close to the larger estimate for national sales. In other words, manufacturer data lends credence to the larger numbers estimated by IDE.

Figure 2



Market penetration was calculated using 1999 Bangladesh Bureau of Statistics data for farmers with landholdings between .05 and 2.40 acres using irrigation technologies. These statistics do not include landless farmers and only include the use of shallow tubewells, deep tubewells, low-lifting

¹³ Alan Sauder, CIDA Evaluation, 1992.

devices and a category called “manual technologies.” Added to this was a modest figure of 10% of landless farmers to account for tenant and share-cropper farmers using irrigation equipment. The total market size is estimated at 12.5 million. Given the 1.3 million estimate of manual irrigation sold, market penetration is at 10.4%. Clearly, IDE/Bangladesh has had a significant impact on the market for irrigation equipment.

4.1.2 Declining Sales and Competition

While IDE’s market penetration is impressive, sales figures make clear that demand for the TP is waning. The peak sales year was 1992, and while another smaller surge in sales was experienced in 1997, the longer-term trend has been downward. According to one evaluator: “There has been a significant fall in the yearly adoption rate (number of TPs installed) in the last 5 to 6 years. Farmers have switched to STW irrigation techniques. Even marginal farmers are buying water from the STW owners instead of operating their TPs. Why? Farmers wanted to free themselves from the drudgery of TP-pedaling labor. Additionally, the STW-irrigation set has become more easily available (due to the state policy of de-control) and drastically cheaper. Previously, in the late 1980s, a farmer could buy an Yanmar Japanese STW set at a price of Tk 16,500 through the state-owned Bangladesh Krishi Bank (BKB). In the 1990s, any farmer could buy a 3HP Chinese STW at a price of roughly Tk 6,000/. Farmers are now buying smaller STWs in increasing numbers.”¹⁴

IDE views the declining sales trend as a normal part of a product cycle. Underlying this declining demand, however, is a much more vibrant and competitive market than existed in earlier years. Of greatest importance is the relatively newly available Chinese 3HP STW at a cost of US \$120. Farmers able to purchase this pump can sell irrigation services to other farmers as well as irrigate their own plots. Thus potential TP owners can buy water from STW owners to save the cost and/or opportunity costs of labor. All manufacturers interviewed concurred that the Chinese 3 HP STW contributed to the declining TP sales. These manufacturers do not believe that the market for TP will disappear, but sales will not likely reach previous levels.

SDC has suggested that declining sales may also be attributable to the low profit margins in the supply chain, discussed below. Surely more competition in the market combined with low profit margins and perhaps to many BDS providers in the supply chain for the level of sales could contribute to lower sales.

4.1.2 Developing a High-Quality, Vibrant BDS Market

The second objective under the market development indicators is to develop a high quality, diverse, competitive market. This objective is measured by: the number of BDS providers, the number of service types, the distribution of prices, average price, number of multiple users, and the subsidy content of the BDS service.

In 1999, IDE provided assistance to 84 manufacturers, 962 dealers, and 2,420 installers. In 1989/90, the number of manufacturers was 20, the number of dealers 30, and the number of installers is estimated at 75. Over this same period the number of BDS services provided by providers increased from 7 to 14. In 1990, the estimated average price for an installed TP was US \$26; this average fell to US \$24 in 1999, not accounting for depreciation of the dollar. Recent interviews with several leading producers suggested that the average price does not vary widely from one manufacturer to the next due to the high level of competition, and pressures exerted by IDE-assisted market leaders. However, a 1993-impact study indicated that less than 5% of sales were at Tk 350, and over 50% of sales were for TPs costing Tk 150 or less, thus suggesting a much wider price distribution reported by manufacturers who do not receive

¹⁴ “Socio-Economic Impact of Treadle Pump Irrigation in Bangladesh,” by Dr. Mahmudul Alam, Dr. Khondakar Mokaddem Hossain, and Dr. M. Salimullah, Bangladesh Institute of Development Studies, December 1999.

direct assistance from IDE. The average price range between directly- and non-directly-assisted producers may, in fact, display a greater range than originally thought. Used TPs likely represent a lower end of the price distribution and KB TPs likely represent the highest end.

Over time, the average price – quoted by IDE - has varied only marginally. According to IDE/Bangladesh, the price of a TP pumphead (not including the tubewell installation) in 1985 was Tk 325 compared to the price today of Taka 280. During this period the exchange rate rose from Tk 33 = US \$1 to Tk 50 = US \$1. In dollar terms, the price fell from US \$9.87 to US \$5.60 over the period, this does not account for the depreciation in the dollar. At the same time, raw materials costs increased by a reported 200%. Clearly over time real prices have fallen considerably. As new manufacturers and dealers have entered the market, profit margins in the TP supply chain have been squeezed. Manufacturers earn a mere 10-percent margin on each pumphead sold.

Year	BDS Providers	BDS Products/Services
1989/90	20 manufacturers 20 dealers 75 installers ¹⁵	(1) TPs, (2) rower pump, (3) No. 6 hand pump, (4) PVC pipe, (5) PVC filter, (6) Installation, (7) repair
1998/88	84 manufacturers 962 dealers 2,420 installers	(1) TP, (2) Deep-set TP, (3) Plastic TP, (4) No. 6 hand pump, (5) Deep-set hand pump, (6) Mobile pump, (7) Animal-powered pump, (8) Drip system, (9) 3 HP motorized STW, (10) PVC pipe, (11) PVC filter, (12) 1" tubewell, (13) installation, (14) repair

According to an IDE staff person, “in 1986 the TP was a profitable product for everyone in the channel.” Presently manufacturers make about Tk 25 on each pumphead, while dealers make Taka 100 and installers average Taka 250 - 350 depending on the depth of the water table and the hardness of the soil. This Tk 250 is earned by four people working one half day. Because of the low margins earned on the pumphead, dealers make their money on the PVC pipe and filters used to construct tubewells. Even manufacturers carry PVC due to its profitability, and one manufacturer interviewed in Dhaka manufactures PVC pipes and filters.

Within the larger market, there may be tens of thousands of BDS providers involved in the production and distribution of manual irrigation equipment.¹⁶ And while census figures on irrigation equipment manufacturers could not be found, the numbers of providers have surely increased substantially over time as new products have entered the market. The number of BDS products and services related to irrigation range from the traditional swing buckets and doons¹⁷, to manual devices such as the TP, No. 6 hand pump, and rower pump, to a range of mechanized pumps. Over time, farmers have found innovative and multiple ways to use and combine these devices to create even more options than there are devices.

To illustrate, many farmers buy water from owners of mechanized pumps. Some use a mechanized pump for some crops and the TP for others; some use one TP on multiple plots; and still others, the poorest, use traditional swing buckets or doons or even a used TP. The 3HP Chinese single shallow tubewell (STW) has been added to the mechanized options, which also include German-, Indian-, and Japanese-made deep- and shallow tubewells. “A (Chinese) STW set can be utilized for irrigating dispersed plots by constructing a number of boreholes at different points. The STW machine can be

¹⁵ Estimated.

¹⁶ Krishok Bhandu, itself a manufacturer and wholesaler, has a network of 500 dealers.

¹⁷ Doons are hollowed out logs that look something like a canoe. The doon pivots on a fulcrum point, collecting water on the downswing and emptying as the opposite end downswings.

shifted to these boreholes to irrigate dispersed plots. Introduction of polythene pipe is another innovation helping farmers to irrigate distant plots from a single STW set. At the moment, the large and medium sized farmers are using TPs for seed-bed preparation before the onset of the monsoons. The TP-irrigation has made it possible to make a transition to more productive STW-based technology.”¹⁸

As the number of irrigation options available to farmers has increased, the price range for irrigation-related BDS has become more “well distributed.” While the real price of the TP has declined significantly over time, the Chinese STW offers mechanized irrigation at a price that 90% reduction in price as compared to what was previously available.

Irrigation Options for Small Farmers	Prices
Swing basket	Tk 100
Doon	Tk 500 - 750
TP (installed)	Tk 1,000 – 1,300
Renting water	Tk 3,000 per acre (fuel included) Tk 1,800 per acre (fuel not included)
Chinese 3HP STW	Tk 6,000
Japanese STW	Tk 50,000 – 75,000 though these prices are falling

4.1.3 Signs of Market Development and Outreach to the Under-Served

The PMF market development indicators reveal a vibrant and competitive market. Over time, the number of BDS suppliers has increased, the number of products has increased, the price range for irrigation equipment has broadened, and the price of the TP has declined with greater competition. As a result, the TP has moved down-market to a larger percentage of the most marginal farmers, living on the smallest segments of land or working as tenant or sharecrop farmers. While IDE does not collect data on size of landholdings (as a proxy for level of poverty) of TP owners, a 1999 social impact study¹⁴ found – based on limited interviews - that early adopters of TPs are not among the poorest. First-generation adopters tend to be the less poor, and over time, the poorer tend to “join in” and the less poor move on to mechanized pumps.

What is striking, however, is the entry of new products and new providers into the market. The Chinese 3HP STW is “causing a revolution in the market,” according to a number of BDS providers. In 1992, the TP caused just such a revolution. The 1999 social impact study suggests that the TP allowed farmers to increase their income and move up to a more labor-saving device, the STW. A number of manufacturers stated that they do not think that farmers are necessarily switching, but rather that the greater number of options in the market make the TP only one option out of many. Perhaps IDE is correct in that the TP has merely reached the end of its product cycle.

What interesting, however, is that the TP has likely – though there is no hard evidence – contributed to the vibrancy of the market, and perhaps contributed to the affordability of its greatest competitor the Chinese-STW pump. While IDE may not have set market development, defining the market broadly beyond the TP, as a goal, it may have done just that.

¹⁸ “Socio-Economic Impact of Treadle Pump Irrigation in Bangladesh,” by Dr. Mahmudul Alam, Dr. Khondakar Mokaddem Hossain, and Dr. M. Salimullah, Bangladesh Institute of Development Studies, December 1999.

¹⁴ “Pedal Pump and the Poor: Social Impact of A Manual Irrigation Technology in South Asia,” by F. Shah, M. Alam, M.D. Kumar, R.R. Nagar, and M. Singh. 1999.

4.1.4 Methodological Challenges in Using the Market Development Indicators

Before discussing the methodological challenges with using the PMF indicators, it is clear that using these indicators do lead to an analysis of the program that most studies have not addressed, i.e. BDS market development. That said, there are challenges in using the indicators. **Measuring outreach or scale** is a methodological challenge for any program that successfully facilitates market development for private BDS providers. Once the scale of outreach grows beyond a certain level, as it has in the case of IDE/Bangladesh's program, accurately monitoring sales among thousands of private producers who do not receive subsidies from the project is difficult. If IDE wants accurate and credible measures of outreach, monitoring the number of BDS providers may be worth the investment. Moreover, they may be the best source of sales data.

Data on the **distribution of price of BDS** clearly shows a progressively more well-distributed price range at the market level. At the program level, there is conflicting evidence. On the one hand, there is a reported narrow range of prices for TPs among IDE's market leaders (manufacturers); on the other hand, prices among the private producers only indirectly assisted by IDE may be considerably lower and more variable. Is this good or bad? Is a wide price range always indicative of market development? Certainly at the market level it is, but for a particular product, like the TP, it may indicate variations in quality. It may be more important, however, for the market rather than the program to offer customers a well-distributed range of BDS.

IDE has very limited data on **multiple-use customers**. Although impact studies verify that multiple-use customers are relatively common, and IDE has an estimate made at 31% for 1999, this information is not systematically collected by the IDE "Monitoring & Evaluation Department." In the case of technology products, multiple use may indicate the quality of BDS in the market, depending on the "shelf-life" of the product. However, level of sales over time is probably more indicative of quality and easier to collect.

Since IDE does not subsidize providers, it assumes the **subsidy content of BDS services** to be zero. Yet IDE does subsidize promotion, training, and new product development for its market leaders; and these are services that other providers producing irrigation equipment benefit from only indirectly. What is not clear is the impact this policy has on the BDS market. IDE is in the process of phasing out in certain areas of the country, and thus withdrawing assistance. The effect of this phase-out on IDE-assisted producers and dealers, especially in terms of the removal of promotional activities, will be telling. Can these producers maintain their earnings and their market leadership without IDE support? If promotion is truly necessary to the success of the supply chain, then perhaps it should be counted as part of the subsidy content – if not early in the product cycle then at the end of the product cycle.

Manufacturers interviewed are looking to IDE to continue to develop new products. Although new product development can be justified as a "public good" and thus appropriate for donor investments, the dependency of rural manufacturers on IDE's product development services suggests a worrisome degree of dependence.

IDE's target market is farmers with landholdings between .05 and 2.49 acres, as well as tenant and share-crop farmers. The GOB uses this definition for "small farmers," who are considered to be disadvantaged, low income, and **under-served**. IDE assumes that all of the MSMEs that own and/or operate TPs as a result of the MAP program are "under-served." Although evidence shows that a range of farmers – from medium sized to the landless - use TPs, over time TPs have become increasing within the reach of the most disadvantaged. IDE's entire strategy is aimed at identifying and developing products that are affordable to the poor. Impact studies have demonstrated that the vast majority of MSMEs served are poor. Nonetheless, IDE does not collect data, as part of its monitoring system, on **under-served**

target groups, such as women and/or landless farmers, or on the number or percentage of clients that fall within the target group defined above.

5.0 BDS Supplier Indicators

GOAL 2: SUSTAINABILITY AND COST-EFFECTIVENESS				
ASSESSING BDS SUPPLIERS				
OBJECTIVE		Indicators		
		Market	Program	
			1989-90	1998-99
Supplier Sustainability	BDS Supplier cost-recovery of operational costs from client fees*	100%	100%	100%
Program cost-effectiveness	Simplified Cost-benefit assessment comparing total program costs to aggregate program benefits for entrepreneurs	n.a.	<u>Cost/Benefit</u> IDE direct + indirect = .03 ¹⁹ ROI = 5,407% ²⁰	<u>Cost/Benefit</u> IDE direct = .14 IDE direct + indirect = .01 ²¹
	Total Program costs	n.a.	\$1,957,365 ²²	\$8,000,000
	Total program cost per customer served*	n.a.	IDE Direct = \$ 15.66 IDE direct + indirect = \$ 8.02	IDE Direct = \$ 14.14 IDE direct + indirect = \$ 6.15
	Total program cost per supplier assisted*	n.a.	\$15,600	\$2,308
	Total program cost per increase in supplier revenue	n.a.	IDE-direct = 1.61 IDE direct + indirect = .82	IDE-direct = 1.35 – 1.08 IDE direct + indirect = 59 -- .47

5.1 BDS Supplier Sustainability

BDS providers in the TP supply chain do not receive grant monies from IDE/Bangladesh; all operational costs are covered by profit margins. The margins charged for an installed pump (including tubewell and PVC pipe and filter) are very low especially for pumphead and for manufacturers. The CIDA evaluation (1992) notes the problem of low margins and attributes it to historical pricing policies. It is not clear to what extent IDE's early policy of controlling the market, and its continued presence has motivated suppliers to keep prices low. Surely increased competition from indirectly-assisted producers has had a dampening influence of prices and price margins.

BDS Provider	Average Margin
Manufacturer	Tk 25
Dealer	Tk 100
Installers	Tk 250

IDE states that margins were much larger in the 1980s, but as the real cost of producing the pumphead increased, final prices changed only marginally. Rather than increasing nominal prices to the consumer, it appears that the BDS providers assumed the increased cost of production. Interviews suggest that to make up for the low margin on the pump, both manufacturers and dealers have entered the

¹⁹ Sauder, 1992.

²⁰ "Evaluation of Marketing Appropriate Technology Phase II," by Alan Sauder, MEDA Consulting Group, October 1992.

²¹ Based on 1998 numbers.

²² Sauder, 1992

PVC pipe and filter market, where they earn larger margins. It is not clear to what extent IDE as compared to competition in the market has influenced producers to keep prices low, and to what extent this has affected TP supply and sales.

5.2 Program Cost-Effectiveness

The cost/benefit ratios indicate the very high level of cost-effectiveness of the IDE/Bangladesh MAT program. The 1992 CIDA evaluation incorporates net income to providers and MSMEs, and thus more accurately accounts for benefits. This evaluation also includes sales by providers assisted both directly and indirectly. The 1998/99 cost/benefit ratio only includes benefits to MSMEs, leaving out income generated by providers. In other words, the 1990 ratio is not comparable to the 1999 ratio. Nonetheless, both indicate a high level of cost effectiveness. A 1999 impact study did an exhaustive assessment of the net income earned by TP owners and found that farmers conservatively earn US \$100 annually. More enterprising farmers earn far more than this²³ In a country where per capita income is estimated at US \$220, even the most conservative figure is indeed substantial.

The cost per customer, cost per BDS provider, and cost per dollar increase in provider revenue are perhaps easier to calculate than the cost/benefit ratio but leave out the enormous financial benefit gained by customers. Nonetheless, if measured over time, they do provide evidence of increased cost-effectiveness. In the case of the IDE program, the decrease in cost per supplier assisted reflects a key achievement of IDE in promoting business linkages among manufacturers, dealers, and installers. The impact of business linkage services that includes the expansion of the BDS market due to the entry of large numbers of providers, earning - in aggregate – significant income, as noted by the figures for program costs per dollar of BDS provider net income.

5.3 Methodological Challenges in Using BDS Supplier Indicators

The measure for **cost recovery** includes “operational” costs. A methodological dilemma relates to what should and should not be included in this definition of “operational costs.” For example, should promotion be included as an operational cost for BDS providers, or can it justifiably be subsidized? Or can it be justifiably subsidized in the short-run but not the long run? To illustrate this dilemma, IDE/Bangladesh is beginning a process of exiting from the market. The real question regarding sustainability is whether BDS providers can and/or will be able to at least maintain reasonable and/or replacement-level sales of TP sales without IDE investments in promotion. The current strategy for sustaining promotional activities is to create associations of BDS providers to collect fees and engage in collective promotional efforts. This suggests the importance that IDE places on promotion, and the need for a strategy to exit from subsidizing this important function. Thus in calculating both subsidy content and cost recovery, it seems to make sense to include promotional costs. Doing so encourages practitioners to develop an exit plan to transfer these costs to BDS providers.

As noted earlier, the **cost/benefit indicator** only includes the financial benefits to MSME customers and not those of BDS providers. And yet the full costs of the program, that include services to providers, are compared to only a portion of all benefits.

6.0 BDS Customer Indicators

6.1 Increased Acquisition of BDS

IDE does not systematically collect data on customer satisfaction or repeat customers but rather relies on the information flow between customers and BDS providers in the supply chain for this type of

²³ For the purposes of the PMF, the more conservative figure of US \$100 was used

information. IDE did provide data on repeat customers for 1999, and the 1990 number was culled from a 1991 publication, which did not state the methodology for the ascertaining repeat customers.

GOAL 3: IMPACT				
ASSESSING BDS CUSTOMERS, MSMEs				
Objective		Indicators		
		Market	Program	
			1989-90	1998-99
Increase customer acquisition of BDS	Customer satisfaction with a BDS	n.a.	n.a.	n.a.
	Repeat customers (percent of customers that buy more than once)	n.a.	18% ²⁴	31%
Increase customer use of BDS	Percent of customers who improve business practices, as defined by the supplier	n.a.	100%	100%
Increase customer benefits from BDS	Change in Value-added (Sales-Raw materials)	n.a.	Value added per customer in 1990: \$120-400 per crop per hectare ²⁵ IDE direct + indirect cumulative value added: \$24,637,560 ²⁶	Value added per customer in 1999: \$100 ²⁷ IDE direct cumulative value added: \$56,586,200 IDE direct + indirect cumulative value added: \$130,000,000

6.2 Increase Use of BDS

While IDE has had a significant impact on business practices of BDS providers, data for this indicator was not available. As stated earlier, IDE has changed the way many manufacturers and dealers sell their products by introducing them to marketing concepts and – for manufacturers - to the advantages of selling through large numbers of dealers. By out-sourcing their sales function to dealers and concentrating on production functions, manufacturers have been able to improve their efficiency and greatly increase their outreach. Dealers, on the other hand, have improved their efficiency by using promotional activities to increase sales, though – for the most part – these promotional activities have been subsidized by IDE.

For customers or MSMEs, change in business practice – as indicated by change in cropping patterns - has also been widespread. According to a 1991 study²⁸ comparing TP adopters and non-adopters, TP adopters show a relatively more productive cropping pattern than non-adopters. For example TP adopters sampled for this study demonstrate a crop intensity that is 10% greater than non-adopters. A 1994 study²⁹ states that TP adopters grow more profitable crops – i.e. vegetables – than non-

²⁴ “The Treadle Pump: Manual Irrigation for Small Farmers in Bangladesh,” by Alastair Orr, A.S.M. Nazrul Islam, and Gunnar Barnes. RDRS. July 1991 p. 37.

²⁵ Orr et al, 1991.

²⁶ Sauder, 1992 (Shown in US dollars).

²⁷ “Pedal Pump and the Poor: Social Impact of A Manual Irrigation Technology in South Asia,” T. Shah, M Alam, M.D. Kumar, R.K. Nagar, and M. Singh.

²⁸ M. Alam and M. Salimullah, September 1991.

²⁹ “Treadle Pump and Small Farmers: A Co-operation for Self Sufficiency,” by Tahmina Haque, University of Dhaka, December 1994.

TP users. According to the 1999 impact survey,³⁰ “treadle pump irrigation’s most significant impact is probably through its impact on crop yields. This study compared differences in yields for TP owners, diesel pump owners, and “pumpless” smallholders and for different crops. TP owners’ yields were consistently greater than those of pumpless farmers; and in some regions and for some crops yields for TP owners exceeded those of diesel pump owners. TP owners were particularly successful with vegetable crops, out-competing diesel pump owners. A 1995 study in India confirmed the 1991 study in Bangladesh indicating that “while the treadle pump’s beneficial impact varies by region, the central benefit of TP adopters is a significantly higher land-use intensity compared to both diesel-pump owners and those who buy water from diesel pump owners.

6.3 Increased Customer Benefits from BDS

As stated earlier, the 1999 estimate for average net income earned by TP owners is US \$100. This average is proffered by IDE and confirmed by the 1999 impact study. A 1999 study in Nepal shows that for nearly 40% of adopters net income increases due to the TP range from US \$50-70, for another 40% it is in the range of US \$70-110, and for another 20% enterprising adopters it is in excess of US \$110. This pattern was also found in Bangladesh and India (T. Shah, 1999). It seems that household-level income takes two forms: less enterprising poor who use it to bring surplus family labor under productive use (including women); and more enterprising poor who use the TP to transition from subsistence farming to commercial farming. One of these “enterprising TP owners in Bangladesh grossed US \$1,600, invested US \$350 in inputs, and some 400 person days of labor.”

6.4 Challenges in Using BDS Customer Indicators

For the most part the BDS customer indicators are straightforward with the exception of “change in business practice.” This is a subjective and/or qualitative measure that is more accurately reflected in value added. If a change in business practice does not contribute to increased value added then it was not a beneficial change, though such a change might take time to show up in increased value added or profit.

7.0 Implications for Best Practices

The IDE program provides a historical view at product development and commercialization offered by few BDS programs. It has also reached a level of scale and outreach achieved by few. As such, it offers an opportunity to explore conceptual ideas about BDS market development, which by its nature requires a long time horizon. Among the lessons for best practices provided by IDE’s experience are:

- **Facilitation results in market development over the long run and higher impacts for MSMEs**
IDE’s experience as both facilitator and direct service provider offers lessons about the strengths and weakness of practitioners taking these different roles. While there is still debate, certainly at KB, about this topic, IDE – in the mind of the author – has had a greater impact on MSMEs and the BDS market as facilitator than as direct service provider. At the same time, IDE’s experience raises some questions about this debate between facilitator and direct provider role – that is very central to the way many practitioners operate in the BDS field. Many practitioners engage in direct service provision. Some have – like KB – established private companies to act as BDS providers. Is direct service provision always a bad thing? Are there instances, where it can be justified? Are there times and places where direct service provision can be justified as long as the impact on the market is positive and the facilitator has a clear exit plan?

³⁰ T. Shah et al, 1999.

Earlier, this paper discussed the problem of a chaotic market when introducing a new product. If, in the beginning, there are too many poor-quality products in the market and the prices are too high, then the product may never be taken up with any enthusiasm. Does it make sense to assume the more controlling role of direct service provider at the initial stages and then exit to the facilitator role as sales take off?

- **As facilitator, practitioners should promote order in the market to prevent a downward spiral of quality, price, and market demand.**

At the beginning stages of new product commercialization, IDE posits that facilitators should exert pressure on the market to create order. In their efforts to take advantage of new market opportunities, “copy cats” can have a destructive impact on the market. If copy cats flood the market at the early stages of product commercialization with poor quality products priced to compete with higher quality products, they can cause a downward spiral that destroys efforts to stimulate demand. To prevent this downward spiral of quality, price, and market demand, facilitators need to use educational and promotional efforts coupled with assistance to market leaders to counteract market chaos and instill market order.

- **As facilitator, practitioners should support market leaders that lead by setting proper business practices and by establishing quality – against which everyone else in the market is measured**

Support to market leaders can be in the form of advertising, training in marketing and quality control, and business linkages to achieve outreach. These market leaders can be instrumental in stimulating demand for a product. However, facilitators need to be aware that too much control for too long can also dampen demand. Customers should be able to choose the price-quality combination that best meets their needs.

- **Let the market decide how much quality for how much price.**

The 1999 impact study (T. Shah et al) argues that IDE’s strategy in India that includes tight control over the market for the purposes of maintaining strict quality control may, in fact, hamper the growth in sales. This study hypothesizes that customers are more responsive to price than quality, and uses evidence from a 1993 study showing that the bulk of the buying in 1993 was in used and lower-quality TPs selling significantly below the price of higher-quality TPs. On the other hand, IDE along with a number of manufacturers maintain that quality is important, and thus IDE has taken the position of supporting market leaders, who set the bar for quality. Perhaps there is a middle ground, where the quality is good enough and price is low enough to attract more buyers than a very high-quality product. KB’s and IDE/India’s strategy of maintaining control over the market may, in fact, dampen this negotiation between price and quality, which allows customer to decide how much quality they are willing to sacrifice for price.

- **As facilitator, practitioners should work with a number of BDS providers to achieve leverage over the market.**

In the early stages of product development, practitioners should work with diverse manufacturers so as not to create a monopoly or dampen competition, on the one side, and to exert leverage over price and quality, on the other.

- **As facilitator, practitioners should gauge how many BDS providers the market can support**

If facilitators work with too many providers, there may not be sufficient profit to make the product sufficiently profitable and attractive for any one provider. The end result is that providers will not invest in the product.

- **Facilitation is not a silver bullet for BDS market development.**
While IDE’s experience suggests the wisdom of facilitating rather than providing services directly, IDE staff asserted that facilitation is not a silver bullet to best practices. Market facilitation requires substantial skill that may be more art than science. Knowing when to exert control over the market – so as to prevent “a downward spiral” in quality, price, and demand, and when to exit from control to allow the market to develop on its own requires excellent business acumen.
- **In the long run, should the costs of promotional activities be borne by BDS providers?**
SDC argues that subsidizing promotional activities can be justified, since microenterprises cannot be expected to afford these costs. This argument makes a lot of sense at the initial stages of product development. Promotional activities are educational, awareness building, and thus could be considered a “public good.” But if promotional activities are important to maintaining MSME sales, in the long run, BDS providers will have to pay for them. In the case of the TP, for instance, if BDS providers are unwilling and/or unable to pay for promotional activities after IDE phases out its assistance, what will happen to the TP market? At this point, IDE does not have the answer to this question. An argument can be made, however, that these cost must eventually be transferred to the BDS provider for purposes of long-term market development.
- **An exit strategy is important from the beginning.**
Fifteen years ago, when the MAT program was launched, IDE understood that exiting would eventually be required. However, a clear and articulated plan for exit was never developed. An exit strategy is itself an experiment that requires time and planning. IDE is currently in the midst of this process.

The above recommendations for “best practices” focus largely on the role of facilitation, however, IDE’s greatest success has been in BDS market development and the achievement of scale. When asked about “best practices” for achieving scale, the following “best practices” were offered:

- **To achieve massive scale requires a product that is affordable, locally serviceable, simple to operate, and culturally acceptable.**
Most practitioners involved in product development and commercialization agree that affordability is important, but what is affordable? IDE defined the term “affordable” as follows: the product should cost no more than 10% of the annual income of the target group and must be able to pay for itself very quickly. IT was suggested that microentrepreneurs should be able to double their investment within one year.
- **Market segmentation is necessary to ensure that the product price is affordable to the majority of the target market.**
- **Marketing that creates awareness, interest, desire, and action (AIDA) is key to stimulating demand.**
- **A strong customer focus is key. A decentralized distribution system is important to creating strong links to customers.**
- **After-sales services must be available locally.**

8.0 Implications for Donor Interventions

- **Investment in the development and commercialization of products for the poor requires a long time horizon.**

IDE's facilitation of the BDS market for irrigation equipment targeted to the poor has required a 15 years. While 15 years is a long time for any donor, the pay-off for SDC and the impact on MSMEs has been substantial as indicated by the cost benefit assessment. As facilitator, IDE has changed business practices of providers, introducing them to advantages of working through a network of dealers and to marketing techniques for stimulating demand. The introduction of TPs to the MSMEs has had a significant impact on cropping patterns and intensity and farmer incomes. And while the market for TPs may be waning, the impact on farmers has expanded. As a result of higher incomes, some farmers have been able to adopt even more labor-saving options for irrigating.

- **Donors should invest in the development of new products that help the poorest farmer graduate to a higher level of income and productivity.**

In many developing countries, the poor rely on traditional technologies – existent for hundreds of years - for adding value to primary products. In many instances, the next least expensive option is far outside the reach of the poor. Donors should invest in developing intermediate products that allow the poor to move up the income ladder.

- **Donors should subsidize R&D to develop products targeted to the poor in productive sectors.**

In the past, donors spent substantial money on product development with little success. In many instances, product development was driven by engineers rather than by the market. The customer needs to be at the forefront of the product development process. IDE uses a nine-step process that is not very different from what many organizations use, though perhaps in practice it is. Nonetheless, the IDE experience makes clear that “affordable” is often a much lower price than many practitioners are willing to accept.